

# Manhattan Episode Guide

Episodes 001-023

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# Contents

<b>Season 1</b>	<b>1</b>
1 You Always Hurt the One You Love . . . . .	3
2 The Prisoner's Dilemma . . . . .	7
3 The Hive . . . . .	11
4 Last Reasoning of Kings . . . . .	15
5 A New Approach to Quantum Cosmology . . . . .	19
6 Acceptable Limits . . . . .	23
7 The New World . . . . .	27
8 The Second Coming . . . . .	31
9 Spooky Action at a Distance . . . . .	35
10 The Understudy . . . . .	39
11 Tangier . . . . .	43
12 The Gun Model . . . . .	47
13 Perestroika . . . . .	51
<b>Season 2</b>	<b>55</b>
1 Damnation Memoriae . . . . .	57
2 Fatherland . . . . .	61
3 The Threshold . . . . .	63
4 Overlord . . . . .	65
5 The World of Tomorrow . . . . .	69
6 33 . . . . .	71
7 Behold the Lord High Executioner . . . . .	73
8 Human Error . . . . .	75
9 Brooklyn . . . . .	79
10 Jupiter . . . . .	83
<b>Actor Appearances</b>	<b>87</b>



# **Season One**



# You Always Hurt the One You Love

Season 1  
Episode Number: 1  
Season Episode: 1

Originally aired: Sunday July 27, 2014  
Writer: Sam Shaw  
Director: Thomas Schlamme  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Daniel Stern (Glen Babbit), Eddie Shin (Sid Liao), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: David Harbour (Reed Akley), Mark Moses (Col. Alden Cox), Daniel London (J. Robert Oppenheimer), Josh Cooke (Lancefield), Carole Weyers (Elodie), Ben Hall (Joey Isaacs), Miles Hall (Joey Isaacs), Lonnie Lane (Driver), Beth Bailey (Fay), Brian Denk (Day laborer), Roberto Earlywine (X Site Worker), Tara Elliott (Computer Woman), Corinne Fox (Brothel girl), Billy Fuessel (Contractor), Noel Green (Scientist), Daniel Madison Hart (Military Private), Catherine Haun (Dot), Jonathan Hubbard (Scientist), Chadwick Johnson (Scientist), Colin Jones (Wayne), Murad Kirdar (Scientist), John F. Kollar (Scientist), Michael A. Kuhn (Military Police), Steve Larese (Scientist), Fran Martone (Akley's Secretary), Kenneth Miller (Purcell), Rodney Nagel (Scientist), Will Ontiveros (Scientist), Philip David Pickard (Robert Bacher), Kristen Rakes (Wilma), Rachel Katherine Ross (Housewife), Bernardo P. Saracino (Acevedo), Rafael Torrez (Scientist), Courtney Walsh (Housewife), Dylan B. Warren (Military Police), Barry R. White (Military Policeman), Jaron White (Military Policeman), Rebekah Wiggins (Gladys)  
Summary: Charlie Isaacs and his family arrive in Los Alamos and attempt to navigate a community built on secrets. Frank Winter, the head of the Manhattan Project, struggles with the sacrifices he is making to help the U.S. win World War II.



The pilot opens on July 2, 1943, 766 days before the bombing of Hiroshima. We see physicist Frank Winter practicing midnight golf swings in the desert, in the midst of a wind storm, as the radio recites the names of the US soldiers killed that day overseas. Staring at a golf ball and thinking about its structure, he has an insight that could solve a knotty issue with the "Gadget" being designed at the fledgling Los Alamos National Laboratory — little more than a makeshift military outpost in these early days — and rushes back to base to test it out.

Specifically, it takes a year to manufacture the weapons-grade plutonium needed for the bomb. Winter's insight comes from pondering what makes a golf ball fly: its dense, compacted core. And he hypothesizes that if one could

super-compress the core of the bomb, that higher density would mean they would need less plutonium — and hence less time. Time is what young soldiers don't have, after all. Reducing that time even by just a few days could save lives, in Winter's mind.

Meanwhile, we meet Charlie and Abby Isaacs, a young Jewish married couple en route to Los Alamos. Charlie is another brilliant physicist, a recent PhD, lured to the project by the prospect of making his mark on science, while Abby just wishes he would accept a job offer from her father already, rather than dragging her and their young son out to the desert. Their first glimpse of the Los Alamos site does nothing to allay her concerns. As a worker tells Charlie, it's just Post Office Box 1663: "No name, no street signs. Welcome to nowhere."

The pilot deftly sketches out the key conflicts at play. For instance, there are two teams with two different designs for the bomb, competing for director Robert Oppenheimer's approval, and lab leaders with vastly different personal styles. Ackley is dapper, clean-shaven, politically savvy, and the clear frontrunner in the game, compared to the stubbled, scruffy underdog, Winter. (Charlie Isaacs is quickly snapped up by Ackley.)

There is also conflict between the military officers and soldiers and the working scientists, further inflamed by wartime paranoia and the need for utmost secrecy. A colonel suspects someone in Winter's lab is selling state secrets — an act of treason — although it's more a case of a young Chinese scientist, Sid Liao pocketing a couple of patent designs in hopes of selling them after the war is over. He has a sick child at home, with mounting medical expenses. Winter doesn't immediately report Liao, which puts his good name in jeopardy.

The highly classified nature of the work — apparently even the vice president of the US doesn't know its true purpose — means mail is monitored, living quarters are bugged, and the scientists can't share any details about their work with their wives, straining some of those relationships.

The period detail in the series is exquisite, from the clothes, technology, and cars, to the rough-hewn outbuildings housing the scientists and their families — not to mention the restrictive class and gender roles. Local natives, several of whom don't speak English, are bused in to act as household servants. Women are wives, or daughters, or secretaries, or "computers" — young women hired specifically to crunch numbers as needed for the busy scientists, persuaded to sometimes put in overtime in exchange for nylons (notoriously in short supply during World War II).

There are exceptions: Winter's lab has one female scientist, and his wife Liza is also a scientist, as we learn when she complains of the poor quality of the produce available on-site. The military officer in charge dismisses it as poor soil and snottily tells her that while her husband might be a brilliant scientist, that ring on her finger doesn't make her an expert in produce. Which is when Winter appears and says, "No, but a PhD in botany does." Oh snap!

Her expertise, I suspect, will prove relevant later on. She's already noted the presence of purple chrysanthemums (they're supposed to be white), which has her wondering about just what's going on with that soil. It also inspires a lovely speech, as tension grows with her secretive-yet-clearly-tormented husband, in which she weaves a metaphor for their marriage using a rare purple orchid she studied, that can thrive in almost any conditions — provided it has its partner, another organism that attaches to its root, thereby forming its own little ecosystem. (Her more literal-minded husband kind of misses the point.)

The pilot mostly hints at the dangerous nature of the research; the realities of radiation poisoning will likely feature prominently in subsequent episodes. During a medical checkup for his nightmares, Winter is screened by a Geiger counter and given a clean pass. Liao gets drunk at the Fourth of July Party and has to be forcibly removed, ranting about how those with families could lie to their wives and let their children go to school "right next to it." And Charlie Isaacs mysteriously vomits mid-calculation, and later gets a nose bleed.

There's plenty of foreshadowing of the inevitable human toll of a detonated nuclear bomb as well. It's the source of Winter's nightmares, and young Charlie also wrestles with his conscience. In one scene, he tells Winter the story of the Golem: a rabbi in Prague created the creature from soil and breathed life into it so it could serve as a protector of the Jewish people in that city. But he couldn't control his creation. First the Golem killed their enemies, and then it turned on the Jews themselves. "And how many Jews do you think are left in Prague today?" Winter counters. That's the ethical quandary. Young men are dying daily on the battlefield, with no end in sight, not to mention the systemic execution of the Jewish population throughout Europe. Whoever wins the race to build an atomic bomb wins the war, with devastating consequences.



By episode's end, Oppenheimer has decided to give the bomb design to Ackley (a design code-named "Thin Man" — which really was a project at Los Alamos, although it was later abandoned. (The two famous bombs dropped on Hiroshima and Nagasaki were dubbed "Fat Man" and "Little Boy.") Winter's lab has been stripped and his team dispersed to other assignments around the country. Poor drunken Liao has been summarily kidnapped and held for interrogation. We can assume it will not be pleasant. To placate Abby, who is distraught that Charlie has committed to Los Alamos for the duration of the war, he tells her about the top-secret "Gadget" — except he might have deliberately misled her. When Abby lets slip to the other wives that she knows something about her husband's work, she tells them it's a cutting-edge radar system.



# The Prisoner's Dilemma

Season 1

Episode Number: 2

Season Episode: 2

Originally aired: Sunday August 3, 2014  
Writer: Sam Shaw  
Director: Thomas Schlamme  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Daniel Stern (Glen Babbit), Eddie Shin (Sid Liao), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Travis Armstrong (Moss), Ryan Jason Cook (Stanhope), Jonny Coyne (Alek Barrath), Christopher Dempsey (Falkoff), Stafford Douglas (Thatcher), Tara Elliott (Computer Woman), Noel Green (Scientist), Travis Hammer (O'Byrne), Daniel Madison Hart (Military Private), Jonathan Hubbard (Scientist), Chadwick Johnson (Scientist), Murad Kirdar (Scientist), John F. Kollar (Scientist), Michael A. Kuhn (Military Police), Steve Larese (Scientist), Mark Moses (Col. Alden Cox), Rodney Nagel (Scientist), Philip David Pickard (Robert Bacher), Sam Quinn (GI #1), Hank Rogerson (Military Policeman), Rachel Katherine Ross (Housewife), Rafael Torrez (Scientist), Courtney Walsh (Switchboard Operator), Dylan B. Warren (Military Police), Nate Warren (Vidders), Barry R. White (Military Policeman), Jaron White (Military Policeman), Jefferson White (Iowa)  
Summary: A special shipment of the first sample of plutonium arrives at The Hill — one that could change everything. With the future of his team up in the air, Frank knows that having some of the precious material could make all the difference. As Frank desperately tries to keep his team alive, he learns that Liao has been detained by a covert outside party. Meanwhile, Liza helps Abby find creative ways to survive life on The Hill. As the wives grow closer, competition escalates between Frank and Charlie in the lab.



We open with a nervous young man washing the sweat and grime from his face in a dingy diner bathroom, a seemingly innocuous orange crate by his side. There is an insistent knocking on the bathroom door. Your average person might show irritation at being rushed, but this guy looks panicked, and produces a handgun, concealing it behind his back as he cracks open the door to reveal — the janitor. He hastily stuffs the gun into his pocket and heads back to his table, tense and secretive. It turns out he's on a mysterious government mission, delivering... something... to a re-

mote site via taxi, because he can't drive. ("What kind of grown man can't drive a car? You Amish

or somethin'?" the driver asks. "I'm from Brooklyn," is the terse reply.) We never see what's in the crate, but it certainly isn't Valencia oranges. When the driver presses his passenger, he's told it's Pandora's Box.

That remote site turns out to be the military camp that will one day become Los Alamos National Laboratory. We find the collected inhabitants watching an excruciating amateur performance of *The Wizard of Oz*. Frank Winters, the beleaguered head scientist who faced the closure of his lab in the pilot, is in the audience, and notices some surreptitious whispering among his superiors in the shadows. As he and Liza, his highly educated wife, head back home, he is met outside by Helen Prins the lone female scientist on his team. She's just had word from the tech department: "We're not getting any."

"Any" refers to plutonium-239 (Pu-239), a newly synthesized isotope that is crucial to achieving an atomic bomb. It turns out that Frank has managed to salvage (most of) his team and his lab by turning over one of his physicists, Sid Liao, to the Army. Liao is being charged with treason for pocketing some papers on his own optics-based research, hoping to sell the patents to Eastman-Kodak after the war the is over to pay for his daughter's medical treatment (she has melanoma).

In exchange for Liao, the military overturns the decision to close Frank's lab, but his team can't very well make much progress on their work without the coveted Pu-239 — "the most valuable substance on Earth," according to one senior scientist. Thanks to the nervous young man from Brooklyn, they now have 150 micrograms — 1/100th the mass of an eyelash — and all Frank wants is 10 micrograms. But Ackley's team (working on a plutonium gun-type nuclear bomb dubbed "Thin Man," as opposed to the implosion-based design touted by Winter's group) gets it all — a transparent attempt to shut Frank out, since they can't outright fire him.

It's worth a brief segue to explain the physicists' reverence for their smidgen of Pu-239. (Ackley calls it "the isotope that launched 1000 ships.") As I wrote in a 2006 blog post, our entire observable world is made up of the first 90 or so elements in the periodic table, and most of those were formed in stars. It takes explosive energies on a par with large supernovae to produce the heaviest elements. But scientists managed to produce new heavy elements in the laboratory, beginning in the 1940s with neptunium and plutonium (Elements 93 and 94, respectively), thanks to the efforts of physicists Glenn T. Seaborg and Edwin McMillan. The physicists on the Manhattan Project were primarily interested in an isotope of plutonium, Pu-239, which boasted a longer half-life and just the right spontaneous fission rate to set off the chain reaction needed in the "Thin Man" bomb design — or so everyone thought at the time.

The catch: it was an expensive, laborious procedure to separate this isotope from uranium fueling slow nuclear reactors — initially housed at a site in Oak Ridge, TN, with production later extended to Hanford, WA and Los Alamos itself. Pu-239 was more precious than gold to the physicists on the Manhattan Project. So Frank really, really wants some of that precious isotope, and starts scheming for a way to get his hands on some.

Frank's secret weapon: Helen Prins, who sneaks into the Ackley lab one night when Ackley's wunderkind Charlie Isaacs is working late on his own. Charlie has been having moral qualms over building a bomb, only to be told by his boss, "I want you to be happy, but I need you to be helpful. Doubt is a luxury we cannot afford." Translation: suck it up, kid, or you're outta here. Plus his wife hates living on a military base rife with secrets and constant violations of their privacy. So Charlie's not having a good day.

Enter Helen with a made-up sob story about how she was sent to retrieve some Pu-239 for an all-night test and she'll probably be fired because she's late, on account of a phone call with her long-distance boyfriend. "Well — ex-boyfriend," she chokes, adding, "A girl with a PhD is like a monkey with a harmonica." (If the science thing doesn't work out, Helen has a bright future as an actress.) Charlie comforts her with a tale of a woman in grad school who could solve LaGrangian equations in her head. And being a nice guy, he unlocks the storage cabinet for her.

By now it's pretty clear Charlie landed in the wrong research group, apart from his antagonism towards Winter for rejecting his paper that one time. There's a cute bonding moment back in the Winters lab, when Charlie and a couple of the other scientists make a back-of-the-envelope calculation of the likely strength of gravity on Superman's home planet of Krypton. (Nerds — amirite?) It doesn't last long: Ackley flunkies burst in, demanding their isotope back — and they're really pissed at poor unsuspecting Charlie.

Ackley and Winter hash it out in front of their superior, another fictional physicist I've dubbed

Pseudo-Fermi. (The actual Enrico Fermi was crucial to the atomic bomb effort, but in 1944 he was based in Chicago, heading the plutonium effort. The character just reminded me of him.) Pseudo-Fermi makes a deal with Winter: if he can demonstrate the feasibility of his implosion design by the next day, he can have some Pu-239. And the race is on!

Meanwhile, things haven't been going so well for poor Sid Liao, confined in a bare room with no windows under armed guard, at the mercy of a mysterious interrogator. The Inquisitor doesn't seem to be buying his (truthful) account of why he took those top-secret papers home with him. When Liao demands an attorney, per his constitutional rights, he's informed that this base is not considered part of the United States, and thus the U.S. Constitution doesn't apply.

Eventually The Inquisitor reveals that he's actually targeting Frank Winter, and he's offering Liao a deal: tattle on Frank, and he might just be pardoned. He leaves him to think it over with a parting "Try to get some sleep." This turns out to be more of a taunt: the lights turn to full strength and music blares as a despairing Liao tries to cope with the psychological mind games.

And now it's time for the dinner party from hell! While Frank Winter and Charlie Isaacs grow ever-more-hostile towards one another, their respective wives have been bonding. Liza finds a tearful Abby trying to salvage what's left of her grandmother's lace curtains after her crappy government-issue stove catches a fire. If Abby uses official requisition channels to request a replacement hot plate so she can cook for her family, or even just make tea, it will take the duration of the war. So Liza hatches a plan. She purloins a stack of sanitary napkins (also in short supply during WWII) and gives them to one of the local workers in exchange for a handful of peyote buds. She instructs Abby to trade the peyote to the requisitions officer (a peyote fan) to fast-track a new hot plate — and invites the Isaacs over for dinner that night, offering her teenaged daughter Callie's services as a babysitter.

It must be said that Callie is a very bad babysitter, drinking their booze, going through Abby's drawers and trying on her jewelry — and of course, she finds the peyote, with predictable, if harmless, results. At least Callie had a pleasant trippy evening.

Chez Winter, the gathering is pleasant enough until a distracted and cranky Frank comes home and proceeds to demonstrate appalling social skills, casting a pall over the dinner conversation. When the two women repair to the kitchen, Charlie confronts Frank, declaring, "You're afraid I'm the meteor that will make you go extinct." To which Frank snipes, "What is it with little boys and dinosaurs?" The conversation goes downhill from there, until Frank tosses Charlie's jacket out the door and says, "Get home safe." He tells the horrified Liza that he doesn't want the Isaacs in their home. Liza begs him to confide in her — she guesses there is a crisis at work — but he shuts her out again. The odds aren't looking favorable for the Winter marriage.

Social faux pas and a pissed-off wife are the least of Frank's worries, as things are rapidly coming to a head on two fronts: the clock is ticking both for his implosion proof-of-principle test in the desert, and for Sid Liao. Stricken with guilt, Frank pulls a few strings to free Liao by drafting him into the army. The idea is that after an accelerated training period, Liao will go to the front, and his scientific training will land him a far less dangerous job as a radio operator. It won't be pleasant, but it will be better than imprisonment or execution for treason.

Alas, if Frank wants to save Liao he has to leave the test site right when his team needs him most. He gets back just as the test concludes — but there is no implosion effect, meaning the test has fizzled. Most of Ackley's team show up for the spectacle and indulge in a bit of gloating over the failure. But Charlie finds a scrap of paper with some of the calculations used among the debris, and is intrigued. He starts working on the problem himself.

Worse is yet to come. When Frank explained his scheme to Liao, the scientist was initially grateful, and then realized it was Frank who sold him out. The shock of the betrayal leads to tragedy. Instead of escaping and catching the assigned train, Liao tells his guard to call back The Inquisitor, insisting he's now ready to talk. Except he steals a gun from the guard and escapes in a car, only to be stopped at the gate because he doesn't have a pass to leave the base. He begs to be let through anyway, but is ultimately shot and killed when a soldier spots the gun next to him on the seat. And all hell breaks loose on the base.



## The Hive

Season 1

Episode Number: 3

Season Episode: 3

Originally aired: Sunday August 10, 2014  
Writer: Nathaniel Halpern, Lisa Melamed  
Director: Christopher Misiano  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Daniel Stern (Glen Babbit), Eddie Shin (Sid Liao), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)

Guest Stars: Josh Cooke (Lancefield), Stafford Douglas (Thatcher), Tara Elliott (Swing Dancer), Noel Green (Scientist), Travis Hammer (O'Byrne), Daniel Madison Hart (Military Private), Catherine Haun (Dot), Jonathan Hubbard (Scientist), Chadwick Johnson (Scientist), Murad Kirdar (Scientist), John F. Kollar (Scientist), Michael A. Kuhn (Military Police), Steve Larese (Scientist), Sarah Minnich (Vera), Mark Moses (Col. Alden Cox), Rodney Nagel (Scientist), Vivian Nesbitt (Col Cox's Secretary), Matthew Page (Private Weaver), Philip David Pickard (Robert Bacher), Rachel Katherine Ross (Housewife), Rafael Torrez (Scientist), John Trejo (Zeller), Courtney Walsh (Switchboard Operator), Dylan B. Warren (Military Police), Nate Warren (Vidders), Carole Weyers (Elodie), Barry R. White (Military Policeman), Jaron White (Military Policeman), Jefferson White (Cole 'Iowa' Dunlavy), Rebekah Wiggins (Gladys), Eric Vincent (Scientist)

Summary: As the news of Sid's death reverberates through the compound, the base begins cracking down on security on The Hill, which creates new complications for the scientists' work. With all files and case studies on lockdown, Frank's team is locked in an uphill battle to resolve the Implosion experiment without Sid's expertise, leading Frank to resort to creative measures. Meanwhile, Charlie grapples with unsettling feelings about his group and Abby starts a new chapter. Elsewhere, an MP looks for penance for his actions.



Colonel Cox is particularly paranoid. He arranges a conversation with Private Cole Dunlavy — the soldier who panicked and shot Liao because he thought the scientist was reaching for the gun on the passenger seat of his car — at an isolated watering hole far from base ("The walls in the base are so thin they don't need ears."). Dunlavy is wracked with guilt over having taken a civilian life, and half expects to be discharged. Instead, Cox promotes him and gives him a position in his own office, in exchange for sticking with the official military story. He's to testify that the military found classified files

under the seat of Liao's car — a lame attempt to justify a civilian shooting, but one that will likely prove effective, if nobody asks too many probing questions.

Meanwhile, Frank Winters is battling dueling demons: guilt over his role in Liao's demise, and anxiety over whether he can salvage the research for which he sacrificed his best mathematician. He is pondering the remnants from his failed implosion test in the desert, when a box is dropped off at his office door. It holds the late Liao's personal effects, but Frank is struck by what's missing: all of Liao's papers, specifically his work on the shock wave analysis of the TNT at the core of the detonated test bomb, a crucial element to Frank's implosion design.

It will be difficult to determine what went wrong with the test without those numbers. Ackley's group has done similar studies — but what are the chances Ackley will hand them over, especially with the new compartmentalization policy in place? First Frank tries the direct approach, an appeal to Ackley. He bribes a guard with ration stamps to get Ackley to meet him, and gets Charlie instead, who tersely informs him that his boss "doesn't take walk-ins."

Charlie won't hand over the reports either — not because Frank insults him at every turn and throws "a lousy dinner party," but because he doesn't want to get fired for violating the new security rules, especially after Frank's team tricked him into giving them plutonium. And he admits, "As much as it galls me to say it, implosion is an elegant solution." This ticks off Frank even more; he declares Charlie "worthless" and a coward. Charlie fires back: "And you're a self-righteous old man on his professional deathbed." Burn! I swear, the snotty exchanges between these two are worthy of a *Real Housewives* cat fight. Frank tells Charlie to "watch out for the man on his death bed, because he's got nothing to lose," adding, "Ackley might not know what you really are, but I do." Hmmmm.

Frank's team does their best to duplicate Liao's work, but as one scientist points out, "That guy could get through a differential equation faster than I can get through a hamburger." This prompts some bittersweet reminiscences of Sid Liao's time in the lab, including the spurs he bought in Santa Fe because he dreamed of being the first Chinese cowboy. (He even played Custer in an on-base re-enactment of Custer's last stand.)

Anyway, Frank goes back to the implosion test site to try and recreate Liao's calculations himself. "It should have worked, this math is flawless!" he tells his colleague and mentor. Frustrated, he starts scheming for another way to get his hands on that data — which means going over Ackley's head and appealing once again to Cox. Except this time he won't find the military man so receptive: the colonel flatly refuses to see him. Frank storms out, but the newly promoted (and still guilt-ridden) Private Dunlavy overhears the whole exchange.

It's no wonder Charlie is a bit testy. He hasn't really bonded with the other scientists in the group, who tease him for working too hard: "This office is Everest. Stop acting like a sherpa." But Charlie is the conscientious genius, and Ackley has assigned him a seemingly impossible task: calculating the neutron velocity distribution of a plutonium bomb.

"The velocity distribution of neutrons is a critical part of understanding if your bomb will work and how big it needs to be," Saltzberg told Roxanne Palmer in an article at the World Science Festival blog. "Every time a neutron induces fission of plutonium it releases 2 or 3 more neutrons. You need at least one of these neutrons to induce another fission to have a chain reaction. Moreover, you actually need even more than one of them to induce another fission in order to have a chain reaction that grows exponentially with time— as in the bomb. Knowing the velocity of every neutron, and whether they are near the edges where they can escape, hence the distribution as a function of radius, would be something that they would have to know, but also very difficult to calculate."

Suffice to say, Charlie's assignment is "nontrivial," as they say in physics. He finally snaps when his office mates chide him at the end of the day for having done nothing but stare at the blackboard. "Physics is 90% thinking, 9% writing, and 1% talking," he retorts. "I've never met so many One-Percenters in my life."

Oh snap! He's channeling his Inner Real Housewife again. When told he'll end up like Frank Winter — "another tortured genius who pisses on everyone from his high horse" — and he should join the group or join up with Winter, Charlie proceeds to humiliate them all by going from blackboard to blackboard and solving in a few minutes the calculations they've been struggling with for weeks. He dismisses them as "vacuous, the empty space between stars," concluding, "There is no group. There is Reed Ackley and there is me." It's the first time we've seen just how smart Charlie really is — the other scientists aren't anywhere close to his league — and why



Ackley is so eager to have him on the team.

On the B-plot front, Charlie's wife, Abby, gets a new job, prodded by the other wives, all of whom do some kind of work, because "Eleanor Roosevelt says we mustn't stand in our husbands' shadows." I suspect the slogan is motivated more by the need for cheap labor; when Charlie jokes he never thought they would be a two-income family, she points out it's more like one income and some pocket change. Her job as a "listener" — a telephone operator who monitors phone calls and alerts security to any high-risk words and phrases, which now includes things like "chop suey" because Liao was Chinese and, well, racism — pays 40 cents an hour. She has to undergo an uncomfortable lie detector test, and memorize everyone's extension because there is no printed director, and her first day on the job she ends up listening in on a phone sexcapade. But she also makes a new friend (with a frisson of same-sex attraction for good measure), so yay.

Meanwhile, Liza Winter is mourning the death of Liao by setting up a bee hive, listening to classical music and savoring a nice glass of scotch. Her grieving is interrupted by the arrival of Dunlavy, looking for Frank. She invites him in, and his guilt doubles when she tells him Liao had a five-year-old daughter: "On the bright side, in a couple of years she won't even remember him." He admits he was the one who fired the fatal shot, and while he sticks to the official story — he was just ensuring the safety of the base, there were confidential files in Liao's car, yadda, yadda— he starts rambling about how the on-base chaplain is a Baptist and doesn't take confessions. "I said 20 Our Fathers but I'm not sure it's enough."

Liza relents and asks the Catholic Dunlavy to take a seat, whereby we learn he hails from an Iowa farm family who lost half their crop in the dust bowl. But he enlisted out of a sense of honor, unable to sit idly by while other young men were dying overseas. Then Frank comes in, and when Dunlavy expresses regret for his loss, he shrugs it off. "You got nothing to apologize for. You did what you had to do."

It's a humanizing moment, and here is where the "hive" metaphor of the episode's title starts to become relevant. People (well, some people) are trying to put their differences aside, reaching across the lines drawn in the sand, rebelling against the enforced compartmentalization, trying to find common ground in the wake of Liao's death — the best defense against suspicion, fear, and paranoia, sowing the seeds for a true community.

But first, Frank and Liza's evening is once again interrupted, this time by Frank's arrest for purportedly stealing a file from Cox's office. Turns out Frank did so deliberately because it was the only way to get in to see Cox; the file in question was a study on the chemistry of magnesium sulfate, a.k.a. Epsom salt. "If it falls into Hitler's hands, he'll enjoy a warm bath," Frank snarks. But Cox refuses to intercede with Ackley for the shock wave studies, reminding him that the last time he did Frank a favor, it ended with Liao's death. And he says if Frank ever tries to contact him again, he will tell his team that Frank was the one who turned over Liao to the military.

Meanwhile, at the on-base bar, Frank's team is trying to drown their grief over Liao at the time same time Dunlavy's fellow soldiers are celebrating his "heroism" in killing a dirty Chinese spy — including a pretty blonde female soldier who seems more than willing to help Dunlavy lose his virginity. A brawl is inevitable, and it erupts over the pool table, with one of Frank's scientists telling Dunlavy that the man he killed was geometry wizard who would have kicked his ass in a game of straight pool — before landing a pretty decent punch to the face. Dunlavy refuses to fight back, even taking a second punch, before his fellow soldiers pile on in his defense.

Nobody is having a quiet evening, it seems, because Ackley shows up to talk to Charlie about hurting the poor baby fee-fees of his fellow team mates. He tells Charlie to apologize, and says he assigned him the toughest problem not as a hazing, but because he was the only one capable of solving it: "You are a once in a generation mind." But he knows somebody even smarter — not Oppenheimer (Charlie's first guess), but Werner Heisenberg, who is heading up the bomb development efforts for the Third Reich. "That is the man you're competing with," he tells Charlie — a stark reminder of just what's at stake.

Those stakes are why Frank is more than just a bitter aging scientist with poor social skills who will do anything to get his way, including sacrificing his own men — and straight out stealing the shock wave analysis studies from Ackley's lab, from under a sleeping Charlie's nose. (He also erases Charlie's equations from the blackboard, which should outrage any self-respecting physicist.) Liza knows this, remembering how much Frank loved and admired the Chinese physicist; Liao was his first choice when he hand-picked his Manhattan Project team. That said, "Whatever we're doing here, please tell me it's worth it." Frank responds, "If it works, we won't just end this

war, we'll end all war forever." (Oh, the irony.)

## Last Reasoning of Kings

Season 1

Episode Number: 4

Season Episode: 4

Originally aired: Sunday August 17, 2014  
Writer: Tom Spezialy, Gideon Yago  
Director: Paris Barclay  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Christian Clemenson (Niels Bohr), Tailinh Agoyo (Paloma), Beth Bailey (Fay), Kyle T. Cowan (Young Frank Winter), Brian Denk (Day laborer), Stafford Douglas (Thatcher), Tara Elliott (Party Attendee), Philip Etinger (Watts), Noel Green (Scientist), Travis Hammer (O'Byrne), Daniel Madison Hart (Military Private), Catherine Haun (Dot), Jonathan Hubbard (Scientist), Chadwick Johnson (Scientist), Murad Kirdar (Scientist), John F. Kollar (Department Head), Michael A. Kuhn (Military Police), Steve Larese (Scientist), Daniel London (J. Robert Oppenheimer), Rodney Nagel (Scientist), Philip David Pickard (Robert Bacher), Dave Racki (Soldier #1), Rachel Katherine Ross (Housewife), Rafael Torrez (Scientist), Dylan B. Warren (Military Police), Barry R. White (Military Policeman), Jaron White (Military Policeman), Jefferson White (Cole 'Iowa' Dunlavey), Rebekah Wiggins (Gladys)  
Summary: Frank grapples with haunting memories from his past and his erratic behavior gets called into question, putting his team's loyalty to the test. Meanwhile, The Hill receives a special visitor in famed physicist Neils Bohr, whose sudden arrival sparks curiosity among the scientists — and Charlie is assigned to escort him around the compound. Elsewhere, Callie plots an escape.



We open with a flashback to World War I, with soldiers huddling in a trench while being shelled by the opposition. The soldiers volunteer a young man nicknamed "Fathead" to venture out into No Man's Land to rifle the pockets of the fallen for documents, because he's the only one who's had any college. It's a risky endeavor: "What's your real name, in case you don't get back?" a fellow soldier asks. Cut to Frank Winter sitting bolt upright in bed in a cold sweat. That's right, he was the young soldier on the front lines, and clearly still suffers from a spot of PTSD — hence his haunted demeanor,

obsessive work ethic, and chronic insomnia.

Add to that the occasional waking hallucination from his WWI experiences. That insomnia is taking its toll. His mentor takes one look at him and says he once ran a study in college on sleep deprivation in rats. "Two weeks in, they looked better than you," he says. "Three weeks in

they were dead." Alas, the army doctor refuses to prescribe any more sleep aids for him. Frank is currently viewed with great suspicion "on the hill" — code for the Manhattan Project's on-site headquarters — because of his increasingly erratic behavior.

Does Frank take his mentor's advice to go home and get some sleep? Do you really need to ask? He's keen to complete the next step in demonstrating his implosion bomb design, having just been given some detonation primers for another proof-of-principle experiment. If it works, he'll finally get his precious plutonium. While the test is officially scheduled for the following week, Frank insists it can't wait. Even though he's under constant military surveillance, he commandeers an MP, an army jeep, and one of his scientists, Paul Crosley, and marches out into the New Mexico desert.

A confrontation between the two scientists is inevitable. Paul has been increasingly dismayed by Frank's behavior — so much so that he asks Ackley to have him transferred to the Thin Man team. To Ackley's credit, he questions Paul's loyalty, observing that rats always flee a sinking ship. "Respectfully, passengers also flee," Paul counters. "To a worthy captain, I'm loyal to the end."

Charlie Isaacs has a meeting of his own: a brief sit-down with head honcho Robert Oppenheimer, who informs Charlie that he is pulling him from the Thin Man project. He will be assigned to shadow Bohr during his stay at the base. "We don't want him to stray," Oppie says. "You'll keep him on the straight and narrow and show him only our finest work, understand?" Translation: Don't let him anywhere near Frank Winter's group.

Charlie is not happy about being demoted to a glorified valet. Oppie responds by quoting Proverbs: "As iron sharpens iron, so one man sharpens another." Ackley has assured him that Charlie is "iron" enough to handle Bohr: "I hope he's right."

Iron might be the wrong material. The Danish physicist is eccentrically stubborn but in a far more fluid, less rigid way. For starters, Bohr refuses to ride in the town car waiting at the entrance gate, opting to take a leisurely walk instead, oblivious to the top brass welcoming party left hanging at his delay. Charlie tracks him down, and finds him puffing on a pipe while regaling a few rapt soldiers with a tale of "passing out in Germany and waking up in Britain" with the worst hangover of his life.

Side note: This is actually a true story. Bohr's harrowing escape from Nazi-occupied Denmark is legendary (for a full account, read Richard Rhodes' masterpiece, *The Making of the Atomic Bomb*), and he traveled to England via an unarmed bomber aircraft dubbed a "Mosquito," designed to fly at high speeds and high altitudes — so high that passengers needed oxygen masks. Bohr apparently didn't hear the pilot tell him to switch on the oxygen and passed out. (The period of oxygen starvation probably did leave him with a wicked hangover.)

Eventually Charlie gets Bohr to Ackley's lab to "meet the Gadget" (the code name for the prototype bomb), entering to a standing ovation. Bohr is less than gracious: "Will you ask these engineers to leave?" Charlie points out that the men have prepared a detailed presentation on the bomb design for him, but Bohr explains, "After my dalliance with the Nazis, I don't relish the exuberance of crowds." Fair enough. Discussing the Thin Man design with Charlie, Bohr calls it the "last reasoning of kings," a reference to the French king Louis XIV, who had the phrase stamped on cannon.

The next stop on the tour is supposed to be the metallurgy lab, but Bohr ignores Charlie's direction and marches off in search of Frank's lab to view "the back-up plan." Charlie gives him the lowdown on the implosion design, his admiration for its elegance palpable: "The geometry, it's like a star swallowing itself." Bohr concurs that the design is impressive, but asks cryptically, "Do you think it is big enough?" That's when Oppie barges in, clearly displeased. Charlie is summarily relieved of his escort duties.

Out in the desert, Paul sets up a camera to record to the experiment while Frank attaches the detonators, to the great alarm of the soldier guarding them. "We don't have clearance to discharge explosives!" Frank says he'll take full responsibility and suggests he move the jeep a little further away from the blast zone. The big moment comes — and nothing happens. Frank marches toward the blast site to check the connections. The apparatus detonates just as he approaches, the shock wave throwing him backward. True to form, despite the ringing in his ears and shrapnel cuts on his face, the first thing Frank says is, "How's the camera?" They need the photographic evidence that the test worked. Without it, there will be no plutonium for his group.

But then the jeep won't start, so Frank resolves to walk the 30 miles back to base. The soldier has orders to remain with any non-operating vehicle and tries to force Frank to stay at gunpoint. Frank's response is to invite him to shoot him point blank. The soldier hesitates and Frank disarms him, tucking the gun in his own pocket.

Paul Crosley gets stuck lugging the heavy camera, and registers his displeasure, telling Frank he's asked to be transferred to Thin Man to work with Ackley, a man who keeps "civilized" hours. Eventually he asks their soldier escort to maybe take a turn carrying the damn thing, but the MP refuses; he is shipping off to the Pacific the following week: "I'm done chaperoning the pencil necks I beat up in grade school." Paul is blase about the insult: "Brilliant. You'll be graduating from taxi driver to cannon fodder."

When they start wrestling over the canteen of water, Paul accidentally drops the camera, exposing the precious film, sending Frank into a rage. Paul pushes back, hard, telling Frank he is unfit for leadership, just a padded cell. Frank takes a deep breath, says that night is coming, and nobody is coming to save them. So they'd best push on.

Meanwhile, back at the base, Liza meets with the army doctor, pretending to need a sleep aid for her own insomnia. The doc runs her through the standard psychological questions about her mental fitness. Liza, to his surprise, answers with brutal honesty, giving us a glimpse of what she has sacrificed so that Frank can be on the Manhattan Project — namely, a tenured position in the Ivy League and her own scientific research. "My husband's research is of vital interest to the government. Mine is expendable." Her marriage is struggling, plus she's not allowed to work on the base and has no idea why. "I barely recognize the woman I see looking back at me in the mirror." She gets the prescription, although the doctor isn't fooled. He tells her to make sure Frank doesn't take the pills with alcohol.

Liza doesn't fit in with the other women on base, the so called Ladies Auxiliary, who pay Abby a visit, Native American maids in tow, for an afternoon of gossip, booze, and mani-pedis. The ringleaders are Dot and Gladys, who are a lot like Hamlet's Rosencrantz and Guildenstern — they're pretty much interchangeable in terms of petty voyeurism and casual racism. (Frustrated with one of the maids' inability to understand her instructions, Dot (or Gladys) gripes, "Two thousand years in this country, they still don't speak the language.") Liza's rebellious teenaged daughter Callie doesn't fit in either. Dunlavy catches her trying to escape from the base in the back of one of locals' trucks. Let's just say that despite some initial antagonism on her part, there was sparkage — Dunlavy is a smitten kitten. And Callie seems to like the attention.

As night falls, our Trio of Bickering Misfits discover Frank has been walking all this way with a bit of shrapnel in the sole of his shoe. His foot is a bloody mess. As Paul bandages the wounds, Frank asks why he wants to work for Ackley, a man who punches a clock and keeps "banker's hours," while young men are fighting and dying on the front. He pulls the gun and points it at a terrified Paul, telling him that gut-level fear he's experiencing is exactly what it's like to be in the trenches: "There's no comfort in battle. And no one is coming to save us — not Niels Bohr and not Reed Ackley."

Frank, Paul and the MP eventually do make it back to base. To Frank's surprise, Paul promptly starts packing up supplies again, telling Frank they can take his personal car back to the test site and re-do the experiment — because he's pinched more detonation primers from Ackley's office. Paul is back on Team Winter, having decided he's a captain worth serving after all.

They missed the big banquet dinner in Bohr's honor back at the base. During dinner, Bohr accompanies Liza to the bar to refresh his drink, and when he asks after her own research, she confesses that her research had been on the sex life of flowers, but "here I'm just a physicist's wife." Bohr laments all the great minds forced to abandon their work because of the war, and tells her, "Flowers bloom everywhere, Dr. Winter — even in the desert." We last see Liza meticulously making notes on a flower specimen in her notebook, having taken Bohr's words to heart.

At dinner's end, Oppenheimer tells the assembled dinner guests that the Danish physicist will be departing in the morning, laying to rest all the fevered speculation about a regime change and subsequent jockeying for position. It seems that Bohr's role in visiting the Manhattan Project all along has been to serve as a morale booster. When soldiers lose hope on the front, "They get pinup girls," Bohr tells Charlie when the young man follows him out of the dining hall. "You get a tired old man with a pipe."

And then Bohr reminds him of his prior question: "Is it big enough?" He meant whether it

was big enough to truly serve as a deterrent to end all war. "Is it big enough that no sane person would ever dare to use it?" Charlie is honest enough to answer, "I don't know." But he pleads with Bohr to stay; the project could use his brilliance. Bohr replies that the human race seems to be hellbent on its own extermination, with an insatiable appetite for horror. "I've lost mine."

Like Frank, Bohr lived through World War I, and tells Charlie about a chemist he knew with an idea to weaponize artificial fertilizer. That was the last time scientists thought they could come up with a weapon so horrific, they could put an end to war, but instead, that chemist's legacy "is a fog of chlorine gas."

The chemist in question is Fritz Haber, a German scientist who pioneered a process for making synthesized ammonia, and its use in fertilizer had a huge impact on agriculture, combating famine around the world. Haber is also the one who suggested weaponizing chlorine gas, first used on April 22, 1915 at Ypres, killing 1000 French and Algerian soldiers in less than 10 minutes and wounding thousands more. (His wife, also a chemist, was so horrified by her husband's work that she committed suicide.) By the end of WWI, chlorine and other poison gases such as phosgene accounted for an estimated 90,000 deaths.

That's what happened to Frank Winter in the trenches during WWI. Being sent into No Man's Land saved his life. When he finally made it back to the trench after another intense round of shelling, he found all his fellow soldiers dead from poison gas. The final scene is the young Frank waking up in WWI hospital ward and pulling bandages off his eyes. A nurse joyfully tells him that the war is over and "There will never be another."

## A New Approach to Quantum Cosmology

Season 1  
Episode Number: 5  
Season Episode: 5

Originally aired: Sunday August 24, 2014  
Writer: Mark Lafferty, Noelle Valdivia  
Director: Bill D'Elia  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Tailinh Agoyo (Paloma), Stafford Douglas (Thatcher), Tara Elliott (Swing Dancer), Corinne Fox (Mother with baby), Travis Hammer (O'Byrne), Jonathan Hubbard (Scientist), Chadwick Johnson (Scientist), Tad Jones (Major James Pellegrin), Murad Kirdar (Scientist), John F. Kollar (Scientist), Steve Larese (Scientist), Genia Michaela (Ruth), Lauren Myers (Jeannie), Rodney Nagel (Scientist), Philip David Pickard (Actor), Rachel Katherine Ross (Housewife), Rafael Torrez (Scientist), Tommy Truex (Young Officer), Carole Weyers (Elodie), Barry R. White (Military Policeman), Jaron White (Military Policeman)  
Summary: Tensions between Charlie and Frank escalate after Charlie takes a public jab at Babbit's past, raising red flags and drawing the attention of Occam — leading Frank to find creative ways to protect his mentor. Meanwhile, Liza suffers several blows of her own — and points the finger at the army.



Frank Winter is driving at night, a mysterious package beside him on the seat, when he notices headlights behind him — an odd sight in such a remote place. At the crossroads, instead of turning left to go into Santa Fe, he turns right, and sure enough, the other car follows. He pulls over and so does the other car — but the man seems to be just a good samaritan, concerned that Frank might be having car trouble, and since he's handy with cars, he thought he might be able to help. Then he spots the package: "Something special for the old lady?" Frank deflects and the man tells him to drive safe. Is

Frank just being paranoid or is the good samaritan more than he seems?

On the science front, Charlie Isaacs and the rest of Ackley's group are slated to present their prototype design for the ignition system for the Thin Man bomb to military Ordinance. The preparation seems to involve watching wartime footage of strategic airstrikes and placing bets on "how many Krauts we're gonna vaporize" with the Thin Man. The presentation doesn't go well. Despite checking and rechecking all his figures, Charlie failed to account for the weight of the fuel to fly the plane, which can add 26 tons to a B-29 bomber. The Thin Man design — basically a nuke housed in a cannon — is too heavy, so the plane won't even get off the ground. Charlie has to find a way to trim 800 pounds from the design, working against 2000 years of ballistic

science. Cannon are heavy, after all, because if they're not, they'll bust apart the first time they fire.

Charlie drowns his sorrows in the canteen afterward, fretting over his dilemma. Frank's mentor, Glen Babbit overhears, buys Charlie a round and tells him an off-color story about a big beefcake of a man who just can't seem to please his wife. "He figures if he screws her more often, she'll whistle like a teakettle," Babbit relates, but it doesn't work.

And then one day a salesman comes to the door, he and the wife go at it, and "right out of the gate she goes KABOOM!" He taps Charlie on the arm significantly: "It turns out all she needed was one... good... bang." Charlie completely misses the point at first — "Is he talking about my wife?" — but his lab mates explain that in the case of Thin Man, it only needs to fire once. So it can be thinner and lighter after all.

When his lab mates taunt that maybe the old guy could give Charlie some help with his wife, Charlie snarls, "Like I need sex tips from a Commie." A discernible chill falls over the group. This was not an era when one made such accusations lightly. Babbit shrugs and says he was just trying to help, to which Charlie replies, "Yeah, like you helped Richard Lavereau." Who is this Lavereau? Only Charlie and Babbit seem to know.

Gossip travels fast, so the news soon reaches "Occam", the government interrogator who broke the late Sid Liao. He demands cooperation from Colonel Cox to investigate Babbit. Lavereau was a brilliant Harvard physicist who defected to Moscow in 1939, and now heads the Soviet version of the Manhattan Project. Despite the fact that much of Russia barely has running water, the bomb program is remarkably advanced, and Occam is convinced it's because Babbit has leaked classified information.

Once again, there is zero proof beyond rumors that Babbit once knew Lavereau. Cox reminds Occam how badly things ended the last time he had a theory, and defends the scientist, who has been with the project from day one and is Jewish — and thus unlikely to be passing state secrets to the opposition. As for his supposed Communist leanings, "You can't swing a dead antelope by the tail without hitting some genius who once attended a communist rally" — and that includes Robert Oppenheimer, head of the Manhattan Project.

Cox is correct that many public intellectuals attended communist meetings of some sort or another in the 1930s, before World War II broke out, including Oppenheimer. Anti-communist hysteria built through the 1940s, erupting into full-out paranoia in the 1950s — the infamous McCarthy era. There is no evidence that Oppenheimer was ever officially a member of the Communist party, even though the FBI spent a good 30 years trying to prove otherwise. But sometimes rumors are enough. In the 1950s, his security clearance was summarily revoked and he was forced to endure public hearings in a bid to be reinstated — a bid that failed. The Atomic Energy Commission upheld the verdict. It was pure politics. The PBS series *American Experience* has a good recap of those events, quoting physicist Marvin Goldberger: "The country asked him to do something and he did it brilliantly, and they repaid him for the tremendous job he did by breaking him."

Anyway, once again, Frank must contend with losing a member of his team. Babbit confesses he lied about the association with Lavereau during his intake interview, figuring no one would ever delve any deeper, and besides, they just met a few times at physics conferences and talked about their research. No biggie. They have their plutonium and there is real work to be done. He's convinced the tension will blow over. "There's no breeze here, things don't blow over," Frank retorts, advising him to stick to his story. Then he goes off to find out what Charlie knows.

Charlie knows quite a bit, having been a staff assistant in the Harvard physics department right before Lavereau's defection. An envelope (unsealed) arrived one day with a ticket to London (from whence Lavereau defected), but it wasn't in Lavereau's name — that ticket arrived the day before. This one was in the name of Glen Babbit. Frank confronts him with the truth, and asks him to explain why his name was on that ticket. Babbit admits they were secretly lovers and Lavereau wanted to run away together to Moscow to start a new life. He thought the ticket would convince Babbit. It didn't. "But I have never betrayed my country," he insists.

Babbit lied to protect a deeper, darker secret, something far more shocking in that era than associating with a Communist. Maybe Frank had no idea, but Liza knew: she never told Frank because "everyone deserves a little privacy." Alas, privacy is in short supply; that night, as Babbit is painting in his quarters, he is taken away for questioning by Occam.

Charlie, too, is feeling the pressure from that ill-advised drunken insult; he's slated to be



questioned next, and Ackley impresses on him the importance of telling Occam everything he knows, for his own protection. He, too, tells a story, of how his dad used to take him hunting for white tail deer every year at the first snow, and would refuse to go home without a kill.

Charlie again demonstrates his incapacity for allegorical subtlety: "You want me to shoot [Babbit]?" Ackley says he is not the hunter, he is the prey. "These men will not go back to Washington without a trophy," he cautions. "If they can't bag a deer, they will settle for a grouse." Why should Charlie endanger his own career to protect Babbit?

Now it's time for some comic relief, in the form of Louis "Fritz" Fedowitz, a chubby junior scientist in Frank's group who has yet to lose his virginity at 29. He confesses his frustration to Helen, the lone female physicist, who decides to help him out by pointing out all the women on base who offer their sexual services in exchange for cold hard cash, including one who charges by the minute: "It's cheap if you're a quick draw," says the surprisingly pragmatic Helen.

Fritz is shocked to learn there are "whores" at base camp, but Helen calls them capitalists, supplementing their meager income from working the lunch counter with the "gold mines" underneath their skirts: "It's basic economics, supply and demand." Apparently prostitution wasn't in the syllabus when Fritz took economics at Cornell, and he's a bit of a sentimental softie, always imagining his first time would be with someone special. Helen's response: "Jeannie's special — she plays the bassoon."

The next day, a triumphant Fritz recounts his "conquest" to an astonished Paul Crosley, before Helen takes him aside and confronts him with what actually happened. Fritz panicked and bolted before Jeannie could get his trousers off, knocking over a lamp and breaking the bulb (a precious resource in wartime) in his haste. Helen was up half the night comforting her. A sheepish Fritz goes back to Jeannie's room to pay her what he owes for their disastrous encounter, along with a new light bulb. And then he asks shyly how much it would cost to take her to the movies. Fritz might just have a bit of game in him after all.

Back in Frank's office a subdued Babbit offers his resignation for the good of the group, because he is an uber-mensch who DOES NOT DESERVE this nonsense. Even though he stuck to his story, it was just a matter of time before Occam grilled Charlie and the truth came out. "At some point we all have to pay for the sins of the past," he says mournfully. "I am out of ration stamps." Frank refuses to accept the resignation, telling Babbit he has another plan.

It concerns Charlie's rejected paper, "A New Approach to Nuclear Cosmology" — the paper Frank rejected the year before, and the source of the original animosity between the two men. It's a fictional paper by a fictional scientist describing "how classical four-dimensional general relativity combined with the nuclear forces can explain the relative abundances of all known elements in the universe," but it has a real-world counterpart: Big Bang nucleosynthesis.

In brief: Einstein's equations gave rise to various models of the Big Bang, which describe a very hot and dense early universe. That universe cooled as it expanded, and quarks started forming protons and neutrons, which in turn formed atomic nuclei. According to Einstein Online (a useful site for those keen on more technical details), "What nuclei are produced, and in what amounts, is the result of a race between the various nuclear reactions on the one hand, and the inevitable cooling that accompanies the expansion of the universe on the other." Those predictions were later confirmed by observational data, so similar work really would have made Charlie's career.

How can Frank get Charlie's attention? Earlier, he had called his 83-year-old senile father in Indiana to wish him a happy birthday, a dutiful son even though his father thinks he's still an undergraduate. Abby was the operator monitoring the call, and accidentally sneezed mid-conversation. Later, when Frank passed her in the hall, he smirked and said "Gesundheit," having guessed it was Abby. Now he makes use of that knowledge, placing another call to his father. From Abby's face, it's clear the substance of the conversation is upsetting her — just as Frank intended, knowing she would pass it on to Charlie, who barges angrily into Frank's office shortly after.

Frank has accused Charlie of plagiarizing part of his brilliant, career-making paper from an obscure 1932 dissertation by a Harvard graduate student — an entire paragraph, almost word for word. Charlie first tries to argue that all scientists stand on the shoulders of giants, to which Frank retorts, "But the rest of us don't pretend to be 1000 feet tall." Then he argues that it was an honest mistake. He'd copied it into his notebook and forgot where it came from, assuming it had been his own observations. And besides, it was just one of several building blocks, not the exciting, original part of the paper, which was genuinely his own work. But even when he realized

the mistake, he was too embarrassed and fearful for his career to come forward and make the correction.

Liza has been dealing with her own mini-crisis. After taking Niels Bohr's advice to find a way for her research to "flower" in the desert, she submitted a paper based on her research with her artificial beehive — which is not a big hit with her neighbors — only to find that the journal returned it because the military had censored so much of the text. She pleads with Major Pellegrin to intervene since nothing in the paper was even remotely classified — it was all about the pollination preferences of the European honeybee.

All scientists are prohibited from publishing during their tenure on the Manhattan Project, and apparently this also applies to Liza, even though she is not an employee, scientific or otherwise. The major is unmoved by her frustration at having given up her own academic career so Frank could work on the Manhattan Project, telling her to suck it up and make the best of it, because "that's what you do in a war." Instead, Liza convinces her maid, Paloma to mail her paper from the pueblo post office, free of the censors' unrelenting black pens. But the next morning, she finds all her honeybees are dead; the hive has been sabotaged. She presumes it was Major Pellegrin and his men who are to blame, but he denies it.

Poor Liza's predicament is worse than she knows. Remember Frank's late-night drive with the mysterious package? His destination is the humble Santa Fe home of the maid, Paloma. The package contains a radio, so she can listen to music. Paloma speaks no English, which is why Frank first confided in her in the pilot — a means of relieving the stress of not being able to discuss his work with his wife. Things have now escalated into a full-fledged affair, which means Liza has sacrificed her academic career for a philandering scumbag. And that "good samaritan" really was a government tail; he reports to Occam.

## Acceptable Limits

Season 1  
Episode Number: 6  
Season Episode: 6

Originally aired: Sunday August 31, 2014  
Writer: Dustin Thomasen  
Director: Michael Uppendahl  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Tailinh Agoyo (Paloma), Frank Bond (Bill Tupper), Jonny Coyne (Dr. Alek Barath), David Devereaux (X-Site Worker), Billy Fuessel (Plant Worker / Diner Patron), Adam Godley (Dr. Adelman), Chadwick Johnson (Scientist), Steve Larese (Scientist), Katie Anne Mitchell (Ticketing Agent), Audrey Moore (Francene), Lauren Myers (Jeannie), Rodney Nagel (Scientist), Matthew Page (Private Weaver), Rafael Torrez (Scientist), Barry R. White (Military Policeman), Jaron White (Military Policeman), Daniel Zubiarte (Control Room Supervisor)  
Summary: When Charlie is chosen to go on an important trip to Tennessee to see the country's first plutonium reactor, tensions in the Isaacs' marriage only deepen when Abby learns that Charlie is accompanied by Helen on his trip. Back on The Hill, Fritz has a medical emergency — and Frank's attempt to intervene leads to a shocking discovery.



We see a man walking through a town that is not Los Alamos — it has a European vibe — into a university building and then a room that looks a lot like Ackley's and Winter's labs: scientists scribbling on blackboards and drinking cup after cup of coffee. When a second man marches through the corridor with an air of authority, the others greet him: "Good morning, Dr. Heisenberg." This is the headquarters of the German Manhattan Project, America's foremost competition in the race to build an atomic bomb, with the outcome of the war at stake.

Back in the New Mexico desert, Frank Winter is definitely feeling the pressure, trying in vain to get useful information about various fissile material tests out of his lovestruck junior scientist, Fritz, who is vague on firm data on certain key properties. He can't help talking incessantly about his lady love, Jeannie — the working girl who reads Dickens and charges him for their highly chaste (so far) "dates." (When his co-workers tease him about this, Fritz points out that "all girls cost money" in terms of dinner, drinks, and the movies; at least with Jeannie it's a flat rate.)

We learn the clock is ticking because an X10 nuclear reactor is about to go online at another top-secret site in Tennessee — the future Oak Ridge National Laboratory — and Frank's group needs to demonstrate their competence with the precious bit of Pu-239 they've been given, in hopes of being given more. The prior samples came from Enrico Fermi's lab in Chicago, made in

teensy amounts in a cyclotron, which is why the substance is so precious; the X10 reactor will scale up production of Pu-239 from micrograms to kilograms.

"We're about to have our very own plutonium factory," Ackley tells Charlie after the latter gets yet another full physical prior to a top-secret business trip to that very site. Ackley is concerned that the military, in its rush to beat Germany to a bomb, isn't quite as concerned with safety as they should be, given the potential destructive power of a nuclear critical reaction should anything go wrong. Charlie is being sent to do a safety review.

And he's not going alone: Helen Prins, the sexually liberated sole female scientist in Winter's group, is traveling undercover with him as his "wife." Given that things are still tense between Charlie and his actual wife, Abby, after last week's plagiarism accusations, this is probably not going to help matters, especially since Charlie neglected to share this fact with Abby. She learned it about from Liza Winter, who let it slip in casual conversation.

Things have smoothed over between Frank and his closeted gay mentor, Babbit — he is once again having a friendly dinner chez Winter. Liza regales Babbit with the tale of Frank's gift to her on their second wedding anniversary: a rabbit in a box. Frank decided the rabbit was an appropriate symbol of their marriage: something about shared curiosity and "a keen mating instinct." But within a week the rabbit developed sores all over its body and started banging its head against the cage, and died soon after. Turns out Frank stole the rabbit from a biology lab, where it was part of an infectious disease study. "Awww, you gave your wife syphilis. That's nice," Babbit teases. It's tough not to see the rabbit story as ominous foreshadowing, given the current stresses on the Winters' marriage.

Fritz is working long hours conducting experiments with the Pu-239 to get Frank the hard data he's demanded. Alas, there is an unexpected chemical reaction. Fritz later calls it a rapid vapor expansion — a sudden pop and puff of smoke, right in his face. Paul Crosley and Jim Meeks return to the lab to find Fritz in his underwear, on the floor with Geiger counter and scope, desperately searching for the missing plutonium. Crosley is incredulous: "You've misplaced a million dollars of Pu-239?" Misplaced isn't quite the right word: Fritz inhaled the full 24 micrograms of this radioactive substance. Crosley and Meeks rush him to the medic, where Dr. Edelman pumps his stomach and presents poor Fritz with the contents, telling him he'll need to recover the plutonium from all that "organic matter."

To Frank's credit, his immediate concern is with Fritz's health, and he is appalled at Edelman's "prescription": aspirin and a case of beer, with instructions to collect all the ensuing urine. "But how do you feel?" Frank insists. "A little buzzed from the beer," Fritz admits sheepishly. Fritz, Crosley and Meeks are a bit too blasé about the odd effects of ingesting even a little Pu-239. They work their way through the case of beer and end up drunkenly making wagers on just how far away the Geiger counter can detect the radiation when Fritz strongly exhales.

Today we know all about the dangers of ionizing radiation, which includes x-rays, as well as the alpha, beta and gamma radiation emitted as plutonium decays. An ion's electrical charge can lead to unnatural chemical reactions inside biological cells. It can break DNA chains, causing the cell to either die or develop a mutation and become cancerous, which can then spread. Fritz inhaled a tiny amount, but it's easier for plutonium to cross into the bloodstream when it is inhaled, and from there it accumulates in the bone marrow, the liver and other major organs. And it has a biological half-life of 200 years, exposing the surrounding tissue to even more radiation. (That said, several Los Alamos workers inhaled a good amount of plutonium dust in the 1940s, with no corresponding spike in incidents of lung cancer. So maybe Fritz will be okay.)

Frank confronts Edelman, who assures him the scientist's exposure was within "acceptable limits." Edelman "followed the Q9 directive to the letter," but when Frank asks who wrote that directive, all he gets is "That's classified." Edelman's ignorance of radiation and its effects on the body is soon unmasked; he's an obstetrician by training. Frank demands that the project medical director be summoned to examine Fritz, but thanks to compartmentalization, Edelman has no idea who that might be.

Thus begins an elaborate cat-and-mouse dance as Frank attempts to chase down exactly who has been getting the blood and urine samples routinely taken from workers in the camp. Edelman's assistant just drops them off to be posted, and they are supposedly analyzed elsewhere by the "project radiation chief." Eventually Frank gets through to a ranking doctor and asks to speak to this mysterious project radiation chief. All the doctor knows is his security ID number, B-379, and calls the assigned extension. Edelman's phone promptly rings, to the doctor's shock.

It's all an elaborate illusion — security theater. Apparently nobody has been analyzing all those blood and urine samples; everyone just assumed someone else was handling it.

Charlie isn't thrilled about traveling with Helen, perhaps remembering how she played him a few episodes back to get hold of some plutonium. At the airport, he complains about Helen's extra luggage: "How many pairs of shoes do you need?" She fires back with a dig about finding a grammatical error in "your little space paper" (Charlie confused "affect" and "effect"), and spins a tall tale for the woman at the ticket counter about how she supports her poor deadbeat husband — just for a little added humiliation. They are so filing for fake divorce when they get back to Los Alamos.

Still bickering, "Mr. and Mrs. Donaldson" arrive at the reactor facility in Tennessee and are met by the man in charge, one Daniel Ellis, who is quickly established as a stereotypical Southern good ol' boy, referring to female employees as "pretty little patriots" and brusquely dismissing any contributions from Helen and his black assistant, Theodore Sinclair, who he would clearly prefer to be seen and not heard.

He shows them the new reactor, a behemoth made of 600 pound of graphite: "She's dressed and ready for her cotillion," he boasts. By tomorrow morning, "She'll start spinning uranium straw into plutonium gold." (Helen notes his choice of pronoun approvingly and declares, "All reactors should be female.") There were actually two fissile materials used in the bomb effort: uranium-235 and Pu-239. Most uranium is actually of the stable (non-fissile) U-238 variety; U-235 is an isotope, meaning the nucleus has the same number of protons but three fewer neutrons. Because the two are so chemically similar, it's very difficult and expensive to separate them chemically. It's much easier to separate Pu-239 from U-238, because they are different elements.

Anyway, Ellis' friendly demeanor soon turns hostile when Charlie starts asking too many questions about safety procedures. Theodore helpfully suggests that Charlie would find the facility's schematics more informative than a lengthy tour, but Ellis cuts him off and sends him for coffee — BURN! — telling Charlie that he is here to grease the wheels, not gum up the works. "I'm here to make sure you don't set the atmosphere on fire," Charlie retorts. Then he pulls rank and plays the Oppenheimer card, since Oppie's orders outrank Ellis' deadline.

Up until now, Helen has been mostly playing along with Ellis, but she follows Sinclair on his coffee run. "When I get dismissed by a group of men, usually it means they're afraid of what I'm about to say," she offers. Sinclair is initially defensive and rejects the olive branch: "This isn't the underground railroad. I don't need a woman to rescue me from the white man." Undeterred, Helen points out that "no one else in that room gives a shit what you think," but she does. He pauses for a beat and then says, "Green water," before stalking off.

"Green water," as we learn in the next scene, is what happens when uranium dissolves into liquid form. The neutrons slow down and become 100 times more fissionable. That's why safety protocol demands that no more than 12 kilograms can be stored in any given building; nobody wants a nuclear chain reaction to begin spontaneously. When Helen and Charlie review the blueprints, she notices that the renderings are off in scale by a good six inches. The uranium storage units are too close to each other. Helen tells Ellis he'll need to clear all those vats, spread out over 100 acres, a process that will cause a week's delay. Charlie backs her up: "You heard my 'wife.'" Finally, they're working as a team.

Meanwhile, Frank is hot on the trail of just who hired Edelman, knowing he'd probably just follow the directive and not ask too many questions. That would be Alex Barath, a fellow scientist, who we've seen briefly in prior episodes. Frank confronts Barath about why he hand-picked an inexperienced obstetrician as the camp's ranking medical officer. Why not give the position to Barath himself? The Hungarian-born physicist worked with Marie Curie as a young man at the Pasteur Institute, and hence had firsthand experience with radiology.

Curie famously died of leukemia at age 67, very likely due to her years of exposure to ionizing radiation in the lab. Frank is correct that her lab books turned out to be highly radioactive — so much so that when scientists placed photographic plates between the pages, the resulting films revealed her fingerprints, made from radioactive deposits wherever she touched the paper. She publicly never spoke of the risks of radiation exposure, but Frank reminds Alex that she never let him handle the radioactive materials in the lab, either — likely to protect the young man who, he implies, had fallen in love with her.

His worst fears confirmed, Frank resolves to confront the issue head-on at the upcoming town

council meeting: "People need to know you're running a Potemkin clinic and it's all a lie." Barath warns him not to shout "plutonium!" in a crowded theater; Frank won't just lose his job for this, he could well end up in a military prison.

Meanwhile, Liza is investigating who or what killed her beloved honeybees in preparation for the same town council meeting, where she plans to make a stink about — among other things — the Army's use of the toxic pesticide DDT all over the base. Apparently studies with mosquitoes ended up with the exposed insects having violent seizures and bleeding internally until all their organs failed. Liza could really use a microscope to aid in her investigations, but when she asked Frank and Babbit to "borrow" one for her from the lab, they refused — the Army is very strict on that score and monitors equipment too closely. She ends up borrowing one from the schoolhouse.

In the end, neither Frank nor Liza testify at the town council meeting. He is dissuaded by Colonel Cox, who shares top-secret information with him provided by a German spy (going by the code name "Magpie") indicating that the German bomb effort is two months ahead of the Los Alamos project. When Frank sees the accompanying equations, he realizes the Germans are already testing yields — they are more than two months ahead. If Frank raises a stink about the medical charade now, it will result in a weeks-long delay, giving the Germans even more of a head start. And if the Germans drop a nuclear bomb, "none of this makes any difference," Cox warns.

By now Frank has amply demonstrated his single-minded prioritizing of the bomb development over everything else, so his decision is never in doubt. He takes Cox's advice and remains silent. Chalk it up to just another human cost of wartime science. At least it's within the "acceptable limits," right?

However, he does make one change to keep his people safer. Following Marie Curie's lead, he insists that from now on, only he will be handle the radioactive plutonium in the lab — although he makes them think it's because he doesn't trust them, thanks to Fritz's stupid mistake. God forbid he should show an inkling of warmth or humanity to his team.

Or to his wife. He returns home to find her still working on the case of the dead honeybees, having skipped the town meeting for lack of evidence. She didn't find any trace of DDT or toxic pesticides in her dead honeybees, and she also ruled out infectious diseases, so it's not due to a virus or parasite. "You'll figure it out, you always do," Frank says in consolation — but he changes his tune quickly when she asks if there might be something toxic in the tech area that's at fault. This is hitting a bit too close to the truth, so naturally he lies to her — what's one more lie when he's told so many by now? — and claims he personally read all the environmental safety reports.

When that doesn't work on the tenacious Liza ("A bee colony doesn't just collapse on its own!"), he tries the old-school, "it's all in your head, dear" line. Liza is insulted and hurt by the ploy, as she should be, especially when Frank follows up with a patronizing "We'll get you some new bees." She rebuffs him when he tries to stroke her face. And does she give up? Hah! We last see her pulling the preserved purple chrysanthemum she'd picked way back in the pilot from the pages of a book. Liza always figures things out.

Meanwhile, back in Tennessee, Helen and Charlie arrive on-site to find the staff have already begun unloading the various rods, as Ellis smugly informs them that the reactor should be fully operational within a day. It's been given a clean bill of health on the storage by the military. Charlie points out they'd made a list of 22 major hazards to resolve — it wasn't just the storage issue — and Ellis assures him the Army will "give your list the consideration it deserves — just as soon as we're critical." And he tells Charlie it's no good playing the Oppenheimer card again, since the current directive comes straight from General Leslie Groves' authority: "the guy who hired Oppenheimer." Once again, safety is sacrificed for the greater good.

## The New World

Season 1

Episode Number: 7

Season Episode: 7

Originally aired: Sunday September 7, 2014  
Writer: Lila Byock, Dustin Thomasen  
Director: Rosemary Rodriguez  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Tailinh Agoyo (Paloma), Frank Bond (Bill Tupper), Phil Duran (Guard), Tara Elliott (Housewife), John Gabriel (Travis), Chadwick Johnson (Scientist), Steve Larese (Scientist), Melissa McCurley (Troop Leader), Rodney Nagel (Scientist), Daniel Stern (Glen Babbit), Rafael Torrez (Scientist), Nate Warren (Fitzgerald), Jaron White (Military Policeman), Jefferson White (Cole 'Iowa' Dunlavey), Daniel Zubiante (Control Room Supervisor)  
Summary: Helen and Charlie must solve a crisis at the reactor. Frank and Liza help Paloma's family. Abby begins a journey of self-discovery.



Let's get right down to what's going on at the future Oak Ridge National Laboratory, where last week, rival physicists Helen Prins and Charlie Isaacs — traveling undercover as a married couple — found common ground in objecting to insufficient safety protocols at the facility. They were over-ruled by the head military contractor, Daniel Ellis, who surged ahead with plans to initiate criticality as scheduled. Now the big day has arrived, and although Charlie is granted the privilege of inserting the final uranium fuel rod to induce a self-sustaining chain reaction, he takes a pass, concerned at bearing any

responsibility for the potential disaster that could ensue.

Helen has no such qualms, and quickly volunteers to do so in his stead, figuring, "Someone has to go down in the history books for this, it might as well be a woman." Everyone cheers, and nothing catastrophic happens. Helen tells the meticulous Charlie that he has no sense of humor and really needs to embrace life's unpredictability. "I'll take predictable over reckless any day," he retorts. She reminds him of the first nuclear reactor pile — the famous "Chicago Pile" initiated on December 2, 1942 — which Enrico Fermi located under the bleachers of the football stadium, lest the ensuing reaction run out of control and take half of Illinois with it. There weren't any safety regulations then; legend has it that Fermi's backup plan was a couple of graduate students ready to dump a vat of salt cadmium solution on the pile in the event of a runaway chain reaction, since this would absorb enough neutrons to dampen it. The experiment went off without a hitch, however. Instead of disaster, "they changed the world and toasted with martinis."

Helen expects a similar outcome this time. As Ellis announces that criticality has been reached, she suggests to Charlie that they go back to her room for a drink to celebrate. Yes,

it's 9 AM and technically this is a dry town, but the resourceful physicist smuggled a few bottles of whiskey in her luggage for the occasion. Why not toast the dawn of the new world?

Oh, Helen. You should know better than to tempt fate. Ominous buzzing alarms begin to sound almost immediately after the criticality announcement. For some mysterious reason, the reactor has shut down. Ellis has his men remove the control rods, and assures Charlie they'll figure out what triggered the shutdown once they sort through all the data. It's just a minor technical glitch, he insists, no call to over-react and cause panic with an evacuation. Except then another alarm goes off, indicating a sharp rise in the core temperature at a rate of 5 degrees each second. Ellis has a cool-down procedure in place, but Charlie points out that this could actually melt the core. Ellis responds — and I paraphrase — yeah, yeah, you're a big-shot smarty pants, but this a factory, not a college lecture hall, and we've done just fine managing our reactor without you so far, so shut up and let us handle this.

Fortunately, Helen figures out that something is building up inside the reactor, probably related to one of the chemical byproducts of the fission reaction. The onsite expert on those byproducts? Ellis's assistant, Theodore Sinclair, who is a nuclear physicist reduced to fetching coffee because racism. Charlie and Helen find a bitter Theodore packing his things, having been banned from even being inside the reactor room after trying to help Charlie and Helen before. "You can't leave, the core temperature is 1000 degrees!" Charlie exclaims, to which Theo responds, "Why do you think I'm leaving?" But in the end, that reactor is his baby and they convince him to help.

It all comes down to how a nuclear chain reaction works. On average you want to get more than one neutron out than you put in, running the reactor right at the point of criticality. Yet you don't want the neutron recapture rate to be too high. Helen is right: it's all about the byproducts, like radioactive iodine, which decays over six hours into radioactive xenon (xenon-135). Xenon-135 has a very high neutron capture rate, a unit of area measured in barns, "as in the broadside of a barn," says UCLA physicist David Saltzberg, who provided some technical consultation for this episode. So the reactor stalls out; there aren't enough neutrons being pumped out to sustain the chain reaction, even though, for the first six hours, it runs just fine. The good news is that xenon-135 will eventually decay — but it takes nine hours. "Imagine you're driving a car, but when you hit the gas it takes six hours before the car starts to accelerate," says Saltzberg. "Then you hit the brakes and it takes nine hours before things start to slow down. This is how you drive a nuclear reactor."

That's how Theo figures out that xenon-135 is the likely culprit: he knows there has to be a chemical byproduct with a neutron recapture rate of 2.2 million barns (compared to about 500 barns for uranium), and xenon-135 fits the bill. This rare isotope is poisoning the reaction, recapturing neutrons "faster than we can supply them." As Theo tells Charlie and Helen, "Sometimes the most crucial elements in a reaction are pretty much invisible. Sometimes they're barely allowed in the building." An incident very much like this occurred at the Hanford nuclear facility in Washington State in the 1940s. The reactor died, and Eugene Wigner John Wheeler [correction] ended up figuring out the problem — in part because Fermi, in a different time zone, was asleep at the time.

The solution is counter-intuitive: taking Theodore's advice, Charlie tells Ellis to add more fuel to the reactor, since it was taking the fuel rods out that caused the temperature to rise in the first place. According to Saltzberg, this is what happened at the Chernobyl facility in 1986: the operators didn't realize that xenon poisoning was the reason they had lost power, so they pulled out the control rods. This actually increased the neutron flux, over-heating the core, and ultimately resulted in one of the worst nuclear accidents in history. (By 1986, frankly, any qualified nuclear operator should have known about xenon poisoning.) That doesn't happen here, because Theodore's solution saves the day.

While all this drama is playing out in Tennessee, Charlie's wife, Abby, is chagrined to learn that the woman traveling with her husband is not only single, but pretty, and a PhD. She unloads to her next-door neighbor and new BFF, Elodie, who assures her she has nothing to worry about: "If your husband prefers hamburger to filet, he deserves an empty stomach." Abby lets slip that she has heard Elodie's love-making with her husband, and is shocked when Elodie cheerfully confesses that she fakes her orgasms: "I only get to the top of that hill climbing alone." She suggests a girl's night out and loans Abby an outfit, since her own are pathetically proper and conservative.

They end up at seedy local bar, masquerading as "Anne and Diane," a couple of WACs from



the base. One of Abby's dance partners gives her a 90% proof drink, with predictable results. He lures the tipsy Abby into a back hallway, but the watchful Elodie intervenes and takes her home. She is tucking Abby in, with Abby still protesting that she was having fun and isn't the least bit tired, teasingly asking Elodie to dance with her. Elodie leans in and kisses her — and let's just say that Abby responds with enthusiasm to this introduction to the Sapphic arts.

Her husband Charlie has been bonding with Helen in an Oak Ridge coffee shop, Helen sneaking shots of whiskey into the cups to help him relax after the day's events. He's still not sure they won't charbroil the state of Tennessee before this is over. Helen reveals that she is actually Dutch by birth: her mother is buried in Holland, and her father fled to London when the war broke out. Charlie confesses that his mother lives in St. Louis and his father is an inmate in a state penitentiary — something he has never even told his wife.

Once the confessions start, they just keep coming. We learn that Helen had become pregnant the year before by a classics professor at Princeton, who gallantly proposed marriage. And she might have accepted, had Frank Winter not offered her the chance to be the only female physicist at Los Alamos. Her beau refused to accompany her, "so I laid down on a piece of metal in a duplex in Teaneck" and terminated her pregnancy. Charlie says it must have been a complicated choice. Her response lays out the dilemma facing any woman physicist of that era: "When the war is over, you'll get tenure anywhere you want. Even Theodore. He'll be fine. Academics choose a black man over a woman every time. I'll fight to get an adjunct job at Podunk Junior College. But I don't give a shit. Because for however long the world lasts, I get to do what I love." Her dream just comes with a very high price tag.

They end up drinking and bonding some more in her hotel room, with flirtatious overtones — but the revels are interrupted by a soldier calling them back to the facility. Now that the reactor has settled back down, they're bringing it back to critical. The next day, Helen bids farewell to Theodore, who has been allowed back into the reactor room, provided he "remembers his place." Why does he stay? "This is as close as I can get to wherever you're building what we both know you people are building," he admits, and asks her to pass his work on neutron reactions to Frank Winter. "If he found a way to get a woman there, he can find a way to get me there — no offense." Helen decides to be cool about that, figuring "a rising tide raises all boats."

Romance is blossoming for the Winters' rebellious teenaged daughter, Callie, who is horrified at Liza's insistence that she be involved with some sort of Girl Scout troop on base, requiring her to wear a less-than-flattering uniform. "You look like a leprechaun," Liza teasingly concedes, "But you're our leprechaun." When she appeals to Frank, he admits it sucks, but assures her that once the war is over they'll be back in Princeton as if none of it ever happened. They all just need to get through this stage the best they can. Callie's coping mechanism of the moment: Private Cole Dunlavey, who became smitten with her a couple of episodes ago. They end up sneaking off and sharing a kiss or two, after which they lay back and gaze at the stars and she tells him all about the Greek mythology behind the Taurus constellation.

Meanwhile, Liza is concerned because the maid, Paloma — i.e., Frank's mistress — hasn't shown up for work for two days, despite always being punctual. She and Frank drive out to the woman's home to check on her. They learn that Paloma's brother was a soldier, just killed in action in the Pacific.

Worse, the military won't return his body — standard procedure in warfare — so the tribe can't give him a proper burial according to their Native American tradition. Paloma (through Liza, who has learned a bit of Spanish) asks Frank to escort them onto the base. There is a shrine on those grounds, where the tribe can perform a "releasing rite," if only they had access. Naturally, the military took over the land for the Manhattan Project with no regard for the tribe's religious traditions — a point driven home by a tribe member named Aniceto, who quotes Robert Frost:

*Before I built a wall I'd ask to know  
What I was walling in or walling out,  
And to whom I was like to give offence.*

After the rite, there is an awkward moment when a grief-stricken Paloma throws her arms around Frank and he comforts her, as Liza looks on in shock. Paloma hugs her too, but Liza is beginning to suspect there is more to Frank's relationship with their maid than he lets on. But

not for long — Paloma quits the very next day, telling Liza she's no longer comfortable working for the Winters. It's unclear just how much Liza knows, as opposed to merely suspects; she's certainly not eager to find a replacement.

It's an awkward morning after for Abby, too, who sleeps until noon before waking up — alone, no sign of Elodie apart from the rumpled bedclothes — with a heck of a hangover. Is it me, or is the nanny just a wee bit judgy when she finds the lady of the house still naked in bed in the middle of the day?

Charlie and Helen return to base camp that evening, and when Helen asks whether they're supposed to go back to being sworn enemies now, he dodges the question. He also refuses her offer of more drinks later. Helen takes Charlie's rejection in stride, hefting her suitcases and marching into the Winter lab with her head held high. She pulls out the envelope Theodore gave her, considers a moment, and then tosses it into the trash. Nooo! What happened to a rising tide lifting all ships? I guess Helen has decided to look out for Helen.

Conveniently, Paul Crosley is also there, working late in an ambitious attempt to impress Winter. Noticing the whiskey she pulls out of the case, he admits he could use a drink. She suggests they could just skip the drink. She wants Charlie, but if she can't have him — well, Crosley is a decent consolation prize. The girl has needs.

Charlie finds Abby in bed, and professes his ardent love for her, unaware of her tryst with Elodie. But he needs to get back to the lab to ponder the implications of the xenon-135 poisoning for Ackley lab. On the drive home, he and Helen had car trouble because the gas station attendant had watered down the gasoline. "Even a Cadillac won't run if the fuel's no good," Helen observes — and Charlie realizes that Ackley's Thin Man design for the bomb is based on the plutonium produced by the cyclotron in Fermi's Chicago lab. The plutonium being produced in the reactor comes with lots of byproducts, like iodine and xenon — the equivalent of water in the gas. "What if reactor plutonium isn't pure?" he wonders. Helen shrugs and admits Frank Winter had already accounted for this because he always assumes the worst: "The implosion model could run on crude oil."

And there is the key to how the B-plan will become the A-plan for the Manhattan Project. The reason Thin Man ultimately didn't work came down to the difficulties of scaling up from making small amounts (micrograms) of plutonium with the cyclotron to making larger amounts (kilograms) in a nuclear reactor. Remember that the most common form of uranium is U-238. If you inject an extra neutron, it becomes U-239, a highly unstable isotope that rapidly decays into neptunium, and then decays again into Pu-239, an excellent fissile material for bomb purposes.

Once you get Pu-239, ideally you should remove it right away, but it's a time-consuming process, spanning a couple of months, to get sufficient material for a bomb. While you're waiting, lots of extra neutrons continue to fly around the reactor, and some of them get absorbed by the plutonium. It becomes Pu-240. Pu-240 is fissile, which is good for a bomb, but it undergoes spontaneous fission, which is bad. It happens so quickly there is not enough time to assemble the pieces of the gun model used in the Thin Man design. The chain reaction kicks off too soon.

"It's a linear versus square problem," Saltzberg explains. Pu-239's neutron capture rate is linear with time; that of Pu-240 is exponential with time. The longer Pu-239 sits in the reactor, the more likely it is to absorb extra neutrons and become Pu-240, which absorbs neutrons exponentially. "That's why the small amounts made in the cyclotron were fine, because there were nowhere near these quadratic effects, where twice the exposure makes four times the Pu-240," explains Saltzberg. The larger amounts made in the nuclear reactor necessarily required longer exposure to the hot neutron fluxes, and hence there was more contamination. And it was far too costly to then try to separate Pu-239 and Pu-240, because they are so chemically similar.

Physicist Emilio Segre discovered this when he measured the neutron capture rates for Pu-239 and Pu-240; he realized immediately that Thin Man wouldn't work because the contamination would be too high and the design required pure Pu-239. It's not really a spoiler to say so: while the show's writers might tweak the history and the science for their narrative ends — Manh(a)ttan is not, nor was ever intended to be, a documentary — they're probably not going to rewrite history entirely. As Saltzberg put it, this is a world "where the laws of physics still apply. And they [the writers] use real stories for inspiration."

## The Second Coming

Season 1  
Episode Number: 8  
Season Episode: 8

Originally aired: Sunday September 14, 2014  
Writer: Sam Shaw, Dustin Thomason  
Director: Daniel Stern  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Bill Camp (William Hogarth), Rebecca Hill Casey (Waitress), Stafford Douglas (Thatcher), Tara Elliott (Housewife), Robin Thomas Grossman (Maxwell Rubins), Jason E. Hill (Military Policeman), Jonathan Hubbard (Scientist), Chadwick Johnson (Scientist), Steve Larese (Scientist), Audrey Moore (Francene), Lauren Myers (Jeannie), Rodney Nagel (Scientist), Rafael Torrez (Scientist), Barry R. White (Military Policeman), Jaron White (Military Policeman), Jefferson White (Cole 'Iowa' Dunlavey)  
Summary: When British scientists who have done extensive work on an Implosion model similar to Frank's visit The Hill, Frank gains some unsettling perspective. Meanwhile, Charlie grapples with whether to tell Akley about the revelation he made about Plutonium, as well as his fate with their group. As Charlie and Frank both face grim predictions about the future of their prototypes, the stakes at home are raised when Abby discovers what is really happening to the Jews in Europe.



The excitement in the Winter lab is palpable, as Frank's scientists try to guess the identities behind the pseudonyms given to the British physicists, which tend towards the erudite and literary, if you're being generous, or pretentious, if you're a crass American (e.g. "Stephen Blackpool," a character from Charles Dickens' *Hard Times*). There's a catch: the new arrivals will get to choose whether to work on Ackley's Thin Man design, or with Winter's implosion group. Fortunately, Winter has his own resident Brit in Paul Crosley, who offers to serve as a cultural liaison:

"There is an art to properly seducing an Englishman."

Charlie Isaacs is oblivious to the coming invasion. Since getting back from Oak Ridge and having his troubling insight into a potential death knell for the Thin Man bomb design, he has been working feverishly through the nights, going over every calculation concerning the properties of plutonium isotopes. The issue, you may recall from last week, is that Pu-239 made in a reactor quickly absorbs extra neutrons flying about the reactor [thanks to a commenter for pointing out the error] and turns into Pu-240 — which undergoes spontaneous fission and thus would set off any bomb prematurely, before it could be fully assembled for deployment.

Charlie rushes off to Helen's room in the middle of the night to tell her this, and is soundly rebuffed when he asks to come in so they could figure out what to do with this insight. It's mostly

because Helen is not alone: her new paramour, Paul Crosley, is there. And, you know, good for Helen. But it leaves Charlie without his former ally, caught in another crisis of conscience.

There is one other person Charlie can trust: Theodore Sinclair, the black nuclear physicist he met at Oak Ridge, whose specialty is the byproducts created in nuclear reactors. He makes a deal with his wife, Abby, still working as a switchboard operator: if she arranges a non-monitored phone call for him, he'll look the other way when she leaves the base without permission to meet her parents, who are passing through by train en route to California. Abby does so, except she breaks her promise to Charlie and listens in on the conversation with Sinclair.

The verdict, when it arrives, is not good. Later that day, Charlie gets a message from "Christopher Columbus" (Sinclair's chosen code name): "400,000." What does it mean? It's a reference to the spontaneous fission rate of Pu-240. Physicists certainly knew at the time that even-numbered isotopes undergo spontaneous emission, but everyone assumed that this wouldn't be a problem as long as the rate was "under 300." So Sinclair's calculation that the number is 400,000 for Pu-240 is truly disastrous.

And here we get an interesting artistic choice by the writers on how to convey Charlie's inner turmoil about what to do: a waking dream sequence, whereby he marches into Ackley's office and tells his boss the Thin Man design won't work with reactor-bred plutonium, and Dream Ackley asks him why he told him, given his moral misgivings about building a bomb in the first place. Dream Charlie protests he was just doing his job. Dream Ackley tells him "You sounded the alarm. Now we'll reorganize all our resources." The bomb will be built, it will be detonated, and "all those lives will be on your head, Charlie." Then Dream Ackley calls him a "conniving ungrateful little Jew," which is when we realize this isn't really happening. But it's enough to give Charlie pause and not go immediately to Ackley with the news.

Further complicating the situation is Ackley's decision to name Charlie as his second in command, in charge of the lab during Ackley's absences, which are going to be more frequent in the coming weeks as they move out of the design phase to actually build Thin Man. He just wants Charlie to work a bit on his people skills, since he's managed to alienate the rest of the team. Now would be a very good time for Charlie to spill what he's learned about the design flaws; instead he waffles and asks to think about it, fearing he might not be good management material. Ackley is annoyed, but gives him a day.

Meanwhile, Babbit runs into Liza on base and is shocked to learn that not only is she barred from scientific research during her husband's tenure on the Manhattan Project, but she can't even work a menial job, like laminating badges, because she failed her polygraph test designed to ferret out any security risks. In fact, she can't walk around the research area at all unless accompanied by an MP. She asks him to just forget about it, but Babbit is a loyal friend, particularly to Liza, who never had a problem with his sexual orientation and always respected his privacy.

He confronts the man who administers all the tests, interprets the results and reports them to security, and asks him to review Liza's case, convinced it's all just a misunderstanding due to a false positive. (This is a common occurrence with the very unreliable polygraph test.) When the man is initially dismissive, Babbit resorts to thinly veiled blackmail: review Liza's case or he might just happen to mention that he shares Babbit's own private secret — you know, a couple of middle aged bachelors who prefer the company of men.

The polygraph expert reveals it wasn't a false a positive: Liza failed Question 17: "Have you ever received treatment or been institutionalized for a disorder of the mind?" We aren't told what Liza's particular disorder might be, but Babbit's threat works: Liza gets her security badge allowing her to have some sort of job on base for the duration of their stay. He tells her the polygraph was "probably on the fritz that day," so her clearance was denied in error, in an attempt to respect her privacy. Liza isn't buying it: "Did they show you my file?" Babbit shrugs: "It's none of my business." So now Liza can have a job.

The British physicists finally arrive, and Ackley wastes no time laying on the charm, as Frank Winter and Paul Crosley assess the new recruits from a distance. Crosley is not impressed: "It looks like the A team stayed home," he tells Frank — with the exception of one William Hogarth. Frank recognizes the name immediately; Hogarth headed the British implosion project, and thus Frank is eager to have him on board, oblivious to Crosley's sudden frosty silence when he recognizes Hogarth.

Whatever Crosley's reasons, he sucks it up like a good soldier and joins Frank at a dinner

with Hogarth, who reveals himself to be a drunken boor of the first order, smacking their server on the derriere and propositioning her crudely, while downing oceans of very expensive wine with the directive to put it on "Lord Crosley's" tab.

Yes, in addition to being a brilliant physicist, Crosley is English nobility, a few notches down in the succession for the British throne. And Hogarth bears some sort of grudge towards him underneath that forced joviality, perhaps because the highly eligible Crosley wasn't interested in marrying his daughter. He's also a recent widower, and when Frank tries to broach implosion, he makes his terms for joining the Winter lab crystal clear: he wants sex, i.e., access to the entrepreneurial prostitutes on base.

And that's how Frank and his entire team end up awkwardly listening to the sounds of Hogarth's enthusiastic rutting with a string of young women for hire, since "Lord Crosley will happily pay." But then he spies Jeannie — the young woman Fritz has been "dating" — and Crosley finally snaps. He intervenes and pays Jeannie not to have sex with Hogarth. "A slave would do well not to poke the lion," Hogarth sneers, "adding, "She named him Henry, by the way."

Yikes. Apparently Crosley did take a shine to Hogarth's daughter, but abandoned her when she became pregnant, leaving England to join the Manhattan Project. We knew he was a player; now he's revealed as a cad, a bounder, a deadbeat dad. Frank intervenes as the tension escalates, and Hogarth declares that none of the Brits will be joining Winter's "group of misfits and liars." As for Frank's implosion design? Hogarth declares it a pipe dream, claiming he had disproved the theory and would send over his research so Frank could wallow in his pathetic failure. "Get this Limey prick out of here," Frank snaps. Oh well. At least Jeannie didn't have to endure intimate relations with the revolting Hogarth.

The key issue, alluded to in earlier episodes, is controlling the shock wave from the implosion — something Hogarth declares is "out of reach." Historically, a Los Alamos physicist named Seth Neddermeyer developed an implosion model for the design, in which explosives were used to compress a plutonium sphere (the "pit") so rapidly, its density would induce criticality and set off a nuclear chain reaction. (NB: Frank Winter's character might have been partially inspired by Neddermeyer, but Winter is still 100% fictional.) But the shock wave from the implosion didn't last very long before dissipating outward, and if it happened too quickly, only part of the pit would be compressed at any given moment as the shock wave passed through it, halting the fission. What was needed was a way to hold it all together into a dense critical mass for a mere few nanoseconds longer so the fission wouldn't sputter out (we'll have more on that in future recaps, but feel free to discuss at length in the comments).

Abby Isaacs has been assiduously avoiding her fellow telephone operator, Elodie, since their drunken tryst last week, even switching her shift at work. Elodie sends a gift: a pretty bra, whether hers or Abby's, it's unclear. But the intent is unmistakable.

Abby has other priorities, anyway: surprising her parents on the train from Santa Fe to Albuquerque, her little boy in tow. It goes about as well as most family reunions: initial hugs, a bit of polite conversation, and then her mother bursts into tears. The family has relatives in Minsk, on her mother's side, cousins Abby has never met, who weren't able to escape the country when the Nazis invaded.

Her parents have learned that the Jewish ghetto in Minsk has been "liquidated." Those cousins are most likely dead, along with their toddler. They ask if Charlie can help find out for sure, but Abby says (correctly) that he can't; his job is the science.

The Minsk ghetto was one of the largest in Eastern Europe, housing around 100,000 Jews, almost all of whom died during the war, starting with the intelligentsia, although large swathes of the population were routinely murdered from its establishment in 1941 until the final "liquidation" on October 21, 1943. By then, only about 9000 remained, most of whom died in the liquidation.

The sheltered Abby doesn't want to hear about any of this at first, but the brewing quarrel with her parents is cut short by the arrival of a government official, who has tracked Abby to the train. She only had a day pass to leave base for Santa Fe, not hop on a train to Albuquerque. She ends up in Colonel Cox's office, and slyly bursts into tears, explaining she is distraught about wanting to know the fate of her relatives in Minsk. He doesn't give her any news, but lets her off the hook with a warning.

But Private Dunlavy, who is holding the baby while she meets with Cox, overhears, and shows up later that night with all the classified information he could find about what happened in

Minsk. And the blinders fall from Abby's eyes as she sees definitive proof of the horrific genocide taking place in Europe. Charlie comes home to find his wife tearful and shaking, not just over the death of the cousins she never met (and now never will) but over the sheer magnitude of the numbers: over one million Jewish people executed (six million by the time the war ended). "I don't even know how to think of a number like that," Abby admits. And while there is nothing she can do about it, Charlie can — by helping the Manhattan Project succeed in its mission to build a bomb.

That turns out to be the catalyst spurring Charlie to action, but he still doesn't go running to Ackley: he knocks on Frank's door instead and tells him that Thin Man is "dead in the water." Frank has been poring over Hogarth's papers in dismay and tells Charlie that implosion seems to be dead in the water too. Without a veritable army of scientists, there's no way he can solve the shock wave problem. "So... what are we going to do about it?" Charlie asks. And Frank lets him into the lab. At last these two adversaries are working together, as they should have been all along.

## Spooky Action at a Distance

Season 1  
Episode Number: 9  
Season Episode: 9

Originally aired: Sunday September 21, 2014  
Writer: Mark Lafferty  
Director: Andrew Bernstein  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Daniel Stern (Glen Babbit), David Harbour (Reed Akley), Peter Stormare (Lazar), Carole Weyers (Elodie), Adam Godley (Dr. Adelman), Josh Cooke (Lancefield), Raoul Trujillo (Javier), Tailinh Agoyo (Paloma), Kenneth Miller (Purcell), Stafford Douglas (Thatcher), Paul Blott (Church), Bruce McIntosh (Samaritan), Travis Hammer (O'Byrne), Ben Hall (Joey Isaacs), Miles Hall (Joey Isaacs), Judith Jones (Blonde Mother), Kenneth Ruthardt (Tewa Man), Catharine Pilafas (Nurse), Brent Lambert (Scrawny Scientist)  
Summary: Pivotal changes are made to the teams when Charlie accepts Akley's offer as part of his and Frank's plan and Helen is part of the deal. Frank is blackmailed, and as he's distracted trying to find a solution, the men of Implosion seize the opportunity to blow off some steam. Meanwhile, as Abby's marriage continues to disintegrate, she finds comfort in the arms of the alluring Elodie. Elsewhere, Liza takes a new job and makes a chilling discovery.



Last week, Ackley offered Charlie a promotion that would make him Ackley's deputy/second in command in charge of the lab in Ackley's absence. He gave the waffling Charlie 24 hours to think about it. Charlie shows up in his boss's office just before the midnight deadline and says he'll accept, on three conditions.

First, he wants security enhanced — specifically, he wants even more compartmentalization among the scientists. Second, he insists they all need to recheck the math for Thin Man's design, even though technically they're supposed to be moving into the build phase. "You make these boys backtrack, they will hang you by your slide rule," Ackley warns — and they already don't like Charlie. But he figures it's Charlie's funeral. Finally, Charlie asks for Helen Prins to be reassigned to the Ackley lab as his deputy. As he tells the assembled scientists in Team Ackley when the announcement is made (to less than enthusiastic applause), "Anyone who has a problem answering to a woman can transfer to another site." You tell 'em, Charlie.

Helen is not happy with the new arrangement when she finds out. Not only does she have to retake the security polygraph test, but she genuinely believes the implosion model will turn out to be the end game. When she complains to Frank, he brusquely informs her it was his idea to

have her transferred. He claims it was in exchange for a bunch of IBM computers Ackley has to spare, but by now it's clear he and Charlie have cooked up some sort of scheme — not even Babbit is in the loop.

Helen is miffed: "You really are a son of a bitch." Well, yes. She's just figuring this out now? She takes out her frustration on the polygraph examiner, giving flippant answers to all his questions until he chides, "This is not a vaudeville act."

Charlie's request for beefed-up security means everyone has to be frisked when they pass through security. "We've created a security monster," he tells Frank when he secretly stops by the Winter house that night. We learn that Charlie has 50 of his scientists working on Frank's implosion problem, although they think they are double checking the math for Thin Man. Charlie is worried they'll figure out the ruse; these are pretty sharp physicists, after all. Frank is dismissive. This was the reason for insisting on stricter compartmentalization. "The calculations are broken up into tiny parts," he insists. "If the puzzle pieces are small enough, there's no way one guy could see the big picture."

Frank has other things on his mind. For starters, he's scheming for a way to get more explosives and detonators for testing the implosion principles, since Charlie can't requisition them through Ackley's lab without giving away the scheme. The search brings him to a remote armory headed by a rugged engineer named Lazar, who appears to be supervising bomb drop tests. Frank finds him standing on a bulls-eye target in a field, mumbling to himself as he makes notations, until a plane flies overhead and drops a charge, which explodes in midair.

Frank first pretends to be interested in trading a bottle of vodka for some of Lazar's hand-made sausages, but Lazar isn't fooled; he knows exactly who Frank is, and what he wants. And he rejects the vodka, which surprises Frank, since Lazar is Russian by birth and it's kind of the national beverage. But he's American by citizenship; you can tell by his cowboy hat, trenchcoat and Winchester rifle. "I hate liars and I hate vodka," he tells Frank, not to mention ethnic stereotyping. Honestly, Lazar is pretty awesome. He also doesn't take kindly to attempts at bribery. And he is unimpressed with Frank's wheedling attempt to get in his good graces by mentioning their mutual friend Albert Einstein. Lazar doesn't like shameless name-dropping either. He flatly refuses to give Frank any detonators or TNT.

Also competing for Frank's attention: chickens are coming home to roost regarding his affair with maid, Paloma. He receives a visit from a man named Javier, claiming to be Paloma's cousin. Frank's daughter, Callie, helpfully translates. Javier's pitch is that things are hard down at the pueblo, what with the bad harvest and all. Javier references Paloma's "many skills and talents," adding that she'd told him Frank is a generous man. It's thinly veiled (for Callie's sake) blackmail: Javier wants a pickup truck by Friday. Or else. The consequences aren't specified, but Frank obviously doesn't want the affair made public.

It turns out that Charlie was right to be concerned. Helen quickly figures out that Charlie has Ackley's scientists working on the implosion problem. She gets the reasoning: Ackley has the resources but the Thin Man design concept is fatally flawed. Implosion is a good model, but Winter's lab lacks the manpower to solve the shock wave problem. Charlie swears her to secrecy, but she's not happy about being forced into complicity in the scheme; she's a woman who prides herself on being independent and making her own choices. So as an extra dig, she tells him "I'm screwing Paul Crosley" as she marches out in a high dudgeon.

Speaking of romance, Abby has been avoiding her erstwhile BFF/lover, Elodie, but the latter is undeterred, showing up during Abby's shift at work with a sandwich as a peace offering. And her winsome ways melt Abby's resistance pretty quickly. Soon they are sunbathing and drinking afternoon cocktails just like old times. But some clearing of the air is still in order. Abby asks whether what happened between them was "normal," causing the continental Elodie to shake her head ruefully. "You Americans. Always looking for explanations. Or penance."

By evening they're giggling over wine and arguing about their favorite actresses. Abby loves Vivien Leigh, whom Elodie considers too wholesome. She prefers "Sweater Girl" — a.k.a. Lana Turner. Things are just heating up to another stolen kiss (with Abby once again highly receptive) when Elodie's husband, Tom Lancefield, comes home. He's another Ackley scientist, by far the most hostile to Charlie among the team members. But he's pleasant enough to Abby at first, and invites her to stay for dinner. Abby has bad luck with dinner parties; remember the disastrous evening chez Winter when Frank threw Charlie out in a fit of pique? This one proves even worse, and not because Elodie keeps whispering naughty sweet nothings to the blushing Abby when



her husband's back is turned.

When Elodie clears the table and heads into the kitchen, Lancefield's manner turns creepy, as he silkily tells Abby he'd like to get to know her better. Then things get ugly. He says he can tell she can keep a secret, grabs her breast and tries to grope under her dress. "I'm just being neighborly," he snarls, when she objects and shoves him away in horror. Then he tells her he sees what Charlie is up to, "and the minute he slips up, I'll be waiting."

So, it's more of a power play to strike back at Charlie than a serious attempt at seduction, but it's still gross. No wonder Elodie seeks comfort elsewhere. Frank used Abby to send a veiled message to Charlie a few episodes ago, too. Maybe these guys could grow a pair and communicate with Charlie directly in the future rather than manipulating his poor wife. Even worse: when Abby tells Charlie what happened, he's initially shocked — as any husband would be — but his face changes when she relays the last part of Lancefield's message. So when Abby tells him he ought to do something about the groping, he shrugs. "Men will be men. Best thing is to stay out of his way." This is not going to help their marriage. But he can't afford a confrontation with Lancefield just yet.

Back in the Winter lab, Crosley is pretending he doesn't miss Helen ("She didn't know anything about shock waves anyway"). He and the remaining scientists (Meeks and Crosley) are at an impasse on cracking the shock wave problem. Brief reminder: in the implosion model, explosives were used to compress a plutonium sphere (the "pit") so rapidly, its density would induce criticality and set off a nuclear chain reaction. But the shock wave from the implosion didn't last very long before dissipating outward, and if it happened too quickly, only part of the pit would be compressed at any given moment as the shock wave passed through it, halting the fission. What was needed was a way to hold it all together into a dense critical mass for a mere few nanoseconds longer so the fission wouldn't sputter out.

"The only problem with implosion is that it's impossible," Fritz moans. So he suggests they need to have some fun and breaks out a bag of psychotropic mushrooms. Crosley is game, Meeks is reluctant: apparently he tried marijuana once, "and you don't even want to know what happened." Fritz assures him the Indians have been eating them for centuries with no ill effects, and ultimately Meeks caves to peer pressure.

Is there anything more entertaining than physicists tripping on mushrooms? "I see a moat, and a boat and I am sailing towards an asymptote," Fritz rhymes, giggling with delight, before turning to Crosley and announcing, "You're in love with Helen, aren't you?" Crosley looks surprised: "Yes, I suppose I am." (Poor Crosley. We all know Helen really fancies the unavailable Charlie.) And they hug it out, in true stoner "I-Love-You-Man" fashion. Meeks seems to be less affected, and Fritz opines that maybe he should eat some more mushrooms, since he probably has a fast metabolism and it's affecting his high.

This is when Meeks has a "Eureka!" moment. "Metabolism. Rates of absorption." He's convinced this is what they've been overlooking in their struggles on the shock wave problem. They all head back to the lab to follow up on this exciting new development, madly scribbling equations on several blackboards in a frenzy of 'shroom-fueled inspiration. The next morning, Babbit arrives to find all three asleep, having worked all night — but the blackboards are filled with gibberish. Fritz sheepishly tells him they were working on absorption rates. "Absorption rates have to do with shock wave control," Babbit snaps. "Quit playing Hangman on my blackboards." I guess we'll have to wait for a future episode to see how they make implosion viable at last.

Meanwhile, Frank has not given up on winning over Lazar, going back to the armory a second and third time. "You are persistent," Lazar observes dryly. "It's an over-rated quality in a man." But then Frank tells Lazar about his affair with Paloma and Javier's blackmail and asks for his advice.

He has two choices: come clean to Liza and face the consequences, or stand up to Javier. "Situations like yours, they end in truth or violence," Lazar the Cowboy Philosopher observes. He still can't give Frank any detonators — the army keeps careful count — "but that shotgun? That's mine."

Frank opts for the latter option, driving out to meet with Javier in a remote area. Javier arrives with a few friends, clearly intended to intimidate Frank. But then Lazar drives up in a pickup, and gets out, shouldering his shotgun and doing his best Clint Eastwood impression. (I kept waiting for him to tell Javier, "Go ahead — make my day.") Frank brought his own backup, and my money's on Lazar in a shootout.

Frank drops the keys to the pickup in the dirt at Javier's feet: "Are we done?" Javier says they will be done when Frank tells him what the US Army is building on their sacred land. Frank just shrugs and walks away: "Enjoy your truck." Oh, and Lazar gets the keys to Frank's car for his trouble — a fair trade, since Liza never much liked the car anyway.

But there's a further twist. When Javier returns to Paloma's house with his new truck, the mysterious Samaritan is waiting — the guy who's been tailing Frank on behalf of Occam, the government interrogator. Javier reports that Frank told him nothing about the work at the base. The scheme was an elaborate ruse to test Frank's loyalty to the Manhattan Project. I guess he passed.

Finally, after Babbit intervened on her behalf last week, Liza Winter has a job on base. She's helping the obstetrician, Dr. Adelman, in the hospital, which seems to have a number of pregnant women and newborns on hand. But she has an ulterior motive. Once Adelman leaves for the day, she snoops through some of his files and borrows a Geiger counter. She starts checking the newborn babies with it — and finds one that has obviously been seriously exposed. Combine that with her dead bees and the odd purple flower she's been studying, and she has grounds for serious concern.

Among the questions left open: we briefly see Ackley, alone in his office, burning an envelope addressed to Oppenheimer. Who knows what it contained, or what the ramifications of Ackley's action will be?

# The Understudy

Season 1

Episode Number: 10

Season Episode: 10

Originally aired: Sunday September 28, 2014  
Writer: Tom Spezialy  
Director: Simon Cellan Jones  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Ryan Jason Cook (Stanhope), Tara Elliott (Housewife / Secretary), Jenelle Gallegos (Housewife), Adam Godley (Dr. Adelman), Chadwick Johnson (Scientist), Steve Larese (Scientist), Lora Martinez-Cunningham (Ida Fredrickson), Rodney Nagel (Scientist), Rafael Torrez (Scientist), Courtney Walsh (Switchboard Operator), Barry R. White (Military Policeman), Jaron White (Military Policeman), Jefferson White (Cole 'Iowa' Dunlavey), Daniel Zubiarte (Military Police)  
Summary: Old demons resurface for Frank when Annie Liao shows up to The Hill to uncover the truth about what happened to her husband. Abby is torn between her marriage and her undeniably intensifying affair with the beguiling Elodie. Meanwhile, Frank and Charlie encounter a critical flaw in Charlie's previous work, and Liza slips back under the spell of old behaviors.



The understudy when it comes to the Manhattan Project is Winter's implosion design concept, which has taken a back seat to Ackley's Thin Man prototype since the series began. But Frank's team — minus Helen, who has been transferred to Team Ackley — still hasn't cracked the problem of controlling the shock wave. Meeks tries for optimism, pointing out that Thomas Edison always took hope whenever he hit a brick wall. Babbit's having none of it: "We didn't hit a brick wall. We hit the Grand Coulee Damn." To add insult to injury, instead of more scientists to help with the problem, they must contend with a couple of janitors

lurking on the premises, meaning they can't discuss classified topics when said janitors are present. Frank is not nearly as upset as he should be, causing Babbit to wonder what he's up to.

What he's up to is conducting detonation experiments with Charlie Isaacs and Lazar at the armory, looking for a clue as to how to control the shock wave blast in the implosion bomb. They stand around a vat of water with three small point charges and set them off, watching how the shock wave spreads outward. Frank explains that he envisions 32 "points" around the spherical core of an implosion-type bomb, detonated simultaneously; the trick is how to redirect the shock waves to create a perfectly spherical implosion, which is tantamount to turning all those tiny explosions inside out — the waves must be concave, not convex. Lazar thinks it quite simply can't be done.

There's nothing like some fun with explosives to get guys to bond; the flinty Lazar even shares his chewing tobacco with Frank and Charlie, although the latter reacts badly to it. Frank and Charlie aren't becoming friends, exactly, but there is some noticeable warming of their frigid bond — even on the charge of plagiarism. Frank now thinks that while Charlie may have lifted one idea in his notorious paper on a new nuclear cosmology, the rest of the paper was sound — a far more sensible and realistic attitude than we've seen previously from Frank.

And when an angry Babbit realizes that Frank and Charlie are in cahoots — hoodwinking Ackley scientists into working on detonation space calculations — Frank says, "I've come to trust him [Charlie]." Babbit is still unhappy. Frank may go to prison when he's found out, but Babbit — already under a cloud of suspicion because he loved a gay Communist physicist — could face a firing squad. As always, Frank forges ahead for the good of implosion, with little thought to possible collateral damage.

Charlie's paper ends up giving Frank the "Eureka!" moment we've all been waiting for when he reads it later that day. He joins Charlie and Lazar (still playing with explosives) at the armory and says he's figured out how to shape the shock wave using "explosive lenses" and by varying the burn rates of the explosive materials used, exploiting something called the "Munroe effect."

This is, indeed, how the real physicists on the Manhattan Project approached the shock wave control problem. The Munroe effect — named after a 19th century chemist named Charles Munroe — describes how blast energy can be focused by a hollow or a void cut into the surface of an explosive. Munroe discovered the effect quite by accident when he was working with a block of guncotton, detonated next to a metal plate. The lettering stamped into the explosive block was also cut into the plate when the charge went off.

Munroe built the first so-called shaped charge in 1894, and it was featured in *Popular Science Monthly* in 1900, but it wasn't until World War II that it was adapted to nuclear warheads, using a 32-point assembly to create an "explosive lens," just as Frank described. And yes, it is critical to vary the burn rates of detonation to get an expanding wavefront to turn inside out. The Gadget prototype used in the famous Trinity Test, as well as the Fat Man bomb dropped on Nagasaki, combined fast and slow explosives. (Helen specifically mentions Baratol when Charlie tells her they've solved the problem, and that was the slow burn rate explosive used.)

Meanwhile, there is an unexpected visitor to the base camp: Annie Liao, widow of the unfortunate Sid Liao, who was shot for suspected treason way back in the second episode. She shows up at "Post Office Box 1663" and refuses to leave until she speaks to Frank Winter, intent on finding out just how and why her husband died. She gets the sinister Occam instead, pretending to be Frank — at least at first. His probing questions as to what Sid may have told her, or whether he asked her to pass along any messages to anyone, quickly arouse her suspicion, and she guesses he is not Frank Winter. "There is no one here by that name," Occam says, because he is a lying liar-man.

Occam advises her to go home — via a train ticket the US Government has provided — and forget all about the past, focusing on her daughter's future instead. Annie demands to see Sid's death certificate and any formal report. She swears she wants the truth. "You want a bedtime story, a fairy tale," Occam counters, but he gives her a sealed file pertaining to Sid's death and tells her he wasn't a hero — he was a spy.

What this episode needs now is a spot of sex, and we get that in spades with Private Cole Dunlavy and Callie making out in her bedroom. Callie is all for going further — "I don't think desire is evil" — but Dunlavy turns out to be the shy, overly moral sort and pushes her away. He asks why she's with him at all, wondering aloud if it isn't just to rebel against her parents, because he shot their friend, Sid Liao. An angered Callie tells him Sid was her friend, too, and tosses him out. Still guilt-ridden by what he has done, Dunlavy tells Meeks that Annie Liao has been on base and will be heading to the train station by bus the next day. If you're thinking his romance with Callie is kaput, think again. She comes to barracks that night and asks another soldier to give Dunlavy a Bible. When Dunlavy opens it to the marked page, Callie has written in the margins: "I like you because you make me feel that someone's listening." Aw, young love survives.

Things are also still hot and heavy between Abby and Elodie, who engage in the Sapphic delights in a meadow one sunny afternoon. But when Elodie invites her for dinner, Abby is reluctant, admitted that Elodie's husband, Tom, had groped her the last time. Elodie, to her credit, is shocked at this affront to her lover's honor — more so than Charlie was, frankly. Abby's

still in denial about exactly what's going on between, insisting it's not an affair. And when Elodie meets her for a drink in the very public base canteen, Abby tries to end the dalliance.

Their conversation is interrupted by a young married couple who are friends of Elodie and like to trade partners with other couples (a shocked Abby declines their invitation to join them in bed that night). The wife returns a book the Frenchwoman had loaned her (Camus's *L'Étranger*), which Elodie pointedly describes as being about how "society invents rules to keep us from happiness." She tells Abby that everybody on the project has a secret life: "The difference is you're keeping the secret from yourself." Elodie's mantra is that life is short, and getting shorter given that their husbands are inventing "the end of the world."

That's how Charlie comes home to find Abby reading Camus in the original French — she did study French at her mother's insistence and is clearly quite proficient in the language, not to mention smarter than Charlie gives her credit for. "You buy gossip magazines for the photo spreads, and suddenly you're reading Beaudelaire?" he says with surprise, clueless about how insulting this is to a woman he presumably loves. Abby tells him she knows he's not really working on a new radar system, but he still won't tell her the true nature of his work. Anyway, Camus changes Abby's outlook. When she returns the book to Elodie, she confesses that she has spent her entire life being "exactly the person everyone expected me to be. I don't even know what I want." But for now, she's okay with wanting Elodie.

Meeks takes advantage of Dunlavy's tip and meets Annie briefly on the bus, telling her he wasn't allowed to call or write after Sid's death — and he still can't say what they're all working on. But he assures her that no matter what Occam told her, Sid was not a spy. Annie asks him to deliver a message to Frank: "Tell him there's nothing to feel guilty about." She means he shouldn't feel guilty for being the one to bring Sid on board the project in the first place, but Meeks still has questions as to who might have betrayed Sid, and has an inkling it might have been Frank. Later that night, Occam visits him in the otherwise deserted Winter lab and says he, too, has many questions about Frank. Will Meeks realize the truth and betray Frank in turn for sacrificing Sid Liao for the greater good? Or will loyalty win out?

The episode ends with an unexpected twist. Recall that Liza finally got a job on base helping out in Dr. Adelman's clinic. She's called to assist when there is a contamination emergency, which involves scrubbing down the two men affected — one of whom reveals there have been incidents before. While dumping the contaminated clothing in the bin out back, she notices the stream of waste water pouring into the soil.

Adelman explains the contamination results from the men's work with explosives and the scrubbing is designed to remove all the residue. But he also asks her not to mention the incident to anyone outside the clinic. Small wonder Liza's suspicions increase. She "borrows" the clinic's Geiger counter and scans various items in her own home — dinner plates, linens cutlery, and so forth — and is horrified to discover all exhibit radioactivity.

Frank comes home to find her frantically burning all the bedclothes in an oil drum. "It's all poisoned! It's all radioactive!" she insists. But when she rescans the household items in Frank's presence to prove to him she's not imagining things, she doesn't get any readings on the Geiger counter, and breaks down, sobbing. Apparently she really is imagining things.



# Tangier

Season 1

Episode Number: 11

Season Episode: 11

Originally aired: Sunday October 5, 2014  
Writer: Scott Brown  
Director: Julie Anne Robinson  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Daniel Stern (Glen Babbit), David Harbour (Reed Akley), Richard Schiff (Occam), Mark Moses (Col. Alden Cox), Carole Weyers (Elodie), Christina Kirk (Rose Akley), Josh Cooke (Lancefield), Stafford Douglas (Thatcher), Travis Hammer (O'Byrne), Lauren Myers (Jeannie), Marc Comstock (Magpie), J.B. Tuttle (Ledbetter), Nathaniel Augustson (Bruce), Morse Bicknell (SS Officer), Jackie Jones (Grete)  
Summary: The identity of the U.S. Army's informant becomes compromised with drastic consequences. Occam suspects that someone on The Hill is responsible for the leak — and Frank is at the top of his list. Charlie comes to blows with Lancefield, who makes a stunning revelation about what he knows, and Abby makes a decision that changes everything.



You might remember that Colonel Cox told Frank Winter about a German scientist dubbed "Magpie," who was passing secrets to the US on the Nazi progress on their own bomb development program. We haven't heard anything further about that, but this week we get to meet the Magpie himself — all too briefly, since he is strong-armed by SS officers into a back room, where they are holding his wife with a gun to her head. He is given a choice: if he admits to spying for the US, they will spare his wife. A terrified, tearful Magpie admits it is true, upon which his wife is summarily shot. The officer tells

him he has spared his wife the shame of living with a traitor, and instructs his officers to cut off Magpie's head and send it to Washington, DC. (He is mercifully shot first.)

It's a hell of an opening scene, and the shock waves reverberate through the rest of the episode. Colonel Cox arrives at his office to find the sinister Occam waiting for him. Occam is not happy, and when Occam is not happy, bad things tend to happen. He wants to install hidden microphones all through Cox's office, monitoring every last bit of gossip among even the secretaries. When Cox objects, Occam says it's on General Leslie Groves' orders, after the general received Magpie's head in a box. "Magpie's dead and now we have no eyes on Heisenberg because somebody talked," Occam says. Cox denies anyone on his staff leaked the information, but hesitates just long enough for Occam to become suspicious, asking who else outside the office Cox might have told.

It was Frank Winter, of course — already on Occam's hit list, for reasons that remain a bit murky. During a barbed exchange with his rival Ackley, Frank learns that his mentor, Babbit, has quit the implosion team and taken an administrative position in Oppenheimer's office. When Frank confronts Babbit, insisting he can't succeed on implosion without him, Babbit tersely responds, "You're gonna have to." And he rebuffs Frank's attempt to get him to report back on anything said about implosion, clearly weary of all the lying and scheming and petty politics, not to mention the high human cost.

Frank is definitely playing a dangerous game, and if he has any doubts about the stakes, those are no doubt erased when he arrives home to find Occam waiting for him, accusing Frank of having gotten Magpie killed by leaking the news that the US had a spy on Heisenberg's project. "You think I sold him out to Hermann Goehring?" Frank asks incredulously. "I think it's far more complicated than that, because you are far more complicated," Occam replies. Frank suggests that since Occam likes complexity so much, "why don't you try quantum electrodynamics?" Occam says the only math he's ever been good at is "eliminating variables," and proceeds to demonstrate just how much he knows about Frank and his people, marveling at the loyalty demonstrated by suspected communist Glen Babbit, the late Sid Liao, and even Jim Meeks, who looks like he'd fold at the first hint of tough questioning but still remains loyal to Frank.

Occam finds this strange, since his only loyalty (he claims) is to his country. "You collect people, dented people with little cracks in their Bakelite, where the funniest impurities seep in," Occam concludes. "The only question is which of these broken men did you trust with Magpie's identity" — or maybe, he adds, he told his wife, or his maid, Paloma, implying that he knows full well about Frank's affair with the latter. I'm hardly a fan of the spooky interrogator, but Occam has a point: Frank did tell others about Magpie, namely Charlie — and who knows who Charlie may have told (although he later denies having done so)? Someone betrayed the doomed Magpie, and one can hardly blame Occam for wanting to find out who, especially since we've known since the pilot that there is a rat somewhere on the project.

We don't see much of Liza this episode, but she's having a rough time of it after last week's breakdown, having given up working and dutifully taking her prescribed phenobarbital to ward off anxiety and hysteria. Her last remaining pleasure is a spot of reading under one of the rare cottonwood trees in the civilian section on base.

But it seems even that will be taken away: she confronts a group of soldiers in the process of tearing down her favorite tree, on orders of the Civilian Town Council, whose members are pretty much puppets of the military. They vote how they're told to vote, and in this case they've voted to clear the cottonwood trees to make room for extra housing, since several thousand new scientists are arriving in a few months, "and they all want formica counter tops," a solder tells her, adding (with a hint of sympathy), "You'll never beat the army, lady. Maybe pick on someone your own size."

On the romance front, we find Paul Crosley and Helen Prins in the desert on the morning after an overnight camping trip — because Crosley wanted "love under the stars." Only Helen isn't in love, rejecting the slightest hint of a love token when he tries to place a flower in her hair. He is equally excited about the progress they've been making on the implosion design, breaking compartmentalization to tell her they've cracked the shock wave problem. Helen, of course, knows all about it but pretends otherwise, telling him that while the breakthrough is a great start, it still doesn't "put implosion in the catbird seat" — and Crosley in turn teases her about her use of the American slang.

Undeterred by his lady love's aloofness, Crosley insists they go on a double date with Fritz and his paramour-for-hire, Jeannie (she charges by the quarter hour, which makes her relationship with Fritz pretty profitable). He mostly sulks the whole time, though, because he's biding his time to make a Grand Gesture in the form of a declaration of love and marriage proposal to Helen. I think it's safe to say Helen didn't see this coming. Crosley gives quite a touching speech about how much he respects and admires her, and doesn't want to own her, or limit her freedom. Helen visibly softens as he talks, and for a moment one might think she'll consider the proposal seriously.

But when Crosley comes to her room later that night, hoping for an answer, she sadly tells him that's just not who she is, and maybe they shouldn't see each other anymore. Hurt and bewildered, he flings the door wider and sees Charlie standing in her room. "It's just work," Helen assures him — truthfully — but he's having none of it and storms off, to her chagrin.



"Don't you say a word. He's a good man," she tells Charlie fiercely, who shrugs it off.

Ackley, too, has noticed Charlie spending time with Helen, and is also convinced they are having an affair. About to leave on a short trip, he stops by to tell Charlie that he knows what's he's been up to. Charlie initially fears the worst, thinking Ackley has figured out he's got his team fooled into working on Frank's implosion project, and is visibly relieved when Ackley launches into a mini-sermon on how "family is everything," ordering him to end his "entanglement" with Helen. When Helen comes into his office with Frank's latest assignment, he tells her they need to stage a breakup. She takes perhaps a bit too much relish in slapping him in front of his colleagues, including the perpetually leering Tom Lancefield, who groped Abby a couple of weeks ago.

Speaking of Lancefield, he goads Charlie into joining the boys for Texas Hold 'Em poker that night, even though Charlie initially insists he doesn't gamble. He changes his mind, ignoring taunts from Lancefield about whether his "pretty little wife" would approve. And naturally the two end up facing off in heads-up action across a very big pot. First, Tom (who hails from a wealthy family) makes a huge raise pre-flop — the equivalent of half a year's salary, apparently — which Charlie calls by signing over his paycheck and putting it in the pot (since he does not hail from a wealthy family). The flop is so-so: 9 of Clubs, Queen of Spades, and 7 of Hearts. Charlie and Tom both check. The turn is the 5 of Hearts. They both check again.

The final card is the King of Clubs. It's not the most auspicious set of cards — unless one of them happens to be holding Jack-10, or pocket Kings or Queens — but a cocky Lancefield raises big, telling Charlie he knows how badly he wants to beat him. Is he bluffing? Maybe. Charlie certainly thinks so, offering a rough schematic of his as-yet-unpatented design for a microwave oven, claiming to have cracked microwave transmission while working on radar as a grad student. (It's artistic license. Percy Spencer, a scientist with Raytheon during the 1930s and 1940s, is usually credited with the invention of the microwave.) "Take the pot, it's yours to patent," Charlie says. Since this amounts to a value of around \$8000, it proves too rich even for Lancefield's blood, and he folds what turns out to be Ace-8 (unsuited). So he was bluffing; at best he had high card. But Charlie was bluffing, too, with a measly 2-3 (unsuited). Go, Charlie! If this physics thing doesn't work out, he's got a fine future as a card shark.

Or a maybe a pugilist. As he collects his winnings, Charlie informs Lancefield that he has a tell: a wink in his left eye whenever he doesn't get what he wants. "Here, let me show you." And he summarily punches him in the face, and tells him if he so much as looks at Abby again — never mind grope her — he will break his neck. It's what he should have done two episodes ago, and the fact that he didn't tells Lancefield he's got something to hide. "You're pulling one over on Ackley," he taunts, making it clear he knows their calculations are for implosion, not Thin Man — and as soon as Ackley returns from his trip, he'll blow the whistle on the scheme.

Frank is not happy when Charlie tells him about the threat, and since they can't bring Lancefield into their fold, he suggests Charlie plant some confidential files in his home or office to get his security clearance revoked. The powers that be are far more likely to believe Charlie than "a disgruntled former employee." Yes, it's the Winter Dick Move of the Week; he's amassed quite a few of them by now. Frank assures him Tom will just be shipped back to Chicago — to which I have to interject, COME ON! They shot Sid Liao dead for having classified files outside the office! It's not clear what would happen to someone violating the policy of compartmentalization, but it probably wouldn't be a slap on the wrist, even for the well-connected Tom Lancefield. But Frank insists "We're playing a zero sum game. Every move costs a piece. And this piece tried to rape your wife."

Charlie caves to the pressure, convincing himself that Lancefield will land on his feet in the end. And he decides to exploit Abby's friendship with Elodie, asking her to plant some files in a crawl space under the kitchen (the floor plan is identical for all their houses). He has no idea of the nature of Abby's relationship with Elodie, of course. She has just spent a delightful afternoon with her lover, playing a game of Elodie's design called "Escape."

"For \$100, where should we go?" Elodie asks, poring over a world map. She is mock-disappointed at Abby's lack of imagination when she suggests Albuquerque, but is suddenly more somber when Abby says (in essence), hey, you're French, how about Paris? "Paris was real for me, before the war," Elodie says — not a fantasy. "I do not think there will be much Paris left." Then she lights upon the city of Tangier — from whence this episode gets its title — a free city filled with artisans, lovers, writers and renegades, completely untouched by the war, and hence just the

ticket to fuel their playful fantasy.

Anyway, Abby is justly horrified at Charlie's suggestion that she help him frame Tom Lancefield to get him fired, especially at his insistence that wars have casualties. "I don't even know who I'm talking to," she declares, before walking out. She goes straight to Elodie and asks if they can run off to Tangier together for real; she has money stashed away that Charlie doesn't know about. When Elodie asks what happened with Charlie, she lists a string of grievances, ending with him asking her "to do things no one ever should. I don't know who Charlie is anymore. And I'm not sure he ever knew who I am." After a spot of lovemaking, a partially disrobed Abby goes into the kitchen to get Elodie a glass of wine — and spots the panel in the kitchen floor, just as Charlie described.

Cut to daybreak, as a subdued Abby returns home and finds a repentant Charlie awake and waiting for her. Charlie starts to apologize for dragging her into the mess, admitting he should have followed his own conscience rather than ask her to betray her friend. He stops mid-sentence because there is a commotion outside, and he realizes, shocked, that Abby has done what he asked. Tom Lancefield and Elodie are being dragged out of their home into waiting cars by MPs. The anguished look Elodie gives Abby makes it clear she realizes what her "friend" has done and it has cut her to the core. It was a monstrous act, and Abby's body language shows she knows it.

Honestly, I had to re-watch the final 10 minutes to clear up my confusion about Abby's sudden shift in priorities, because the twist seemed to come out of nowhere. Rachel Brosnahan's performance was so subtly nuanced, if you weren't watching closely it was easy to miss. And perhaps I'm reading too much into it. But when she walks into the kitchen to get Elodie that glass of wine, all smiles in the afterglow of their lovemaking, she glances out the window and spots a young family — husband, wife, and two small children — walking happily hand in hand down the street. And that smile slowly fades. That's when she glances over to the panel to the crawl space under the kitchen floor.

We haven't seen much of Abby's toddler in recent episodes; she's been flushed with the excitement of her love affair and preoccupied with the tension between her and Charlie, relying on a nanny to watch over her son. But that glimpse of domestic happiness seems to snap her back to reality, making her realize that sure, you can dream of an escape to Tangier, where there aren't any secrets or obligations or cumbersome responsibilities, and no ugly world war.

In the end, though, it's just a dream, however much Abby wanted to make it her reality and shed her role of dutiful traditional wife and mother — at least for a moment. By betraying Elodie so ruthlessly, she's shed her delusions and chosen her future with Charlie, for better or for worse. Not that it sits well with her: the final shot is a grief-stricken Abby retreating to their bedroom and locking the door, Charlie plaintively knocking and asking her to let him in.

And in the end, Abby's sacrifice was all for naught, because while Frank and Charlie were focusing so narrowly on the threat posed by Tom Lancefield, they neglected to spot the viper in their midst: the spurned and heartbroken Paul Crosley, who's already wobbled once on the loyalty front. Crosley has opted to throw himself into his work to soothe his aching heart, and stops by Frank's office to express how proud he is of the progress the team has made in recent weeks. Frank nods distractedly and says that while using baritol is a start to solving the speed problem (remember they need to vary the burn rates of the point explosives to turn the shock waves inside out), "it doesn't put implosion in the cat bird seat."

Crosley recognizes the same slang Helen used on their camping trip, and the truth slowly dawns on him, seeping through the cracks in his Bakelite, as Occam might say. Hurt at being shut out, he finds the calculations from Ackley's team in Frank's office, and marches over to Ackley's home. At the first mention of their work on implosion, Ackley reminds him, "Implosion is Frank Winter's country. The border's closed." Crosley pulls out the papers with a flourish and hands them to Ackley: "I believe your border is wide open." Hell hath no fury like an Englishman scorned.

## The Gun Model

Season 1

Episode Number: 12

Season Episode: 12

Originally aired: Sunday October 12, 2014  
Writer: Lila Byock  
Director: Dan Attias  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Daniel Stern (Glen Babbit), David Harbour (Reed Akley), Mark Moses (Col. Alden Cox), Christina Kirk (Rose Akley), Corey Allen (Theodore Sinclair), Travis Hammer (O'Byrne), Lauren Myers (Jeannie), Merritt Glover (Windchime Woman), Matthew Page (Edgar), Tad Jones (Brass), Jennifer Allcott (Evelyn), Mike Miller (Lonnie), Harry Zimmerman (Mr. Epstein), James Lawrence Sicard (Ivan), Chadwick Johnson (Scientist), Timothy Holmes (Scientists)  
Summary: When Akley attempts to fix the Thin Man's shortcomings, puts himself in a vulnerable position.



Last week Ackley learned about Frank Winter and Charlie Isaac's unholy alliance to siphon resources from the Thin Man group to solve the implosion problem. What will he do with this information? We find him sitting alone late at night in his darkened office, rifling through requisition forms, all signed by Charlie, when an MP barges in, surprised to find the division head still on the premises.

"Boldly they rode and well/Into the jaws of death/Into the mouth of hell," Ackley intones — you know, just to set the mood. He's quoting Tennyson's "The

Charge of the Light Brigade," written to honor the fallen soldiers in the Battle of Balaclava during the Crimean War. One line Ackley didn't quote: "Not tho' the soldier knew/Someone had blunder'd" — and that blunder cost the brave soldiers in the brigade their lives.

Abby has not forgiven Charlie for pressuring her into framing Tom Lansfield, betraying Elodie in the process, which is why Charlie is sleeping on the living room couch when Ackley knocks on his door in the wee hours, a rifle slung over his shoulder, and invites him to go hunting in the desert. Once there, it's clear Ackley isn't interested in hunting wild pigs. He wants to know why Charlie shot him in the back by trying to sabotage Thin Man via his collusion with Frank Winter. At least he's being direct. So Charlie comes clean about the issues with Thin Man: namely, the spontaneous fission rate for the plutonium being manufactured at Site X (the future Oak Ridge National Lab) is too high and the bomb will pre-detonate.

Ackley insists the actual bomb will be using weapons-grade plutonium made at the nascent "Site W" — his trip was to Washington state to tour the new Hanford plant, and Ackley claims that the plutonium made there is as pure as the stuff made in Enrico Fermi's cyclotron in Chicago:

"I have the fission rates on my desk." If you're wondering why this should make any difference... well, you should be wondering. Ackley's answer is that it's better because it was designed by Fermi himself. I am disappointed in Charlie for accepting this as an explanation on its face.

Ackley tells Charlie he's been manipulated by Frank, who (Ackley claims) cares more about cementing his place in history as the architect of an implosion bomb than the outcome of the war. It's true, the whole scheme was Frank's idea, and Frank has shown himself willing to sacrifice just about anyone to make implosion work, right down to insisting Charlie frame Tom Lansfield. Since Charlie signed all the requisition forms, it will be Charlie who pays the price should the military find out about this huge violation of compartmentalization. But then, surprisingly, Ackley promises to protect Charlie, if the latter will trust him.

Why isn't Ackley furious with Charlie for the betrayal? We get a hint during a top-secret meeting of military brass and high-clearance scientists, announcing that the larger sample of plutonium is now ready for transport from Site X. Ackley insists on tighter security measures: a heavily armed military convoy, even though this will delay delivery of the plutonium by several weeks. He mentions a betrayal by one of his own scientists — but names Lansfield rather than Charlie, despite knowing full well it was a frame-up. When Babbit (now working in Oppenheimer's administrative office) ingeniously finds a way to fast-track a convoy within a few days instead of weeks, Ackley claims this might still be insufficient. Ackley is trying to delay delivery of the plutonium. But why?

He also confronts Helen Prins, trying to undermine her loyalty to Frank with a story about his own history of sticking up for Frank when the older physicist inevitably pissed off the wrong people, only to find himself twisting in the wind with Frank nowhere to be found: "It taught me a valuable lesson about politics. And about Frank. Great men are not always good men." When Ackley asks if she was involved in the scheme — Charlie refused to implicate her — she claims she was coerced. He offers to protect her, too, in exchange for her trust. Helen goes running right to Frank with the news that Ackley is onto them, and is moving the proverbial chess pieces around the board to ensure Frank takes the fall for the whole mess.

So playtime is over. The clock has run out. They need that plutonium from Site X as soon as possible to prove that the gun model won't work and implosion will. But Frank can't do anything about it himself because his security clearance has been mysteriously downgraded. Colonel Cox won't help either, even when Frank insists Thin Man will pre-detonate. Cox points out that the only way he could know that is if he violated compartmentalization in some way, thereby incurring severe consequences. Does he really want to make that declaration official? Frank wisely backs down.

Meanwhile, if Paul Crosley was hoping for a reward by ratting out Frank and Charlie to Ackley, that plan backfired. Nobody likes a snitch, even one with a posh British accent — especially if said snitch comes bearing an inconvenient truth. Since he can't work with Frank anymore, and Ackley thinks he's disloyal, Crosley asks Babbit to transfer him to Site X. "Whoever we once worked for, Frank has become someone else," he declares, having guessed that Babbit, too, had been left in the dark about Frank's scheme. Babbit says he'll see what he can do.

Liza Winter has decided to run for the Town Council. Her competition includes a nervous man who spends his entire campaign speech claiming he wasn't a peeping Tom, nosiree, he was birdwatching, and for his opponent to suggest otherwise is shameful. Ah, local politics. When it's Liza's turn, she comes clean about her mental troubles because "I don't believe in keeping secrets anymore." She demands that Colonel Cox explain precisely what rights she and the other civilians on base have, and what recourse is available if they feel those rights are being violated. "The war for American values is being waged right here on this Hill. I believe transparency is the lifeblood of democracy," she concludes. "I'm asking for your vote." You go, girl!

We find Abby is brooding in the kitchen of the now-empty home where she and Elodie spent so many blissful hours together. She finds a playing card on the floor, part of Elodie's deck with the rather risqué artwork (a female nude). She is interrupted by a cheerful young woman named Evelyn, newly arrived from Berkeley with her husband, a scientist joining the Manhattan Project — they have been assigned the Lansfields' former quarters. Evelyn is quite a bit like Abby was when she first arrived on base. Maybe that's why Abby slaps her and snaps, "Wake up!" before stomping out. Abby has lost her innocence; I kind of like her new edge.

She is equally frosty when Frank shows up at the door to see Charlie and try to win him back over to Team Winter, insisting that it is Ackley (not him) who can't be trusted. He scoffs

at the notion that the Site W plutonium will be any purer: "I guess Reed Ackley figured out a way to rewrite the laws of physics." Frank wants Charlie to use his security clearance to get the plutonium delivered from Site X right away. Charlie refuses and the two trade verbal punches, with Frank taunting Charlie with how vulnerable he is because his name is on all those requisition forms. Charlie retorts that Frank has compromised every person on his team and driven his wife mad by dragging her out to the desert, all for the sake of his implosion baby, declaring, "I am not going to be the last casualty of Frank Winter's ego." So there.

After Frank leaves, Charlie tells Abby he trusted the wrong man and betrayed his mentor, but that Ackley was giving him a second chance with a clean slate. Her response is a withering, "There's no such thing as a clean slate. For any of us." From her perspective, there's no difference between Winter and Ackley. They are opposing sides in an intricate political chess match and Charlie is just a pawn in their machinations. She wants to leave the Hill and go home to her family, and when Charlie reminds her the Army would never allow that, she says the Army will under one condition — if she and Charlie divorce.

Just when it looks like Frank has run out of options, we find that Babbit has had a change of heart following his conversation with Crosley. Fritz accompanies Babbit to the base entrance, where none other than our good friend Dr. Sinclair — the sole black physicist at Site X — is there with an early delivery of the plutonium, lured there with the promise of a permanent position on the Hill. Maybe he can have Babbit's job, since the latter will likely be fired for abusing his position in Oppenheimer's office to get the plutonium, torpedoing his career. (Seriously, why does Frank inspire such loyalty?)

Thus far on the series, Ackley has been a pretty cool customer, but we see his uber-confident mask start to slip in a touching scene with his wife, Rose (who seems to know all about the Gadget, which surely must be a breach of security) helping him with his tie: "Men like you shouldn't be thinking about apparel," she says, convinced her husband is going to win the war for America. He says they might not need Gadget to beat the Germans after all, and suggests they should just pack up and go home to Chicago for the rest of the war. Rose brushes this off: surely he would be called to Washington by the President, and she's already thinking about the prestigious dinner invitations they'll receive. "I don't know about that," he says with the tightest of smiles, tearing up just a smidge as an assistant bursts in with news of an urgent call from Site X, no doubt with the news that the plutonium has been delivered.

Charlie finds Ackley in the lab feverishly writing equations on the board in a last-ditch attempt to save his Thin Man. He's calculated muzzle velocity and barrel pressure and thinks perhaps they could extend the barrel so the plutonium could reach a higher rate of speed, thus warning off pre-detonation — except the only aircraft capable of carrying an 8000-pound bomb can't accommodate the longer barrel. When Charlie tries to tender his resignation, Ackley finally cracks, admitting that he can't fix the problems with Thin Man without Charlie's help. That's why he brought him on the team in the first place; his paper on a new approach to nuclear cosmology "changed the way we think about the universe, the way we think about the creation of the elements. You can fix Thin Man."

Charlie realizes with horror that Ackley has known all along that Thin Man would fail and covered it up for months. Remember that scene several episodes ago where we saw Ackley burning an envelope addressed to Oppenheimer? I'm guessing it was a confession to that effect. Shaken to the core, with his marriage and career crumbling around him, Charlie ends up parked outside Helen's place, and they finally consummate the attraction that sparked on Site X.

Frank receives a cryptic message to meet out at the armory blast zone. He expects to find Charlie, but it's a desperate Reed Ackley with his trusty shotgun. This is a bad sign for anyone familiar with Chekhov's Gun. (One variant: "One must never place a loaded rifle on the stage if it isn't going to go off. It's wrong to make promises you don't mean to keep.")

Ackley asks for Frank's help on Thin Man. Frank opts for the harsh truth: "Thin Man is dead. You did the best you could, but your bomb won't run on imagination." Instead of gloating, Frank admits he and Ackley both have blood on their hands, and will likely both end up in the brig unless they form a united front and go straight to Oppenheimer with a recommendation to move forward with implosion.

Ackley is incredulous. "You'll work with me?" Frank insists he will work for Ackley if it means winning the war. Besides, in the end someone will have to go Washington, DC, to advise the president on how best to use (or not use) the most powerful weapon in history, "and I think you

and I both know I don't belong in a room with the president."

It's a genuine act of grace in a man who has not exactly been a shining example of ethical behavior thus far, but clearly his actions weren't ego driven — that was Ackley projecting his own issues onto Frank. "What would you have done if you thought implosion might not work?" Ackley asks. Frank shrugs. "Let it go. Six months from now, all anyone will remember is that we built it." He thinks the matter is now resolved, but as he gets into his car, there is a gunshot. The well-dressed, polished physicist with the too-perfect math has committed suicide, crushed by the humiliation of his failure and the cost (in the form of soldiers' lives) of his own blunder in covering it up for so long.

## Perestroika

Season 1

Episode Number: 13

Season Episode: 13

Originally aired: Sunday October 19, 2014  
Writer: Sam Shaw  
Director: Thomas Schlamme  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams)  
Guest Stars: Daniel Stern (Glen Babbit), Richard Schiff (Occam), Eddie Shin (Sid Liao), Christina Kirk (Rose Akley), Daniel London (J. Robert Oppenheimer), Gerald McRaney (Sec. Hentry Stimson), Ryan Jason Cook (Stanhope), Ben Hall (Joey Isaacs), Miles Hall (Joey Isaacs), Victor Talmadge (Balding Man), James Cady (Functionary), Bob Kaye (Gray Suit), Shawn McCall (MP #3), Audrey Moore (Francine), Jade Scott Lewis (Swee), Sonia Maslovskaya (Malka Perlman), Derek Blakeney (Military Driver), Clay Johnson (Immigrant)  
Summary: Frank is offered a life-changing opportunity; at the same time, the U.S. Army put Charlie on the hot seat.



The episode starts at Ellis Island, where an Eastern European refugee woman with a young girl is pleading with an immigrations official to let them into the US: they paid the requisite fee, it should have only taken a day, and yet here they are, three days later, still in holding. Alas, the woman has caught the attention of the nefarious Occam — seriously, that guy pops up everywhere in his single-minded quest to steamroller innocent people into confessing they're spies — who wants to hear more about the woman's American benefactor, a certain physicist named Charlie Isaacs. This does not bode well for Charlie, who is already having a tough

time of it, between his marriage and his falling out with Frank Winter.

And don't forget the suicide of Charlie's boss, Reed Ackley, which ended last week's episode. "As hard as it is having secrets kept from you, keeping them can be even harder," Frank's wife, Liza, muses the next morning as the couple dresses. She doesn't know Frank was there when it happened, of course — she's already left the bedroom when he finds the bits of gore on his shoe and rummages around in the closet for a different pair. Apparently he sees something interesting in the back of said closet, but before he can investigate further, none other than Robert Oppenheimer comes to the door.

Oppie is not a happy camper. Ackley is dead, Thin Man is a bust, and he had to fire Babbit (in the form of forced "retirement") for abusing his position of privilege in Oppie's office to fast-track the plutonium delivery. "The friends of Frank Winter don't have a long shelf life on the Hill, do they?" Oppie observes. But Babbit's sacrifice served its purpose: the project's focus is now shifting to implosion, and Oppie is appointing Frank to head the effort as Ackley's replacement.

"It's not how I wanted it," Frank admits. And Oppie is clearly not about happy about it either. But nobody knows implosion as well as Frank, so he'll need to make the case to US Secretary of Defense Henry Stimson, arriving soon for a briefing on the fiasco that this project has seemingly become. "Buy a comb," is the impeccably coifed Oppie's terse advice to the perpetually scruffy physicist before swanning away in his town car.

Charlie Isaacs is also reeling from the news of Ackley's suicide when he returns home to a royally pissed off Abby, who has guessed he's been spending his nights with Helen. She is horrified to hear the news about Ackley, though, and Charlie blames himself for not being more supportive when Ackley was teetering on the edge. But his wallowing is cut short by the arrival of MPs, who drag him off for questioning and ransack the house.

Meanwhile, Liza stops by to see Ackley's widow, Rose, just as Rose is departing the base for good, returning to Chicago with her husband's remains. (Side note: Liza learns she won election to the civilian town council by a landslide.) Rose is in denial, insisting Reed would never kill himself and his death must have been an accident, refusing Liza's farewell hug when the MP comes around with the car. "Take care of Frank," she advises Liza. "He's on the throne now. That's what really killed Reed. The Gadget."

You don't win at chess unless you're willing to sacrifice a few pieces — sometimes very important pieces. Frank's ascension to the throne has cost him dearly, in the form of fractured relationships and lost loyalty and trust. There's Paul Crosley, for one, who told Ackley about Frank and Charlie's collusion (with a reluctant Helen Prins) to break compartmentalization and crack the implosion puzzle. Frank finds a still-bitter Crosley packing up in anticipation of his transfer — one assumes to Site X, as he requested of Babbit — and the British physicist flatly refuses to return to the implosion team, although he does promise not to say anything further about the Unholy Alliance that led, ultimately, to Ackley's suicide. "You get my silence, but not me."

Then there is Glen Babbit, also packing up his office and departing for parts unknown. The academic environment for physics has shifted markedly with the launch of the Manhattan Project, and Babbit is tainted, both by his past Communist associations and by his abrupt termination by Oppenheimer. "I hear a lot of old bachelors are heading west," he muses, and we hope he finds peace and maybe even a stable long-term partner in a more forward-looking place like Berkeley, because, as Frank says, "You deserve to be happy." But the bond between these two is irrevocably broken. Babbit chides Frank for making friendly chitchat about seeing each other after the war, telling him not to call or write. "Stop trying to have both ways," he says, adding that maybe a genuinely good man couldn't have gotten implosion to work. "Let God do the accounting when it's over."

At least Frank still has Fritz, Jim Meeks and Helen Prins, each of whom is being promoted in kind to head up divisions on implosion relevant to their expertise. Fritz's main concerns are being able to afford a ring so he can propose to Jeannie, and not having an adequate suit. But Helen is fretting about Charlie, suggesting that since Crosley is AWOL, perhaps Frank could bring him into the fold. Frank gives her a warning look — the other two don't know about their secret arrangement — telling her that Charlie is currently being investigated for violations of compartmentalization: "The Army is wiping its leadership slate clean." Yes, Frank is sacrificing yet another piece for the sake of his beloved implosion bomb. What good would it do for all three of them to go down for violating compartmentalization? But it doesn't sit well with Helen.

Initially Charlie thinks this is all about breaking compartmentalization, too — his name was on all the requisition forms, after all. And Occam begins the interrogation session on that note, probing how much Charlie knew about the technical problems with Thin Man. For starters, the calculations Charlie had been assigning Ackley's team seemed to have little to do with the gun model, and Tom Lancefield — the physicist Abby helped frame — is singing like a canary about how they actually pertain to the implosion design. Charlie allows that he may have been exploring other theories out of an excess of caution, but to Occam it just "looks like sabotage."

What Occam really cares about, however, is how the Allied spy in the Nazi bomb project, "Magpie," came to lose his head. We were told in the pilot there was a leak on the Hill — historically there were, indeed, spies on the Manhattan Project — and identifying the traitor has been Occam's primary objective from the start. He set his sights on Sid Liao, on Glen Babbit, on Frank Winter, on Tom Lancefield, and now on Charlie — based entirely on the fact that his wife's relatives in Minsk escaped to the US (at least Malta Perlman and her little girl did; Malta's



husband wasn't as fortunate). Charlie recalls that he had asked Reed Ackley to intervene on their behalf; apparently Ackley did so, but now Ackley is dead and can't confirm that. That's not even counting Charlie's estranged Socialist father languishing in prison, or the fact that he lied to save Babbit, thanks to Frank's threat to expose him for perceived plagiarism.

But Charlie proves a tough nut to crack, probably because he knows he's innocent of international espionage and treason. So Occam starts applying the screws by dragging in a terrified Abby for questioning. He gives the couple a few minutes alone beforehand, during which Charlie begs her to go home to Massachusetts; he'll give her a divorce, anything to keep her safe, and apologizes for ever bringing her to the Hill in the first place.

We never do hear what Abby told Occam, if anything, but the Grand Inquisitor already knows a great deal about her, including her love affair with Elodie. "Your wife is a complicated woman," he tells a shocked and disbelieving Charlie.

Charlie still won't crack. And now we see the truly dark side of Occam. "A secret trapped inside a man is like the energy trapped inside an atom," he says. "It wants to be released." It's his version of "We have ways to make you talk," implying that torture is imminent, Geneva Convention be damned, because as he so dearly loves to remind his prisoners, they have no rights inside that cell.

Helen Prins goes to Charlie's house to look for him and comes face to face with Abby, who lets her rival know she knows what's up — and the brief appearance of their son, Joey, with the nanny drives home what's at stake. She also tells Helen that Charlie is in far worse trouble than anyone expected: "You are not the only person on this Hill who's trying to take my husband away from his family." Helen passes this information onto Frank, prompting one last crisis of conscience, in the form of the late Sid Liao — the first casualty of Frank's machinations. "You don't owe Isaacs anything," Ghost-Sid tells Frank, rattling off the numbers of all those who have died so far in the course of the war, amounting to something on the order of 1157 deaths per hour. "What's one more?"

As Stimson arrives on the Hill with his entourage, Frank finds Liza in their bedroom, tells her he loves her, and then confesses that his top-secret classified research involves building an atomic bomb capable of wiping out an entire city, assuring his horrified wife that "The Army will detonate it where it can't hurt anyone." Once the Germans, Russians and Japanese see what the US is capable of, the war will end — and, in Frank's mind, there will never be another. Liza, shocked and not nearly as optimistic, leaves the room in silence.

Cut to Oppenheimer in the dining hall, overseeing preparations for the banquet in Stimson's honor when Occam arrives to tell him there's a "personnel issue" that requires his immediate attention. We see Frank combing his hair as the MPs arrive to escort him to his meeting on the Hill. We see Charlie being led out of his cell, catching a glimpse of a grim-faced Oppie going into an interrogation room with Occam. And we see Occam play an incriminating recording for Oppie: Frank Winter telling Liza all about the atomic bomb project, leaking classified information, because of course the Winters' home has been bugged. When Oppenheimer finally briefs Stimson about the implosion backup plan, he introduces the man who "single-handedly" cracked the implosion problem and will be heading up this redirected program: not Frank, but Charlie Isaacs.

At long last, Frank has done the right thing. He knew his home was bugged; that's what he saw in the back of his bedroom closet earlier in the episode. And he kept right on talking after Liza left their room, "confessing" that it was he and the late Reed Ackley who cooked up the scheme to funnel resources from Thin Man to implosion, thereby violating compartmentalization, setting up Charlie Isaacs to take the fall should they be found out. "We sacrifice the few to save the many," Frank tells the empty bedroom, before adding that while the Army now thinks Charlie is a spy, he's actually 100% innocent. And also, Frank and Ackley "stole" the idea that solved the shock wave problem from Charlie's now-infamous paper. (It was what inspired Frank to try the wave-shaping scheme.) We last see a handcuffed Frank in the back of an MP car with a burlap sack over his head, being escorted off the base. He sacrificed himself to save the many, and just maybe to atone a tiny bit for all the pain he's caused.

Frank doesn't confess to espionage, so while the consequences will be severe, he won't be facing a firing squad for treason. Occam still hasn't found his rat. But focusing his suspicions on Winter's group might not have been misguided after all (or he made a lucky guess). Just as the implosion team is moving into their new offices, Jim Meeks gets word that his ailing mother has died. One of Frank's last acts during his all-too-brief tenure as top dog is to get Meeks a pass to

attend her funeral.

But the first thing Meeks does when he gets into town is to call his very much alive mother from a payphone before sitting down in a nearby diner (he does seem to have a tail watching him). Another man takes the booth immediately behind him — yes, the mild-mannered Meeks is our spy. He tells his contact that implosion is taking center stage. And... curtain.

# **Season Two**



## Damnation Memoriae

Season 2

Episode Number: 14

Season Episode: 1

Originally aired: Tuesday October 13, 2015  
Writer: Sam Shaw  
Director: Thomas Schlamme  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Nathaniel Augustson (Smitty), Brian Barela (G.I.), Richard Beal (Scientist), Derek Blakeney (G.I.), Neve Campbell (Kitty Oppenheimer), Ryan Jason Cook (Stanhope), William Greely (Scientist #41), Mamie Gummer (Nora), Christopher Hagen (Ronnie), Harrison Kavanaugh (SED Worker), Murad Kirdar (Scientist), Steve Larese (Scientist), Lauren Myers (Jeannie), Richard Schiff (Occam), Samson Snell (Private Dodd), Steve Sprenger (Harwood), Daniel Stern (Glen Babbit), Michael E. Stogner (Scientist), Jefferson White (Cole), Shawn-Caulin Young (Agent Jones), Alan Humphrey (American Military)  
Summary: Charlie is forced into a new leadership role in the race to build the world's first atomic bomb.



**July 16, 1945 — 21 Days Till Hiroshima** We're leaping forward in time to a rainy night in the desert where *The Gadget* is apparently fully formed and ready to test.

This would be Trinity, the real-life site of the first man-made atomic blast. But things aren't going well. The storm means fallout could spread, a reporter is torturing him for metaphors about Promethean fire, and they're not even sure what will happen when the trigger is pulled — or if what happens will stop.

Charlie Isaacs is forging ahead as leader of the projects, obstacles be

damned, and stands in the rain watching the ultimate weapon being hoisted aloft like Frankenstein's monster, about to be brought to life.

Cut to 15 months earlier: Charlie is reading *Mein Kampf*, probably for inspiration in finishing this weapon rather than for pleasure. Pleasure is waiting just to his right, as his fellow scientist Helen reaches out to stroke his shoulder, her body wrapped only in a sheet.

Then we see his wife, Abby, in a medical office, her feet in stirrups (being examined by a doctor with a cigarette dangling from his mouth.) Then the montage ends with Liza Winter looking through notes left by her husband Frank, who was last seen with a canvas bag over his head being driven away by security.

If you remember from last season, Frank was manipulating resources with Charlie to support the bomb project that will actually work. But what he's been arrested for is deliberately revealing the nature of the project to his wife, taking the fall for the scheme so Charlie doesn't have to.

On the soundtrack: Frank Sinatra crooning "This Is the Beginning of the End" with the Tommy Dorsey Orchestra. Wonder why they chose that.

J. Robert Oppenheimer reveals that the government is auditing the project. The United States has spent millions of dollars and now wants results. Charlie is in charge of the new implosion initiative but isn't sure he's up for the job.

He confesses to Oppenheimer that he thinks he's unqualified. "Where is Frank Winter?" he asks. "Implosion is Frank's baby."

"You're going to have to deliver it," Oppenheimer says.

Back at the Winter residence, Liza face two soldiers but tells them she hasn't seen her husband in two days. They tell her he has been "transferred" — and she's going to be, too. They're coming back with boxes and plan to evict her.

In the offices, Paul Crosley examines one of Winter's equations and notices that he worked the letters of his daughter's name, Callie, into his math as the variables.

Charlie doesn't find many friends here when they find out he'll be leading the implosion group. He starts searching for the one man who may know where Frank has been taken — the anonymous spy hunter played by Richard Schiff, who interrogated him last season.

Meanwhile, Charlie's wife visits his mistress to ask for advice finding someone who can end a pregnancy. She tells Helen she had an affair. "Who's the guy?" Helen asks.

"It's Charlie's," Abby says, but Helen, who has previously had an abortion, doesn't understand why she'd want to. But she let's her know where to find a doctor anyway.

"I don't regret it," Helen says. "But you will."

Back on The Hill after attending his "mother's funeral" is Jim Meeks who is alarmed to see military police going through his quarters. This troubles him because he's a mole, working on behalf of the Soviets.

But... deep breath. Turns out they're just moving his belongings. The whole hill is being reshuffled as priorities shift on the project.

Someone else is arriving at Los Alamos as well: a new character, Col. Emmett Darrow, the new military head of the project. The guy is stoic in the extreme, and when Crosley goes to him to get a signature for a transfer, he gets a lesson in discipline.

Darrow is disgusted that Crosley would want to leave the project over romantic entanglements: He and Isaacs both had a thing for Helen.

"Will you close the door please?" Darrow asks softly. Then: "Get down on your knees."

He instructs Crosley to ask Jesus for forgiveness. His sin: "Weakness," Darrow says. "God buried an atom under a million tons of rock so America could split it in two and redraw the maps of the world. And you want to run off... because some girl didn't ask you to the prom?"

He drops the transfer in the trash.

Charlie's not the only one searching for Frank Winter, Liza confronts Private Dunlavey, her daughter's illicit boyfriend, and forces him to take her to where she has run off. He sets up a trap, though, that snares both mother and daughter by the authorities that police The Hill. Her remote investigation is at an end.

"Sorry, ma'am," the private says. "If you took her away, I'd never see her again."

Back at Charlie's office, one of the men he's looking for finds him: Schiff's X-4 spy hunter. "I am the reason you are sitting behind that desk instead of ..."

"Where?" Charlie says. "Where is Frank Winter? You pack him off to wherever it was you were going to send me, to torture him?"

"He's gone," Schiff's character says. "And he's never coming back."

Charlie takes this to mean Frank is dead. At this point, we have no idea.

"My name is Avram Fischer," the mystery man says, leaving Charlie his telephone number. "Where are my manners — congratulations!"

"For surviving or adapting?" Charlie asks.

"For the baby," Fischer says. "Mazel tov, to you. And your wife."

Back home, Abby believes Helen told him. But he says, "I had to hear it from the angel of death."

Charlie convinces her the pregnancy is a chance to fix things. He asks her not to leave him. "There's a lunatic in Europe making orphans out of a thousand Jewish kids a day. You want two more to grow up without a father?"

Abby lights a cigarette.

"We can do better," Charlie says. The child inside her doesn't know what his parents have done wrong. "I can do better."

It's the first of two inspiring speeches Charlie will give in this episode.

"It feels like a girl," Abby says.

Back at Los Alamos, Liza is trying to convince Col. Darrow to let her leave. "I can't spill secrets I wasn't entrusted with in the first place," she says. "If you just let me go back to Princeton, you'll never hear from me again."

The colonel responds by quietly walking over to a table and pressing play on a reel-to-reel. It's a recording of Frank telling her about the bomb that can wipe whole cities off the map.

"Your husband is at another site proving his loyalty to his country," Darrow says. "You can help him by proving you can be a discreet, productive member of this community."

Liza agrees, with a catch. "I may know what it is you're building here. But my daughter does not."

Sorry. No time for love, Private Dunlavy.

When Charlie's turn comes to stand before his team of scientists, he begins by airing his conscience. Frank Winter is the brain behind this new, final push toward completing The Gadget. Oppenheimer watches from the balcony with concern.

"The implosion model exists because of Frank Winter. He was the crank in the wilderness rubbing two sticks together when no one else believed. He fed the spark, he fended off the wolves. He corrected his error. You should be listening to Frank right now..."

But before revealing that the military is willing to disappear anyone who pushes back against them, Charlie perpetuates the lie that Winter has been transferred.

Helen turns away, disgusted, but the other scientists are rapt.

"We're going to build a working Gadget and drop it on Berlin," he says. "On July 4, 1945, we're going to put on the biggest fireworks show since the Book of Genesis."

A working test in a year? Some scientists think it's a bluff. Most are inspired.

As he talks, we see Meeks writing code for his Russian handlers, we see Abby looking through her new home — it's the one the Winters occupied previously.

Meeks talks his way off The Hill to deliver details of the new project to his handlers. Fischer the spy hunter watches him go — and follows.

In the woods, Meeks buries his information in a dead-drop tin and heads back to the car, where Fischer confronts him. The game is up; the spy has been snared.

"Germans or Soviets?" Fischer says. "You are in a world of trouble from sea to shining sea. I am your only friend. So I advise you to think very carefully about your next answer: Frank Winter recruited you — who recruited Frank Winter?"

Meeks barely gets time to say, "What?" before his Russian handler loops a garrote through the window and chokes Fischer to death.

Fischer flails, pulling his revolver and firing blindly into the car, missing Meeks completely, but scarring him in ways that can't be seen.

The episode ends with another flash forward: Meeks in the rain, the night of the test. He volunteers to climb the tower a double-check the detonators on The Gadget.

"It should be someone you trust," Meeks tells Charlie.

Meanwhile, Col. Darrow visits the site. "If anyone sees Dr. Frank Winter on the premises, arrest him. If he resists, you have the authority to use all necessary force."

The final shot: the Russian spy climbing the tower to gain private access to the world's greatest weapon.





# Fatherland

Season 2

Episode Number: 15

Season Episode: 2

Originally aired: Tuesday October 20, 2015  
Writer: Scott Brown  
Director: Dan Attias  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Daniel Stern (Glen Babbit), Richard Schiff (Occam), Justin Kirk (Joseph Bucher), Brian Barela (G.I.), Derek Blakeney (G.I.), Steven Ray Byrd (Military Police Officer), Jetto Dorsainville (Military Police), William Greely (Scientist #41), Marty Lindsey (Gallagher), Aaron Templeton (S.E.D.), Alan Humphrey (American Military)  
Summary: Frank wakes up in, and wanders around, an empty prison. He meets a mysterious prisoner who seems to be the only other person in the prison. He is subjected to all kinds of mind bending games before the truth of his situation is finally revealed.



X-4 (before he was killed) has taken Frank to an interrogation room where he interrogates him some more about Dr. Schwimmer (the scientist in Germany who was killed for working with the Americans). X-4 wants Frank to confess and reveals information about Frank going to Germany for two months. Frank stays quiet and is given a sandwich. X-4 leaves Frank in the cell with an empty bucket with water slowly dripping in it.

The bucket is now filled to the top, which means Frank has been there for a while (about a month) and is getting desperate for food. He looks over Schwimmer's files and begins to hallucinate that Liza is in the cell with him. She encourages him to look through the files for something familiar — a variable that seemed familiar. CALLIE's name is in the equation. The equations in the files belong to Frank Winter! They don't belong to the Germans! The Nazis are STEALING his work! He realizes... there IS a spy back on the hill!

He yells to the guards that he wants to talk. Frank wakes up to find the cell door open. He walks out and end up in a jailhouse. He looks outside and sees that he is in an internment camp as Japanese Americans walk in holding bags. He turns around and gets knocked out by an MP.

He is awoken up by the warden who does not know who he is. He is unlisted from the documents, which means the government doesn't want anyone to know he's there. Frank tells them who to call and the information he knows. The warden and the MPs won't hear any of it and tosses in a crazy inmate named Tojos.

Frank's new guest arrives after being tossed and beaten up by the MPs. Joseph Bruker (played by the fabulous Justin Kirk) threatens Frank to stay away from him. They begin to talk about the place and their lives — with Frank lying about his name and job. Bruker explains that the place

is where they send the people who they don't want found to and the MPs pit prisoner against prisoner. Frank tries to convince Bruker to help with their escape.

Frank and Bruker talk about their careers, where Frank is a "calculus teacher". Meanwhile, Frank hears some classical music (specifically Mourning cantata for King Frederik), which Bruker does not hear. The MPs bring in two covered trays into the cell and leave. Bruker tells him that it could be poisoned to make sure they fight. They agree to both open a container each; when they do, they find an empty gun in one tray (Frank) and a bullet in another (Bruker).

Frank finds a secret boiler room in the cell and finds a locked telephone booth. He calls Bruker to bring the gun so they could shoot the lock. Bruker isn't having any of it because he wants to use the shot to escape. Frank hears music again and this time, Bruker interrogates him on his knowledge on the music — it's from the German composer Johann Adolf Scheibe. He said he'd give Frank the gun for the truth. He assumes Frank is not really Jewish, but instead pure German. Frank finds out Bruker a Nazi — an American Nazi.

Frank is disgusted with this fact and walks away. Bruker wants to know how Frank knows about Schiebe, but Frank refuses because of his hatred for the Nazis. He goes to the phone box and begins to bang the lock with a chair. Bruker tries to convince him about the Nazi party, which Frank basically calls a bunch of lies. Bruker tries to get Frank's secret out of him through anger. Frank finally gets the lock opened and finds nothing in the phone box.

Bruker discovers it was Frank's mother who played the music and the whole reason he knows Scheibe's music. He begins to tell Bruker the story of his mother who was a music prodigy. She just left him one day as a child. He went to find her as an adult in Germany where his mother called the Gestapo on him.

Frank tells Bruker if he gets out, to call Sante Fe's Hill and tell him that Magpie was their work. He then closes his eyes, causing Bruker to think Frank died. As he approaches Frank, Frank punches him and grabs the gun. The gun is a dud. Bruker calls out Uncle and the MPs come in and take Frank. Bruker was a spy for the army all along to get information from Frank. He tells Frank he believes him.

Colonel Darrow shows up and asks Frank where X-4 aka Isla Fisher is. Frank is confused and realizes there is no Toso and Bruker. It was all a test. Darrow is concerned with where Fisher is at. Frank just yells at him to tell Oppenheimer that Magpie/Germany is taking work from the Americans — his work! He explains it to Darrow, who then refuses to let Frank go. The army is using Frank's own work to look like the Germans are ahead of schedule to push their own scientists and their own propaganda. They lock Frank up because he knows too much.

**Meanwhile back at the hill** — The scientists watch a film about the horrors of war brought to you by the army and Charlie. The American troops are planning to invade Europe. He plans on forming a new test group for the bomb.

Helen confronts Charlie about 'talking to Frank'. He tells her they just need to move on from Frank. He stops by home to his wife Abby to spend some time with her. Abby demands to know what Charlie is building, which he tells her. He later tells her about the Americans invading Europe and trying to find the German's bomb. She tries to give him advice on how to kill off the German scientists, which he says is complicated because they know the scientists. She brings up the point, would they do the same for the American scientists?

Frank's old gang head to the fields to try to find and take photos of Hitler's surveillance plane and find something radioactive. They camp out at night after setting up the poles. To pass the time, Fritz wants to tell scary stories by the campfire. Crosley tells them about X-4 vanishing with only his badge found on the side of the road. This causes Meeks to have a worried look on his face. He begins to have flashbacks of X-4's murder and hiding the body. His contact gives him half a Hersey bar wrapper and tells him his next contact person will have the other half. Meeks flashback is interrupted by Fritz screaming after finding a dead coyote. Meeks wants to bury it and just seems confused on what to do.

# The Threshold

Season 2

Episode Number: 16

Season Episode: 3

Originally aired: Tuesday October 27, 2015  
Writer: Lila Byock, Vinne Wilhelm  
Director: Andrew Bernstein  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Brian Barela (G.I.), Richard Beal (Scientist), John Campbell (MP), Stafford Douglas (Thatcher), Esodie Geiger (Maid), William Greely (Scientist #41), Travis Hammer (O'Byrne), Kevin P. Manning (Prison Guard), Audrey Moore (Francine), Lauren Myers (Jeannie), Daniel Stern (Glen Babbit), Miles Wartes (MP), Ben Whitehair (Nervous Private), Olivia Williams (Liza Winter), David Grant Wright (General Barnes), Alan Humphrey (American Military)

Summary:



The scene begins in a mental institution before Frank and Liza moved to the Hill. Liza was committed for accidentally taking too many pills. Frank visits Liza and promises to bring her home. As he leaves, he hears on the radio that German scientists have discovered how to split the atom. He looks worried and goes to see his fellow scientists, including Glen Babbit and a general. He tells them Germany is working on building a bomb and they need to prepare for one. Babbit brings Frank to Albert Einstein to try to convince the president they need to build an atomic bomb.

Back to present time on the Hill, Colonel Darrow is reading the newspaper about Frank's disappearance. He confronts Liza during her community town council meeting and threatens that Frank's conditions may worsen with this publication. She wants him to tell that to the council members; instead, he disbands the town council. Frank is given very little food from the consequences of his wife.

As Darrow is reading, Dunlavy interrupts him to let him know they found the reporter. The reporter is outside waiting and asks the Colonel where all the leading scientists are. He threatens the Colonel with exposure if he could get the story on Frank Winter. Instead, the Colonel negotiates with him to drop it and he'll give him the big story about what they are working on. Liza, who is friends with the reporter and called him initially, tries to reason with him, but he is now the official reporter for the gadget. Liza is picked up by MPs and is confronted by Darrow about her relationship with the reporter. He tries to persuade her to drop the whole thing by telling her Frank was unfaithful. She tells Darrow she would do anything in her power to find Frank. Darrow knows it was Callie who called the reporter. Darrow has a 24/7 security

team on Liza. Dunlavey is guarding Liza's home and tells her that Callie is safe in Canada and where Frank is. He helps her get out of the Hill.

There is another flashback at the mental institution where Liza was staying. Frank arrives as Liza was doing her dance therapy. Frank demands to know what is wrong with his wife — he has not heard a diagnosis or prognosis from the doctor yet. Frank wants to take her home because Liza has been offered a position at Princeton.

Back in present day, we see Babbit in his new position away from the Hill. Liza visits him at his new office and she tells him Frank is in trouble and in an internment camp. Babbit enlists the help of Einstein to get him out.

At Abby's job at the telephones, she listens to Oppenheimer's secret call to California and learns he's having an affair. She tells Charlie and he basically says to mind her own business. Of course, she doesn't and invites the Oppenheims to dinner at their home. They meet Mrs. Oppenheimer who is pregnant (close to delivery). Abby sort of pried into Oppenheimer's business, much to Charlie and Mrs. Oppenheimer's annoyance. While Charlie and Oppenheimer go for a smoke to discuss work matters, Abby tells Mrs. Oppenheimer about her husband's affair. Annoyed, Mrs. Oppenheimer tells Abby to mind her own business.

Back at the lab, Fritz is talking about time travel until a young scientist accidentally gets electrocuted. This makes him realize, life is too short. He rushes to Jeanie and proposes to her. She says yes. He asks Meeks to be the best man. Meanwhile, Helen is pretty peeved at Charlie for not letting her be on the G-group list (working on the bomb) since their group were researching implosion. Fritz was the only one on the list.

The scientists celebrate at the bar for Fritz's bachelor party. Meeks and Fritz are dressed up and plan to create their own film, an adaptation of *Auro, Lord of Jupiter*. Fritz sees Jeanie at the bar and quickly blindfolds himself from seeing her before the wedding. Crosley brings Fritz a prostitute, but Helen tells her to go away. Helen and Crosley get into a heated argument, which causes Helen to confront Charlie, in front of Oppenheimer, about not letting her be in the G-group. She also confronts Oppenheimer's leadership and thinks it should have been Frank who was in charge. Oppenheimer is impressed by Helen and offers her a position on another team. The next day, Charlie tries to explain Helen's presence last night, but Abby isn't thinking about that. She thinks he should have Oppenheimer's job.

During the celebration, Helen is talking to a new USO girl named Nora who has her eyes on Meeks. She takes Meeks away from the party and pleasures him. She reveals herself to be his spy contact — revealing the other Hersey bar. He runs off and burns any evidence he has, but she comes to his quarters and they discuss his next steps. The scene reveals he's working with Russia (the Communists) because the government shot and killed Sid. Meeks is not a Communist or a spy but didn't want the US to only have a bomb. Meeks says he's out because of the death of X-4, but she pulls him back in because they will kill him. Meeks must find a way to get in the G-Group. As Fritz is getting ready to get married, Meeks tells Fritz to take the job with the G-Group... and then to somehow get Meeks in. Fritz agrees and said he will try. Jeanie and Fritz get married.

# Overlord

Season 2

Episode Number: 17

Season Episode: 4

Originally aired: Tuesday November 3, 2015  
Writer: Alexander Woo  
Director: Christopher Misiano  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Corey Allen (Theodore Sinclair), Brian Barela (G.I.), Sarah Fischer (Gun Group Scientist), William Greely (Scientist #41), Steve Larese (Scientist), Michael Neal Powell (Weary Texas Traveller), Daniel Stern (Glen Babbit), Rob Tode (Dr. Crippen), Courtney Walsh (Switchboard Operator), Alan Humphrey (American Military)  
Summary: Oppenheimer puts Charlie in a precarious position.



It's early June, and the episode deals with one of the true-life scandals surrounding the development of the atomic bomb, although it compresses its dates a little.

Tatlock was a communist involved in a romantic relationship with the scientific head of the Los Alamos project, and there's foreshadowing in that line of hers. He's preoccupied, spending time with her in San Francisco rather than at the research center in New Mexico, where his wife Kitty is about to give birth to his child.

She tells him her psychiatrist believes the two of them have led many past lives

together, including as father and daughter, brothers, mother and child. "You murdered me dozens of times. You enjoyed it."

Her appeal is more than physical. She intrigues his imagination with this Freudian gobbledygook and indulges his intellectual side with poetry. She's reading a collection by John Donne, who inspired Oppenheimer to name the first test site Trinity.

She tells Oppenheimer to hold her down under the water.

More foreshadowing, people.

Back in Los Alamos, Charlie Isaacs is overwhelmed by the politics and bureaucracy that Oppenheimer usually handles. Fritz informs him that there's a complication about the test-site property. "We need to buy this lady's farm so we can blow it up."

A judge has her support and won't sign off on the eminent domain takeover. Isaacs tells Fritz to tell the judge "to wipe his ass" with the declaration of ownership. Fritz apparently takes this order literally, and then so does the judge — sending a feces-stained document to the hill.

Col. Darrow tells Isaacs he needs to get better at handling these matters and should start filling the role of politician and peacemaker to help get this project the resources it needs. But all Charlie wants to do is focus on the science.

By phone, Oppenheimer tells him: "If it helps to pretend you're me, pretend. It's what I do.

In the trenches of the research being done at Los Alamos, Helen Prins has a plan to make the discarded Thin Man project work by swapping plutonium for uranium.

William Hogarth, the miserable head of their Island of Lost Toys research group, gives her the anti-St. Crispin's Day speech: "We few, we unhappy few, have gathered here to wank out numbers until the implosion group gets its tickertape parade."

Paul Crosley, still burned by Helen's rejection, is trying to get fired off the project and later succeeds by banging Hogarth's secretary on his desk and leaving her panties behind.

That earns him a job in Chattanooga, enriching the Uranium that Helen said would rejuvenate the Thin Man project. She wanted that job, too. So Crosley scores misery points on both Hogarth and her by getting reassigned.

Charlie's wife, Abby, is getting checked by the OB-GYN when she has another encounter with Oppenheimer's wife, who's soon to give birth. They have a moment after Abby kills a terrifyingly large spider on her bed. Kitty is all alone and going through false contractions. She confesses that Oppenheimer is leaving her.

Abby takes this message and immediately launches into Lady Macbeth mode. "This is your chance. It's not just his family he's abandoning. He's leaving the project. He's dropping the reins in your lap. The fate of the war. You're already doing Oppenheimer's job, it's time you had the title."

In Texas, a prison door opens. Frank Winter finally gets to walk free.

"You got some pretty fancy friends," says the warden. "Clean yourself up for Chrissakes."

Liza is waiting for him. "Is the war over?" he asks. It's the only reason he can imagine for his release.

"Yours is," she says.

At a Texas chili house, Frank is stuffing his face while Liza explains that Albert Einstein conspired with Eleanor Roosevelt to engineer his release. (Those are some fancy friends.)

After she brought him good news — the chance to start their lives over — he gives her bad: He intends to go back to Los Alamos. On the radio, D-Day is unfolding. It's June 6, 1944

"Hitler will dig in, probably for months. Every day he does, the Army pumps Oppenheimer, Isaacs, the whole senior staff full of their lies," Winter says. "Imminent threats. V-2s over New York. Cities in ruins. They'll say anything to build that thing faster."

"Ever wondered why you're the only man for the job?" Liza asks. "In 1939, you thought you were the only man who could start this ball rolling; now in 1944, you're the only man who can stand in its way."

But after a feat of stubbornness, Liza caves. Okay — she'll take him back, and drop him off.

Back at Los Alamos, Jim Meeks is being pushed by his Soviet handler to support Charlie Isaacs' bid to replace Oppenheimer. "It sets the schedule back. The longer it takes anyone to deliver a weapon, the less chance anyone has of dropping it over a city full of kids before the war is over," she says.

Meeks gives it his best try, pulling out arcane baseball analogies to inspire Charlie to the big man's job, but it just sends Isaacs storming out of the room. He wants to get Oppenheimer on the phone and discovers he's back, touring potential test sites.

Isaacs finds him out in the desert and scolds him for being an absentee landlord. "I can't do my job when I'm doing yours."

"Don't you want my job?" Oppenheimer says.

"That's what everyone think, including my wife, but they're wrong. I want you to want your job."

Oppenheimer stares out into the mountain horizon. "This is where it will happen. Your test. Where the caldera opens up and swallows the world."

"It's your test, Robert."

"I'll be alerting General Groves that you'll be my successor." He doesn't care if it sets the project back. He no longer believes in the bomb, a tool America wants not just to win the war, but to "lord it over our allies in peace."

Charlie suggests his mistress, the communist, is planting Stalinist flowers in his head.

He tells both his wife and Col. Darrow about Oppenheimer's plan. Abby is the only one willing to take action. She calls the mistress, pretending to be a survey-taker from Redbook magazine and steers her toward a discussion of her man, her motives, and her reputation.

Tatlock is no fool. And she figures out fast this is no survey.

"I know what you are," Abby says. "Seducing him with pornographic sonnets and Freudian nonsense. He's about to have another child and you want to break him away from his family."

"What do you mean another child?"

"You don't know? He lies to his wife. Why shouldn't he lie to you?"

"Is this Kitty?"

"He doesn't love you. You're just a rag. You're nothing. And you will never see my husband again," Abby says and disconnects the line.

But then... maybe Col. Darrow did take action. It's hard to know for sure.

Charlie told him if Oppenheimer leaves, it will slow the schedule three months. Assuming their intelligence about the German program is accurate (it's not, at least according to Frank Winter, who thinks it's being doctored to scare the scientists to work harder) that means catastrophe.

"By next summer, Washington, D.C.'s a crater and Heisenberg's on the cover of Time magazine," Isaacs says. "I'm not telling you how to do your job; I'm just telling you there's a job to be done."

Darrow brushes him off, but Charlie pushes the panic button: "Frank Winter was a problem; you made him disappear."

Does Darrow make a call? Do some black ops G-men pay a visit to Tatlock. There have been rumors and speculations for decades about her fate and whether anyone else played a hand in it. All we know for sure (in this fictionalized retelling) is Oppenheimer places a call to her apartment and a man answers.

"Put Jean on the phone," Oppenheimer snaps.

"Inspector?" says the man. We see he is a police officer, and Tatlock's naked body is kneeling beside a full tub with her face submerged and a copy of *The Poems of John Donne* nearby.

Outside The Hill, Liza drops Frank off. He walks toward the gate, then turns around and comes back. "Now it's your choice. If you think we should go to Princeton, we'll go. We'll go right now."

We're not sure what she's going to choose.

At night, Oppenheimer is distraught and silently closes his door on Charlie when he approaches. Meanwhile, he has a newborn across The Hill in the hospital. Kitty has given birth.

Back at Isaacs' home, a door opens as he pours a drink.

"Abby?" he says.

Frank Winter walks in.

"They told me... I thought you were dead," Charlie says.

"They lied."





## The World of Tomorrow

Season 2

Episode Number: 18

Season Episode: 5

Originally aired: Tuesday November 10, 2015  
Writer: Mark Lafferty  
Director: Daniel Stern  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Shad Adair (Councilman / Scientist), Colt Balok (Military Mechanic), Brian Barela (G.I.), Richard Beal (Scientist), Rebecca Hill Casey (Waitress), William Greely (Scientist #41), Lauren Myers (Jeannie), Daniel Stern (Glen Babbit), Courtney Walsh (Switchboard Operator), Danny Winn (Trooper Moran)  
Summary: Frank attempts to navigate his new place on the Hill.



The episode begins with John Benjamin Hickey's Frank Winter making this declaration to Ashley Zukerman's Charlie Isaacs. It's the first time either has seen each other since Frank was detained, and now he's back at Los Alamos to tell Isaacs, the current leader of the tech group, that there is no Nazi bomb.

"The Army manipulated us," Winter explains. But Isaacs, to his horror, is unmoved.

"The gadget's an inevitability," the younger scientist says.

"You don't even care that we've been lied to?"

"There's a war on three continents. And a madman rounding up Jews," Isaacs says. Then his pregnant wife, Abby comes into the room. She's pale, sweating. Something is wrong.

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Outside the home, Winter is arrested by military police, and we next see him in the office of Col. Darrow who is not happy that the White House forced the release of his prisoner. And he's even less happy that the prisoner is back making trouble on his Hill.

When Winter threatens to tell the world about the Army's deception, using the threat of a non-existent Nazi bomb to motivate scientists to build one for the U.S., Darrow hands him two folders.

One contains charges of espionage for sharing what he knows with Isaacs. The other is an enlistment form.

"You're going to send me to the front?" Winter says.

"You'll stay right here as a private in the Army under my command. Unless you test my patience then you'll get a one-way ride to the Pacific," Darrow tells him.

It's really not much of a choice. "Now go say goodbye to your wife," Darrow says.

In another act of cruelty, the colonel won't let Liza Winter leave Los Alamos either, but the husband and wife are forbidden from associating.

Liza is furious at Frank for dragging her back when they were free and clear. "You told me two days," she says.

We then flash forward six months to December 1944.

W.D. Lorentzen, the newspaper reporter (and former flame of Liza's) who has similarly become stuck in the gravitational pull of Los Alamos, is trying to figure out how Frank went from head of the tech group to buck private. "Best-educated grunt in history of the U.S. military," says the writer. "What do you say we unbury that lead?"

We get a series of flashbacks to June 1944 in a curious structure that makes this feel like a bit of narrative whiplash — leaping ahead six months, then leaping back. We see Frank bond with Private Dunlavey, who still harbors feelings for his daughter. "Don't discuss my daughter," Frank says. "And don't call me sir. You outrank me."

Soon, Dunlavey is shipped off to Saipan, the "bloodiest theater in the war," to punish Frank for sneaking to visit his own wife. Frank confronts Col. Darrow, who makes no apologies. "When I give an order, I expect it to be followed," he says.

As we snap back to the future of December, we learn that Abby's feeling ill at the beginning of the episode was something much more serious than anyone realized. She lost her baby. She wants Liza to tell her if the dangerous substances being used on the Hill may have had some cause, but apparently hers was the only late-term miscarriage among the population.

As Lorentzen continues his shoe-leather reporting, we see a story from Fritz and Meeks' perspective of an encounter in the desert on the site of the coming Trinity test. Frank is out in the brush with blast-cap aficionado Lazar testing ordnance when Fritz, Meeks, and Isaacs show up to examine the site.

When local ranchers ride up on horseback and level a shotgun at Isaacs' face over the government plans to confiscate the land for a pittance, Frank talks the cowboy down and persuades him to do a mineral survey that might squeeze a richer payout from Uncle Sam.

Isaacs responds with resentment rather than gratitude, and the two men end up throwing punches, then rolling around in the dust. Afterward, Charlie banishes Frank from the tech area. From now on, if Charlie has his way, Frank's just digging ditches.

When Lorentzen questions Paul Crosley, he learns that the implosion project known as "Thin Man" is now being called "Little Boy," which is the real name of one of the two bombs developed at Los Alamos.

Hogarth, the head of implosion, explains why he promoted Paul over Helen Prins. "War is no longer a question of artillery and trenches or how many tank divisions you can martial to outflank your rival. Information is the future." He's a Brit, and so is Crosley. He suggests they need to begin compiling information about the bomb not just for the Americans, but for their own country.

We know one reason for bad blood between the two men is a past relationship Crosley had with Hogarth's daughter. The older man tells him that if he helps spy for Britain, he'll be welcomed back and can resume his relationship with his daughter. Hogarth also has a photo of a young child on his desk.

Hogarth shows him and says this is Crosley's chance to "go home to your little boy."

So, it turns out the name-change has a deeper reason than anyone else realizes.

The episode ends with Lorentzen showing Darrow a report he wants to publish about the secret project being built in Los Alamos. Darrow isn't interested in pulling back the curtain just yet, but that's why Lorentzen was looking into Frank's story — leverage. "Why did you let Frank back onto the Hill? Shut him up or torture him?" he asks, before supplying his own answer.

## 33

Season 2  
Episode Number: 19  
Season Episode: 6

Originally aired: Tuesday November 17, 2015  
Writer: Scott Brown, Megan Ferrell Burke  
Director: Kimberly Peirce  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Mamie Gummer (Nora), Brian Barela (G.I.), Richard Beal (Scientist), Stafford Douglas (Thatcher), William Greely (Scientist #41), Steve Larese (Scientist), Lauren Myers (Jeannie), Geoffrey Pomeroy (Dr. Gill), Hank Rogerson (Bukowski), Richard Schiff (Occam), Michael Sheets (Pritchard), Daniel Stern (Glen Babbit), Courtney Walsh (Switchboard Operator), Ben Whitehair (Gore)  
Summary: The scientists and army battle for control of the bomb.



The show begins with Helen Prins calling for worker and scientist safety, since now they are engaged with highly risky research such as criticality, pushing the core of the gadget to the brink of an uncontrolled chain reaction.

She also urges her collected colleagues to push for scientist representation on the Targeting Committee, which will determine how or when the bomb they make is deployed.

Fitz asks Charlie Isaacs to consider doing some research on the effect of all this radioactive research on human beings. Charlie agrees, if he can find an expert already on the hill who isn't otherwise engaged. He goes to Liza Winter who is still furious at Col. Darrow for sending Private Dunlavy to his doom in the South Pacific to punish her husband, Frank, for contacting her.

Darrow later agrees to give Liza the job, after she scares the hell out of him by pointing out that if a fast neutron chain reaction — known colloquially as "tickling the dragon's tail" — got out of control in an adjacent building, it would have no problem passing through those walls and giving him a fatal dose of radiation at his desk chair.

Elsewhere, Jim Meeks is in the new lead of a community theater production of Gilbert and Sullivan's *The Mikado*. Charlie has a tense conversation with his wife, Abby, which sends him to the campus watering hole for a drink with Helen. "I would like to address an injustice," he says — and dumps a drink in her lap.

But really, he wants to invite her to be part of the G group on the primary bomb. "The test is three months off, and we're shorthanded and under-brained." FDR's science adviser, Vannevar Bush, is on his way to Los Alamos to review test preparations, and Charlie needs the program to be firing on all cylinders. Helen accepts.

In the operator room, Abby discovers that Paul Crosley is using a British phone attendant to send off-the-books updates on Plutonium enrichment to their government — a.k.a. spying, albeit for an ally.

Frank urges Helen to take the opportunity of FDR's science adviser visit to slip him a letter from the scientists on the hill demanding a place at the table on the Targeting Committee.

Meeks lets his Soviet handler Nora know about the petition, but she tells him not to stand for anything. She wants him to earn Charlie's trust, period. So Meeks tips him off about the petition too, and Darrow confronts Winter. Ultimately, he decides to let Winter circulate his letter.

The reason, which isn't immediately clear to Frank, is that Darrow wants to see who is disloyal enough to sign it. Frank keeps pressuring Helen to give the letter to FDR's man.

Meanwhile, Frank gets sent off to the desert to take part in criticality experiments. Tickling the dragon's tail. (Darrow was smart enough to move this volatile part of the process far from the main base.)

While on the road there, Frank sees the ghost of the spook: Schiff's deceased Fischer, who taunts and torments him as he engages in the risky criticality experiment. It's a way to get inside Winter's head as he puzzles through a problem: Why would Darrow allow the letter to make the rounds?

By the time he figures it out, he realizes there may be only one way to get back to the base in time to stop Helen from delivering the letter and exposing all who signed it as potential traitors. He needs to tickle the dragon's tail, come close to criticality, and either max out his exposure, irradiating himself, and leading to certain death — or perform it flawlessly and survive (while still earning an ambulance ride back to base.)

Abby finally figures out Crosley's ruse and confronts him about it. "I'm on a mission of vengeance," he confesses. But he's trying to hurt Helen — and Helen is Abby's husband's mistress. So now Abby is conflicted. She ends up telling Darrow anyway, but he doesn't seem very alarmed.

He's more concerned with her spiritual life and persuades her to pray with him. He tells her that the loss of her baby was not an accident, but part of God's plan. He proves to be much more adept at alarming her.

In the tech area, Winter is rallying the scientists. He tells them there is no German bomb, that they are being lied to in order to motivate their work.

He apologizes for being a "son of a bitch" and disrespecting many of them. Then he takes out a lighter and incinerates the letter some of them signed. "This petition is a black list," he says. "Anybody know the half-life of an FBI file?"

Frank inspires them to walk with him and confront FDR's science adviser as he arrives on the hill. "Follow me no matter what you believe, so long as you believe the scientists who developed this gadget should have some say in how it is used."

It's a powerful moment — and would make an excellent example of the emotional and sophisticated work Hickey has done on this show when it comes time to vote on Emmy nominations. Frank inspires a long trail of fellow scientists to walk into the yard with him.

They approach Darrow and Vannevar Bush, but in this particular moment of criticality ... the experiment fails.

Darrow is given a whispered piece of news and walks to a nearby American flag to lower it to half staff.

It is April 12, 1945. President Roosevelt has died from a stroke.

Whatever they say to his science adviser now will be pointless. It's now up to the nation's 33rd president, Harry S. Truman, to decide what to do with "the gadget."

## Behold the Lord High Executioner

Season 2

Episode Number: 20

Season Episode: 7

Originally aired: Tuesday November 24, 2015  
Writer: Lila Byock, Vinne Wilhelm  
Director: Jennifer Getzinger  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Corey Allen (Theodore Sinclair), Sherman Allen (Mikado Director), Beth Bailey (Fay), Brian Barela (G.I.), Vincent Connor (Nanki Poo), Stafford Douglas (Thatcher), William Greely (Scientist #41), Catherine Haun (Dot), Lauren Myers (Jeannie), Rich Sickler (Bartender), Daniel Stern (Glen Babbit)  
Summary: The hunt for a Soviet spy turns deadly.



The episode begins with a Native American maid at one of the Los Alamos homes who overhears some of the scientists' wives discussing a spy on the hill and the need to report unusual behavior. Her young son, Pablo, saw something: a man in the woods burying a tin box.

It was very near the location where Avram Fischer (Richard Schiff's counter-intelligence agent) was executed after catching Meeks in the middle of a dead drop of information. The tin box he buried was recovered, and Col. Darrow now has a witness to help him identify just who

from Los Alamos went for a walk in the woods that night.

He also has the tin box, which has code written on the inside of a Hershey's bar wrapper.

He seeks Dr. Theodore Sinclair, the only black scientist at Los Alamos. At first, it seems like a case of racial profiling — and it is, sort of. Darrow wants Sinclair to help him crack the code. He says it's because Sinclair is known to have an excellent mind for problem solving, but there's something he's leaving out. Since Sinclair is the only black man on the project, Darrow can be sure he's not the spy. The little boy can identify the culprit, and so the colonel knows the man he's looking for has light skin.

Newlyweds Fritz and Jeannie are already thinking of having children. She wants to do it, but he doesn't. He's afraid to tell her that he was contaminated with radiation on a long-ago experiment. Since the effects aren't known, he thinks it could lead to birth defects. Or in the less delicate way Fritz puts it: "How can you tell your wife you could have a kid with three heads?"

Pablo is with security, checking faces at the gate of the facility. Meeks' Russian handler, Nora, rescues him from the line and slips him an envelope full of cash, telling him to make a run for it. It's only a matter of time before he is exposed.

Meeks doesn't want to leave. "If I disappear, I'm going to look guilty."

"You are guilty," she tells him.

But Meeks can't walk away from his life. Then security puts the Hill on lockdown, and he can't get out. That leads Nora to devise a more gruesome solution.

Sinclair has found a clue. The man they're looking for works with the element polonium, and Sinclair has a list of the 23 men who handle the substance on the project.

Pablo remains with security and ends up in the care of Jeannie, who tries to reassure the frightened little boy by passing him a lucky charm: her pin. "This is Athena. She's a famous warrior, and she watches over the Women's Army Corps. As long as I wear this, no one can hurt me." That makes him feel a little better.

Nora delivers a suicide pill to Meeks, in case he is apprehended before she can work out an alternate solution. That solution would be putting another such pill into a bottle of orange soda and giving it to the child, eliminating the witness, eliminating the problem for Meeks.

"Absolutely not," Meeks says. "I'll turn myself in before I let you take care of a 10-year-old boy."

"How many 10-year-olds do you think are in Tokyo?" she says. Meeks asks for 12 hours and uses it to pose as an FBI agent (those theater mustaches make good disguises!) who pays a visit to the boy's mother, trying to indirectly scare her. She sees through the ruse pretty fast, and he has to get rough and make the threat clear.

It works. The next day, the boy doesn't remember anything. And when he happens to lay eyes on Meeks, he either honestly doesn't recognize him — or has been told not to. Later, he nods when Darrow shows him a suspect drawing (which we don't get to see). Eventually, we learn that he ID'd the man who executed Fischer — Nora's own handler.

But the reason he even gets to see Meeks is the bottle of orange soda he has been given by a friendly lady from the Women's Army Corps. Meeks rushes into the room to spill the bottle before the boy can drink the poison, saving his life but keeping his own at risk. This grants him a little forgiveness, a shred of sympathy, even as the final moments of this episode play out.

Elsewhere on the project, over at the Trinity test site, Liza Winter is trying to gather plants and animal specimens so she can test the effects of the eventual fallout. The soldiers helping her don't care much about her research, but husband, Frank, who is restricted from associating with her as punishment from Col. Darrow, proves to be resourceful in gathering materials for her — a way of showing his affection at a distance.

Abby Isaacs also makes a confession to Darrow, admitting that she called Robert Oppenheimer's mistress, Jean Tatlock, and feels she is responsible for the guilt that made her take her life. She believes that's what caused her to lose her child. Darrow's response to this is curious. He seems almost amused.

She wants to make restitution to Tatlock's family, but Darrow tells her: "God doesn't accept the U.S. dollar. There are other paths to redemption." I have to wonder if, in the fiction of this show, Tatlock's death is going to prove to be not by her own hand.

Jeannie ends up walking Pablo home and offering reassurance to his mother, who doesn't seem to want anything else to do with the mysteries of Los Alamos. While at the home, Jeannie finds something in the yard. The pitch pipe that Meeks was using to rehearse for the play.

It also happens to be opening night, with Fritz front and center for the show. Jeannie can't sit still for *The Mikado*. The possibility of what she has discovered is eating at her. During intermission, she confronts Meeks.

Meeks admits he's a spy, but he lies and says Fritz is the one who got him into it. That messes with Jeannie's head, tangles up her resolve to expose him. She thinks he's lying but doesn't know. As she runs off into the night, Nora emerges from the shadows. She tells Meeks to get back inside. Act 2 is starting. She promises to take care of Jeannie.

Meeks asks, "What are you going to do?" but doesn't wait for an answer.

As Meeks takes the stage, Nora is seen striking Jeannie over the back of her head.

Maybe she should have held on to that Athena pin.

# Human Error

Season 2

Episode Number: 21

Season Episode: 8

Originally aired: Tuesday December 1, 2015  
Writer: Mark Lafferty  
Director: Julie Anne Robinson  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Brian Barela (G.I.), Richard Beal (Bar Cowboy), Stafford Douglas (Thatcher), Howard Ferguson Jr. (Hawkes), William Greely (Scientist #41), Bob Kaye (G2 Agent Wax), Ted Maritz (Harvey), David Alexander Miller (Trinity Worker), Audrey Moore (Francene), Daniel Stern (Glen Babbit), Danny Winn (Trinity Employee H-326), Peter Stormare (Lazar)  
Summary: As the project falters, Charlie turns to an unlikely partner for help.



A man shows up with a post-office box written on a matchbook. He's looking for someone. "Someone I care about," he says.

An agent confronts him at a gas station. "You. Who are you?"

"Isaacs," the man says. "Ring a bell?"

This is how we meet the inveterate gambler and ex-con who is Charlie Isaacs' father. Brad Garrett plays him with a kind of blustery charm. He's hard not to like. At least at first.

Off in the desert, Charlie is overseeing a test of the globular blasting mechanism that will trigger the gadget. One problem:

It doesn't blow up in front of him.

Instead, it fizzes and flames out. It's a desperate, sad sight — and the clock is ticking. Their schedule is off. This needs to work.

One scientist who doesn't turn out to see the test is Fritz, who is grief-stricken from the death of his wife, Jeannie — last seen being clobbered across the back of her skull by Nora, the Russian operative who killed her after she discovered Meeks is a spy.

Fritz — and everybody on the Hill — thinks she died in an accident while crossing through a construction site at night. Only we — and the two people responsible — know the truth. Fritz is guilt-stricken and wants to volunteer to be tested on with radioactive material.

Meeks isn't self-destructive, but guilt is gnawing at him, too.

"They were going to have kids," he tells Nora later. After staying the night in her quarters, he finds a notebook, describing the spy she's assigned to monitor in unflattering terms. "Perseus is immature, distrustful of authority, politically uninformed. He believes he is more intelligent than he is, which makes him susceptible to flattery."

She tells him, "Those notes are not about you." There's another Soviet spy on the Hill.

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Suspect No. 1: The new boyfriend of Helen Prins, a patent attorney who seems to know an awful lot about her work and is planting ideas in her head that this research could be a money-maker for her in the future — and he would be willing to hide some of it from Uncle Sam, if she's game.

Col. Darrow goes to Frank Winter and orders him to help problem-solve what went wrong with the test that day. Winter calls his bluff — go ahead, send him off to the front lines for insubordination. If Darrow wants a working gadget, he needs to meet Frank's demands — which include discharging him from the military service he forced on Winter and giving a scientist a seat on the target committee that will determine how — or if — the bomb is used.

As Winter sits down to start helping Charlie solve the mystery of the bomb that wouldn't blow, they hear gunfire popping outside. It's a celebration. "Hitler just blew his goddamn brains out!" a soldier cries. "It's all over!"

Suddenly, the quest to beat the Nazi bomb is not much of a motivator.

The end of the war in Europe means that Britons Paul Crosley and William Hogarth are packing up and heading home. Their war is over — and as a parting gift, they intend to abscond with as many nuclear secrets as possible to give their own country a leg up in the coming arms race.

As they make their escape, the feds swarm their car. Both Crosley and Hogarth are taken into custody. Darrow confronts Hogarth, who blames the younger scientist — the one he lured into being his accomplice by telling him about the son Crosley fathered with Hogarth's daughter.

But Darrow isn't buying it. Remember when he was so unperturbed after Abby reported that Crosley was likely passing secrets via phone? He has known about this for a long time, and Crosley was not Hogarth's accomplice — he was Darrow's.

Hogarth tries to shame him: How dare he do this to his own child's grandfather, but Crosley is amused by the old man's rage. He has looked closely at the photo of the boy and even took it out of its frame at one point. On the back was a date that meant it couldn't possibly be his child.

Hogarth's manipulations haven't been nearly as effective as he thought, and now he's finally out of moves. For his trouble, Crosley gets U.S. citizenship.

While piecing through the remains of his failed test, Charlie gets a call. It's his father. He wants to see his grandson. Maybe just hear his name. "Go to hell," Charlie says.

His wife, Abby doesn't have the same hard feelings. She seeks a pass from Darrow to meet with her estranged father-in-law and bring him his grandson. Darrow agrees after she plays on his sense of family responsibility and religion. "The Jewish people don't just need Palestine," she says. "We need each other."

Darrow grants her leave, and Abby spends an afternoon with the old timer. He charms her, and everything seems to be going great until he reveals his true motivation. He knows somehow that Charlie is working on a weapon, and he wants to sell whatever tech he's developing to the new Jewish state that will form in the aftermath of the war.

Before saying goodbye, Abby gives Mr. Isaacs a check. He considers it a good start on their budding arms business, but she says it's not for that — it's to get him to stay away from them. Here's where the good-time charmer departs and the snarling crook emerges.

"I bet your family's been paying people off for generations," he says. "You think you know the man you're married to? Think about that the next time you're sitting across from your husband at the dinner table. If I was you, I wouldn't believe anything he says!"

He bellows these final words as her car swerves around him on its way back to the Hill.

Out in the desert, Frank questions whether Charlie checked all the detonators, made sure to use 32 of them, and had the positive and negative connectors aligned properly. "Yellow to red, I'm not colorblind," Charlie says.

They go through a number of increasingly unlikely scenarios, from moisture in the cork lining to a rogue, undetected lightning strike.

During an intimate conversation about how the project has "turned around" Charlie's sense of right and wrong, Frank has his eureka moment. "It was turned around!"

What if someone made a mistake on the detonators and mislabeled the positive and negative connectors? Before offering this solution, Frank gets Charlie's commitment that he will serve on the target committee. He wants Charlie to convince them to demonstrate the bomb on an uninhabited island — a warning shot that will force Japan to surrender without killings tens of thousands of civilians.



Frank tells him about the mislabeled detonators. It's a solution so simple, Charlie can barely believe he missed it.

"You did the right thing," Charlie says.

"I know you will, too," Frank answers.

After a shared glance with Liza, Frank (now in his civilian clothes) stops by to visit Lazar, the ordnance supervisor. "How long did it take him to figure it out?" Lazar asks.

"He didn't," Frank says, paying off a bet with an old friend by handing him a bag of tobacco. "I had to feed him the answer."

On a shelf nearby are the same kind of detonators Lazar deliberately mislabeled.



## Brooklyn

Season 2  
Episode Number: 22  
Season Episode: 9

Originally aired: Tuesday December 8, 2015  
Writer: Dustin Thomason  
Director: Michael Uppendahl  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Corey Allen (Theodore Sinclair), Brian Barela (G.I.), Richard Beal (Scientist), William Greely (Scientist #41), Justin Kirk (Joseph Bucher), Audrey Moore (Francene), Daniel Stern (Glen Babbit), Danny Winn (Trinity Employee H-326), Victor Talmadge (Victor Green), Mamie Gummer (Nora), Daniel London (J. Robert Oppenheimer), Jason Ralph (Stan)  
Summary: Days before the world's first nuclear explosion, everyone races to secure their place in history.



"Brooklyn" is the title, and like the name of the series itself, it is a New York-themed codename. "Brooklyn" is Jim Meeks, an American scientist turned Soviet spy, who thinks creating a nuclear stalemate between the two countries will protect the world once this weapon is deployed.

Charlie Isaacs leaves home and finds a stick-figure drawing from his son on the windshield. He meets Frank Winter briefly to talk about the Target Committee, and Frank again urges him to convince the group to drop the bomb on an uninhabited South Pacific island as a

show of strength that will make the Japanese surrender without causing mass civilian casualties.

Even if they target a military base, Winter expects there to be 50,000 civilian casualties — about 20,000 of them children.

Charlie seems doubtful that Emperor Hirohito will surrender to a warning shot. "It's not a warning shot. It's not even another bomb," Winter says. "It's a second sun. The emperor is not surrendering to an army; he's surrendering to the power of the universe."

Winter urges him to wait and seize the last word and try to make it personal. Isaacs takes out the drawing, which has a note written on it: GOOD LUCK DADDY. "If we don't show mercy without WMD in this war, how can we expect anyone to show our kids mercy in the next one."

Winter thinks that will be persuasive. "Just make sure you get the last word."

Meanwhile, at a diner, Victor Green, the Soviet handler, finds himself seized by U.S. agents, including Bucher, the character last seen playing mind games with Frank Winter in an offsite U.S. detention camp.

In custody, Kirk's counter-intelligence agent grills Mr. Green about scraps of partially burned paper they found on his property, referring to "Brooklyn." The U.S. has determined this is code,

but for what? Paul Crosley, who proved his loyalty by revealing the espionage of his fellow Brit William Hogarth in the last episode, is invited to be part of the effort to crack Mr. Green.

Green begs him to help him commit suicide and refers to his son, which makes Crosley aware that someone who knows him well must be "Brooklyn."

Meeks and his direct handler, Nora, are in crisis mode — preparing to sabotage the upcoming test while simultaneously considering their escape. They have no idea how long Green will hold back what he knows. When his interrogators bring up his daughter, Eleanor (similar name, right?), a student at the University of Pittsburgh who has since disappeared, Green says he'll talk if they leave her out of this. He offers a name, for the spy on the Hill: Sid Liao, the Asian-American scientist from the first season who was killed after stealing tech, not for another country, but for his own profit after the war.

Crosley doesn't buy it.

Abby Isaacs has been in touch with John Tatlock, the father of Jean, the mistress of lead scientist J. Robert Oppenheimer. Jean committed suicide sometime after Abby telephoned her to anonymously chastise her for the illicit relationship. She feels responsible for the woman's death and has reached out to her family to make amends. But... Jean's father doesn't believe the suicide note was written by his daughter.

Abby confronts Oppenheimer with the information. "What business is it of yours?" he asks. When Abby floats the idea that his mistress was murdered and the suicide was staged, he already has his own theory about that. "Do you know the difference between a conjecture and a theorem? I may conjecture that Col. Darrow had Jean murdered to keep me on the project. But I have nothing to test, to prove. Therefore — no theorem. We'll never know. That's our world. Uncertainty."

He tells her she doesn't need to return to the switchboard. "You're removed."

When she has a meeting with Darrow, he decides to reveal the shocking truth, one that plays into longtime, real-life theories about what happened to the real Jean Tatlock. He plays an audio recording of her husband, Charlie, urging him to murder the woman to refocus Oppenheimer on the project. He even offers the colonel some guidance on how to hire a killer, since his father was associated with underworld figures in St. Louis.

In a previous episode, we saw Charlie tell Darrow, "I'm not telling you how to do your job. I'm telling you there's a job to be done." But we didn't see the end of that conversation, and it seemed reasonable to assume that murder was not what Isaacs had in mind. Now, we hear him straight-up advocating for it. "You're a soldier, right? We're at war."

On the Little Boy project, the second bomb in the works, Winter learns the metallurgy budget has been largely spent on a lab in Rochester, N.Y. He seems to know what that is, even if Helen Prins and Theodore Sinclair have no idea.

Liza Winter is busy warning about the danger of radioactive particles from the test raining back down to earth. She even coins a term: "fallout," but no one in the room is listening as they go about their business. She gets their attention by pointing out that the corn muffins they're munching were baked from corn harvested from another test site. "The extent of the fallout will depend on the weather," she says. Charlie Isaacs enters and tells them to study her report "chapter and verse" before the test, and her husband, Frank, asks if the muffins were really baked with potentially contaminated ingredients. She smiles. She bought them at the P/X and has no idea.

Fritz decides to step down from the project after the "accidental" death of his wife, Jeannie, who was actually killed by Nora after discovering Jim Meeks is a spy. "I've had enough death for a lifetime," Fritz tells Isaacs.

In the detention area, Darrow comes storming out of the cell containing Green. "Clean it up," he says, looking urgent and disheveled. Inside the room, Green is lying dead. It doesn't seem he got the information he was looking for.

At the same time, Isaacs goes home for a moment before the big Target Committee meeting. He asks Abby to make him a sandwich for the road, but she tells him, "Have your men do it."

"What?"

"Your men, from St. Louis. Your father's men who took care of Jean Tatlock. Have them do it."

"It was a bluff," Charlie says. "To light a fire under Darrow. He took things too far. He did it, not me."

"You think a jury cares whose hands are dirtier?" she asks.

He starts to give her the old spiel about wartime, loss of life, and how things look from his perspective with so many other lives in the balance. "You let me believe I was responsible for a woman's death," she answers. "You're a monster."

Suddenly, everything her horrible father-in-law warned her about his son in the last episode seems to be coming true. Charlie has no time for this and asks to see his son. "He's on his way to Brooklyn," Abby says — revealing the second reason behind this episode's title. She has sent him to her parents' house with their housekeeper.

"Colonel may have me trapped here, but my son will have no part of this," she says.

Charlie grabs her violently. "You think I won't get in the car and bring him back?"

"Your test is in 24 hours," she replies coolly. "You think I don't know which way you'll drive?"

Back in Green's barn, Bucher and Crosley are staging the deceased spy's hanging suicide. Bucher casually mentions that he prefers to create these scenes in people's homes. "I prefer bathrooms. It's a good place to open a wrist — or drown," he says.

You know what that implies.

Neither believes Green confessed the identity of "Brooklyn." "Angry man, your colonel," Bucher says. "He'll make a hell of a senator some day. You'll see."

Each grabs a foot and pulls — cracking the neck of Green's corpse. "World War II is over," Bucher says. "The next war has already started. It's going to be unlike any conflict in history. It's going to be waged silently by men like you and me. We're forming a new breed of intelligence operation. One with a more... centralized approach."

Their Soviet counterparts, Nora and Jim, are busy trying to figure out how to deal with Green's death. Nora proposes not just sabotaging the test, but also wiring it to go off before the scientists clear the test site. "You want to kill my friends," Meeks says.

"We do one terrible thing tomorrow," she says. "But then no one ever has to again."

It's an ominous suggestion, especially since we know from the first episode of this season that Meeks ends up in the tower babysitting the bomb on the night of the test.

Elsewhere, we see Helen and her new boyfriend, Stan, the patent lawyer, relaxing in bed while she laments her frustration at not getting to visit the Trinity test. He tells her not to go, and she gripes that even he has a pass to attend.

It's pretty clear. He's got to be "Perseus," the other Soviet spy — right? At the very least, the show clearly wants us to think this.

Bucher shows up on the Hill outside Frank Winter's office, and the two old prison buddies have an uncomfortable reunion. "I hear you fixed both gadgets inside of six months. Not bad for a conscientious objector," Bucher says.

"What do you want?"

Bucher tells Winter about a prison camp in Alabama for German POWs, some of them cultural ambassadors, including musicians. Including Frank's mother. "I thought you might like to know," Bucher says.

The next day, Helen confronts Frank in his office. She has found out how the metallurgy budget ended up in Rochester. Frank filled out the wrong forms. Liza is collaborating with the University of Rochester on her fallout work, and the money from Little Boy just funded her research and equipment. Quite a coincidence, Helen notes. "It must be really exhausting making sure we don't finish Little Boy on time," she says.

Helen feels betrayed. She has backed every move by Frank, even the illegal ones. She suspects Frank may have had a hand in sabotaging earlier tests, only to fix the problem and return to a position of power in the tech group.

At the test site, scientists are busy assembling the big bomb, and Isaacs considers the drawing from his children again. When the Target Committee meets, Charlie doesn't wait for the last word — he starts the meeting, instead.

He rattles through everything Winter told him to say, about showing mercy and detonating a test on an unpopulated island, but now that his wife has called him a murderer and stolen away his son, the darkest possible version of Charlie Isaacs — a character we once thought of as a hero of this show — emerges from a place within him that we never suspected was there.

Isaacs says we need to show the world unmitigated power. "The truth is, we can be loved — or we can have peace," he says. "Not both."

If the bomb is going to change the world, then he tells the Target Committee to embrace the title of "monsters, who erased a city, without warning."

"You mean a military target," one of the generals interrupts.

"No, a city. Full of civilians," Isaacs says. "And we detonate at the altitude that gives us the widest blast radius. Maximum destruction of infrastructure. Homes. Hospitals. Schools. It has to be catastrophic, on a scale that no one has ever imagined."

He thinks for a moment. "If we detonate our bomb on a desert island, we might stop this war. But we won't prevent the next one. The weapon we're testing — Fat Man. It's nothing. We'll measure it in kilotons for TNT. But 20 years from now they'll be counting in megatons. Countries. Continents. So I'm begging you for you kids and grandkids: Show the world what evil looks like — once.... We have to be monsters today to stop the monsters of tomorrow."

At the same time, we see Jim and Stan (aha, he is Perseus!) driving together to the test site.

Suddenly, they seem like the good guys.

Back at his room, Fritz is watching a home movie of his wedding when Crosley comes to comfort him. He succeeds in boosting Fritz's spirits a little, but something catches his eye in the movie: Jim Meeks puts on a Brooklyn Dodgers baseball cap.

After the Target Meeting, Charlie paces around the desert, looking distraught. Oppenheimer walks up to him, and without breaking stride, he punches Isaacs in the face. That's for Jean. But also, Oppenheimer seems horrified at what Charlie has just proposed.

As night draws near, Helen enters Darrow's office and says she believes Frank Winter is sabotaging the project, while Crosley enters Winters's office and says: "We need to talk about Jim."

# Jupiter

Season 2

Episode Number: 23

Season Episode: 10

Originally aired: Tuesday December 15, 2015  
Writer: Sam Shaw  
Director: Thomas Schlamme  
Show Stars: Alexia Fast (Callie Winter), Ashley Zukerman (Charlie Abrams), Christopher Denham (Jim Meeks), Harry Lloyd (Paul Crosley), John Benjamin Hickey (Frank Winter), Katja Herbers (Helen Price), Michael Chernus (Louis "Fritz" Fedowitz), Olivia Williams (Liza Winter), Rachel Brosnahan (Abby Abrams), William Petersen (Colonel Emmett Darrow)  
Guest Stars: Peter Stormare (Lazar), Daniel London (J. Robert Oppenheimer), Jason Ralph (Stan), Griffin Dunne (Woodrow Lorentzen), Ben Hall (Joey Isaacs), Miles Hall (Joey Isaacs), Tad Jones (Major Pellegrin), Ryan Jason Cook (Gate Guard / MP #6), Evan Adrian (MP #8), Damon Guerrasio (Shope), Michael McCabe (Soldier), Nathan Brimmer (MP #5), Matt Peterson (Scientist), Miles Wartes (MP #4 / Moffett), Howard Ferguson Jr. (Hawkes / Sharp Suit), Kenneth Miller (MP #2), Sam Quinn (MP #3), Chris Ranney (Lieutenant)  
Summary: A new era is ushered in with the first test of an atomic weapon.



Turncoat scientist Jim Meeks is on his way to the Trinity test site alongside fellow Soviet spy Perseus (the patent lawyer Stan). The Soviets want Jim to rig the bomb to go off when the trigger is tested, obliterating most of the researchers who worked to develop it. He can't do it and tries to persuade his comrade to abandon the plan.

"What's your part? To make sure I do mine?" Jim asks.

Elsewhere, Frank Winter learns that Meeks may be a spy from scientist-turned-counter-espionage-agent Paul Crosley. Winter also soon learns he is now wanted by the project's leadership because Helen Prins has revealed he has been deliberately siphoning money away from his team to slow the development of the bomb.

He heads to the test site to intercept Jim while military police hunt for him. Jim sidelines "Perseus" when he's hunting for his test-site pass in the trunk by knocking him out — or killing him? That part is unclear. It was a pretty brutal take-down.

It's a game of cat and mouse with lots of cats and lots of mice.

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As a storm sweeps over the test site, Fritz turns up at Trinity to witness the first man-made atomic blast. He meets with Liza Winter who is hoping to study the effects of fallout. She turns

him into her own spy — infiltrating the command tent and urging Charlie Isaacs to wait out the rain or risk contaminating a wider swath of New Mexico.

As we saw in a flash-forward on the first episode of this season, Jim ends up stationed inside the tower to safeguard the bomb, because Isaacs has received word that Winter sabotaged one of the pre-tests as a way of earning his trust and getting him to advocate against using the weapon in a populated area. (That effort failed last episode when Isaacs not only urged them to hit a populated place, he suggested a city full of civilians instead of a military target.)

Helen turns up at Trinity. (She stole Stan's pass, which is why he couldn't find it — and is not probably dead. Oops.) She makes peace with Charlie after their affair went badly. "In case you set the atmosphere on fire tonight and this is goodbye... I don't blame you for choosing your family." The MPs show up to escort her away, and she ends up in a car with Oppenheimer, who has a major new assignment for her: She is the new head of the tech group, and she'll be responsible for delivering the bomb to the South Pacific. "Buy a slicker," he says. "It's monsoon season."

Charlie ends up calling his in-laws house to talk to his son and discovers the boy is not there. Then the in-laws hang up on him. Back at his home, Abby won't take his call either. She is planning her own escape.

Up in the tower, Frank slips through security and surprises the man who is tinkering with an atom bomb. Jim holds him at gunpoint: "I don't want to hurt anybody."

"Then you picked the wrong line of work," Frank says.

He says he's not here to stop Jim but to help him. "I've been trying to put this thing back in the box for over a year," he says. But is Frank there to save Jim or save the test? Maybe both.

But while working on disarming Jim and re-arming the bomb, he learns that Isaacs recommended dropping the bomb on a city. Suddenly, the morality of Frank's physics studies got a lot more abstract. I don't think he knows what he's fighting for anymore.

Jim reveals he's not leaving once their work is finished. "It'll be over in a thousandth of a second," he says. "I'm not scared."

"Whoever it was who sent you on a suicide mission... "

"It was a homicide mission," Jim says. "Kill the whole brain trust."

Frank manages to stall the countdown by wiring the tower to become an antenna that broadcasts music through all the communications equipment on the ground. This will at least slow the test and maybe allow the weather to clear before the radioactive explosion is unleashed. Liza figures out that it must be Frank up in the tower.

Col. Darrow gives Isaacs a scolding over the delays, but Isaacs isn't afraid of him anymore. He sent a letter to the Secretary of War that details not just Darrow's murder of Jean Tatlock, Oppenheimer's mistress, but also his falsification of intelligence designed to motivate the scientists — and the leadership in Washington, D.C. — to accelerate work on the American bomb. This seems to have hit a target with Darrow, who is speechless.

Frank convinces Jim to save his own life, saying that if the U.S. ties him to the Soviets and comes to believe they sabotaged the test, it will lead to a continuation of World War II between the two allies. One bullet in Sarajevo, he points out, led to the clash of treaties that unleashed World War I. "We cannot let anyone believe a Soviet spy was responsible," Frank says.

"They won't think it's an accident," Jim says. But Frank has another idea.

"They have to think it was me," he says.

Jim confesses that he was responsible for the murder of Jeannie, Fritz's wife, who figured out he was a spy. Frank seems to be continually surprised by the depths of darkness in his friends.

The phone rings in the tower. It's Liza. She says everyone knows he sabotaged the tests. "You're going to get yourself shot," she says.

He tells her to get into the next car she sees and get out of the blast radius. "Don't send up the cavalry," he says. "I've made a lot of mistakes. I'm trying to unmake one tonight. I don't know if you're still my wife, but I'm still your husband. And I love you."

Frank cuts the radio broadcast. The countdown is back on: 32 minutes.

Jim holds the gun on him. "What are you really doing up here, Frank?"

Liza sends Fritz into the tower, and Frank tells him he was the one who re-wired the detonators, absolving Jim in the eyes of his friend. "Somebody had to save the world from the guys who were trying to save the world," he says.

"If the gadget doesn't kill you, the army will," Fritz says.



Frank laughs. "That's what Jim said," he tells Fritz. "You were right, Jim. I have too much to live for."

The three of them get to work fixing the gadget and then drive away from the blast radius as dawn crests. Inside a bunker, Jim confesses his crimes to Fritz, including the death of his best friend's wife.

Overcome with grief, Fritz takes the gun and points it at Jim. Frank stands behind him, eyes fixed on the horizon. Then the bomb goes off.

The three men stand in awe, staring at this new sun.

Fritz raises the gun, but puts it to his own head — and pulls the trigger. Behind him, the glorious glow of the blast becomes a screaming hellfire.



# Actor Appearances

## A

Shad Adair .....	1
0205 (Councilman / Scientist)	
Evan Adrian .....	1
0210 (MP #8)	
Tailinh Agoyo .....	5
0104 (Paloma); 0105 (Paloma); 0106 (Paloma); 0107 (Paloma); 0109 (Paloma)	
Jennifer Allcott .....	1
0112 (Evelyn)	
Corey Allen .....	4
0112 (Theodore Sinclair); 0204 (Theodore Sinclair); 0207 (Theodore Sinclair); 0209 (Theodore Sinclair)	
Sherman Allen .....	1
0207 (Mikado Director)	
Travis Armstrong .....	1
0102 (Moss)	
Nathaniel Augustson .....	2
0111 (Bruce); 0201 (Smitty)	

## B

Beth Bailey .....	3
0101 (Fay); 0104 (Fay); 0207 (Fay)	
Colt Balok .....	1
0205 (Military Mechanic)	
Brian Barela .....	9
0201 (G.I.); 0202 (G.I.); 0203 (G.I.); 0204 (G.I.); 0205 (G.I.); 0206 (G.I.); 0207 (G.I.); 0208 (G.I.); 0209 (G.I.)	
Richard Beal .....	6
0201 (Scientist); 0203 (Scientist); 0205 (Scientist); 0206 (Scientist); 0208 (Bar Cowboy); 0209 (Scientist)	
Morse Bicknell .....	1
0111 (SS Officer)	
Derek Blakeney .....	3
0113 (Military Driver); 0201 (G.I.); 0202 (G.I.)	
Paul Blott .....	1
0109 (Church)	
Frank Bond .....	2
0106 (Bill Tupper); 0107 (Bill Tupper)	
Nathan Brimmer .....	1
0210 (MP #5)	
Steven Ray Byrd .....	1
0202 (Military Police Officer)	

## C

James Cady .....	1
0113 (Functionary)	
Bill Camp .....	1
0108 (William Hogarth)	
John Campbell .....	1
0203 (MP)	

Neve Campbell .....	1
0201 (Kitty Oppenheimer)	
Rebecca Hill Casey .....	2
0108 (Waitress); 0205 (Waitress)	
Christian Clemenson .....	1
0104 (Niels Bohr)	
Marc Comstock .....	1
0111 (Magpie)	
Vincent Connor .....	1
0207 (Nanki Poo)	
Ryan Jason Cook .....	5
0102 (Stanhope); 0110 (Stanhope); 0113 (Stanhope); 0201 (Stanhope); 0210 (Gate Guard / MP #6)	
Josh Cooke .....	4
0101 (Lancefield); 0103 (Lancefield); 0109 (Lancefield); 0111 (Lancefield)	
Kyle T. Cowan .....	1
0104 (Young Frank Winter)	
Jonny Coyne .....	2
0102 (Alek Barrath); 0106 (Dr. Alek Barath)	

## D

Christopher Dempsey .....	1
0102 (Falkoff)	
Brian Denk .....	2
0101 (Day laborer); 0104 (Day laborer)	
David Devereaux .....	1
0106 (X-Site Worker)	
Jetto Dorsainville .....	1
0202 (Military Police)	
Stafford Douglas .....	11
0102 (Thatcher); 0103 (Thatcher); 0104 (Thatcher); 0105 (Thatcher); 0108 (Thatcher); 0109 (Thatcher); 0111 (Thatcher); 0203 (Thatcher); 0206 (Thatcher); 0207 (Thatcher); 0208 (Thatcher)	
Griffin Dunne .....	1
0210 (Woodrow Lorentzen)	
Phil Duran .....	1
0107 (Guard)	

## E

Roberto Earlywine .....	1
0101 (X Site Worker)	
Tara Elliott .....	8
0101 (Computer Woman); 0102 (Computer Woman); 0103 (Swing Dancer); 0104 (Party Attendee); 0105 (Swing Dancer); 0107 (Housewife); 0108 (Housewife); 0110 (Housewife / Secretary)	
Philip Ettinger .....	1
0104 (Watts)	

## F

Howard Ferguson Jr. ....	2
0208 (Hawkes); 0210 (Hawkes / Sharp Suit)	

Sarah Fischer ..... 1  
 0204 (Gun Group Scientist)  
 Corinne Fox ..... 2  
 0101 (Brothel girl); 0105 (Mother with baby)  
 Billy Fuessel ..... 2  
 0101 (Contractor); 0106 (Plant Worker / Diner Patron)

G

John Gabriel ..... 1  
 0107 (Travis)  
 Jenelle Gallegos ..... 1  
 0110 (Housewife)  
 Esodie Geiger ..... 1  
 0203 (Maid)  
 Merritt Glover ..... 1  
 0112 (Windchime Woman)  
 Adam Godley ..... 3  
 0106 (Dr. Adelman); 0109 (Dr. Adelman); 0110 (Dr. Adelman)  
 William Greely ..... 9  
 0201 (Scientist #41); 0202 (Scientist #41); 0203 (Scientist #41); 0204 (Scientist #41); 0205 (Scientist #41); 0206 (Scientist #41); 0207 (Scientist #41); 0208 (Scientist #41); 0209 (Scientist #41)  
 Noel Green ..... 4  
 0101 (Scientist); 0102 (Scientist); 0103 (Scientist); 0104 (Scientist)  
 Robin Thomas Grossman ..... 1  
 0108 (Maxwell Rubins)  
 Damon Guerrasio ..... 1  
 0210 (Shope)  
 Mamie Gummer ..... 3  
 0201 (Nora); 0206 (Nora); 0209 (Nora)

H

Christopher Hagen ..... 1  
 0201 (Ronnie)  
 Ben Hall ..... 4  
 0101 (Joey Isaacs); 0109 (Joey Isaacs); 0113 (Joey Isaacs); 0210 (Joey Isaacs)  
 Miles Hall ..... 4  
 0101 (Joey Isaacs); 0109 (Joey Isaacs); 0113 (Joey Isaacs); 0210 (Joey Isaacs)  
 Travis Hammer ..... 8  
 0102 (O'Byrne); 0103 (O'Byrne); 0104 (O'Byrne); 0105 (O'Byrne); 0109 (O'Byrne); 0111 (O'Byrne); 0112 (O'Byrne); 0203 (O'Byrne)  
 David Harbour ..... 4  
 0101 (Reed Akley); 0109 (Reed Akley); 0111 (Reed Akley); 0112 (Reed Akley)  
 Daniel Madison Hart ..... 4  
 0101 (Military Private); 0102 (Military Private); 0103 (Military Private); 0104 (Military Private)  
 Catherine Haun ..... 4  
 0101 (Dot); 0103 (Dot); 0104 (Dot); 0207 (Dot)  
 Jason E. Hill ..... 1  
 0108 (Military Policeman)  
 Timothy Holmes ..... 1  
 0112 (Scientists)  
 Jonathan Hubbard ..... 6  
 0101 (Scientist); 0102 (Scientist); 0103 (Scientist); 0104 (Scientist); 0105 (Scientist); 0108 (Scientist)  
 Alan Humphrey ..... 4  
 0201 (American Military); 0202 (American Military); 0203 (American Military); 0204 (American Military)

J

Clay Johnson ..... 1  
 0113 (Immigrant)  
 Colin Jones ..... 1  
 0101 (Wayne)  
 Jackie Jones ..... 1  
 0111 (Grete)  
 Judith Jones ..... 1  
 0109 (Blonde Mother)  
 Tad Jones ..... 3  
 0105 (Major James Pellegrin); 0112 (Brass); 0210 (Major Pellegrin)

K

Harrison Kavanaugh ..... 1  
 0201 (SED Worker)  
 Bob Kaye ..... 2  
 0113 (Gray Suit); 0208 (G2 Agent Wax)  
 Murad Kirdar ..... 6  
 0101 (Scientist); 0102 (Scientist); 0103 (Scientist); 0104 (Scientist); 0105 (Scientist); 0201 (Scientist)  
 Christina Kirk ..... 3  
 0111 (Rose Akley); 0112 (Rose Akley); 0113 (Rose Akley)  
 Justin Kirk ..... 2  
 0202 (Joseph Bucher); 0209 (Joseph Bucher)  
 John F. Kollar ..... 5  
 0101 (Scientist); 0102 (Scientist); 0103 (Scientist); 0104 (Department Head); 0105 (Scientist)  
 Michael A. Kuhn ..... 4  
 0101 (Military Police); 0102 (Military Police); 0103 (Military Police); 0104 (Military Police)

L

Brent Lambert ..... 1  
 0109 (Scrawny Scientist)  
 Lonnie Lane ..... 1  
 0101 (Driver)  
 Jade Scott Lewis ..... 1  
 0113 (Swee)  
 Marty Lindsey ..... 1  
 0202 (Gallagher)  
 Daniel London ..... 5  
 0101 (J. Robert Oppenheimer); 0104 (J. Robert Oppenheimer); 0113 (J. Robert Oppenheimer); 0209 (J. Robert Oppenheimer); 0210 (J. Robert Oppenheimer)

M

Kevin P. Manning ..... 1  
 0203 (Prison Guard)  
 Ted Maritz ..... 1  
 0208 (Harvey)  
 Lora Martinez-Cunningham ..... 1  
 0110 (Ida Fredrickson)  
 Fran Martone ..... 1  
 0101 (Akley's Secretary)  
 Sonia Maslovskaya ..... 1  
 0113 (Malka Perlman)  
 Michael McCabe ..... 1  
 0210 (Soldier)  
 Shawn McCall ..... 1  
 0113 (MP #3)  
 Melissa McCurley ..... 1

*Manhattan Episode Guide*

0107 (Troop Leader)	
Bruce McIntosh .....	1
0109 (Samaritan)	
Gerald McRaney .....	1
0113 (Sec. Hentry Stimson)	
Genia Michaela .....	1
0105 (Ruth)	
David Alexander Miller .....	1
0208 (Trinity Worker)	
Kenneth Miller .....	3
0101 (Purcell); 0109 (Purcell); 0210 (MP #2)	
Mike Miller .....	1
0112 (Lonnie)	
Sarah Minnich .....	1
0103 (Vera)	
Katie Anne Mitchell .....	1
0106 (Ticketing Agent)	
Audrey Moore .....	6
0106 (Francene); 0108 (Francene); 0113 (Francine); 0203 (Francine); 0208 (Francene); 0209 (Francene)	
Mark Moses .....	5
0101 (Col. Alden Cox); 0102 (Col. Alden Cox); 0103 (Col. Alden Cox); 0111 (Col. Alden Cox); 0112 (Col. Alden Cox)	
Lauren Myers .....	10
0105 (Jeannie); 0106 (Jeannie); 0108 (Jeannie); 0111 (Jeannie); 0112 (Jeannie); 0201 (Jeannie); 0203 (Jeannie); 0205 (Jeannie); 0206 (Jeannie); 0207 (Jeannie)	

**N**

Vivian Nesbitt .....	1
0103 (Col Cox's Secretary)	

**O**

Will Ontiveros .....	1
0101 (Scientist)	

**P**

Matthew Page .....	3
0103 (Private Weaver); 0106 (Private Weaver); 0112 (Edgar)	
Matt Peterson .....	1
0210 (Scientist)	
Philip David Pickard .....	5
0101 (Robert Bacher); 0102 (Robert Bacher); 0103 (Robert Bacher); 0104 (Robert Bacher); 0105 (Actor)	
Catharine Pilafas .....	1
0109 (Nurse)	
Geoffrey Pomeroy .....	1
0206 (Dr. Gill)	
Michael Neal Powell .....	1
0204 (Weary Texas Traveller)	

**Q**

Sam Quinn .....	2
0102 (GI #1); 0210 (MP #3)	

**R**

Dave Racki .....	1
0104 (Soldier #1)	
Kristen Rakes .....	1
0101 (Wilma)	

Jason Ralph .....	2
0209 (Stan); 0210 (Stan)	
Chris Ranney .....	1
0210 (Lieutenant)	
Hank Rogerson .....	2
0102 (Military Policeman); 0206 (Bukowski)	
Rachel Katherine Ross .....	5
0101 (Housewife); 0102 (Housewife); 0103 (House- wife); 0104 (Housewife); 0105 (Housewife)	
Kenneth Ruthardt .....	1
0109 (Tewa Man)	

**S**

Bernardo P. Saracino .....	1
0101 (Acevedo)	
Richard Schiff .....	5
0111 (Occam); 0113 (Occam); 0201 (Occam); 0202 (Occam); 0206 (Occam)	
Michael Sheets .....	1
0206 (Pritchard)	
Eddie Shin .....	1
0113 (Sid Liao)	
James Lawrence Sicard .....	1
0112 (Ivan)	
Rich Sickler .....	1
0207 (Bartender)	
Samson Snell .....	1
0201 (Private Dodd)	
Steve Sprenger .....	1
0201 (Harwood)	
Daniel Stern .....	14
0107 (Glen Babbit); 0109 (Glen Babbit); 0111 (Glen Babbit); 0112 (Glen Babbit); 0113 (Glen Bab- bit); 0201 (Glen Babbit); 0202 (Glen Babbit); 0203 (Glen Babbit); 0204 (Glen Babbit); 0205 (Glen Babbit); 0206 (Glen Babbit); 0207 (Glen Babbit); 0208 (Glen Babbit); 0209 (Glen Bab- bit)	
Michael E. Stogner .....	1
0201 (Scientist)	
Peter Stormare .....	3
0109 (Lazar); 0208 (Lazar); 0210 (Lazar)	

**T**

Victor Talmadge .....	2
0113 (Balding Man); 0209 (Victor Green)	
Aaron Templeton .....	1
0202 (S.E.D.)	
Rob Tode .....	1
0204 (Dr. Crippen)	
John Trejo .....	1
0103 (Zeller)	
Tommy Truex .....	1
0105 (Young Officer)	
Raoul Trujillo .....	1
0109 (Javier)	
J.B. Tuttle .....	1
0111 (Ledbetter)	

**V**

Eric Vincent .....	1
0103 (Scientist)	

**W**

Courtney Walsh .....	7
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0101 (Housewife); 0102 (Switchboard Operator); 0103 (Switchboard Operator); 0110 (Switchboard Operator); 0204 (Switchboard Operator); 0205 (Switchboard Operator); 0206 (Switchboard Operator)

Dylan B. Warren ..... 4  
 0101 (Military Police); 0102 (Military Police); 0103 (Military Police); 0104 (Military Police)

Nate Warren ..... 3  
 0102 (Vidders); 0103 (Vidders); 0107 (Fitzgerald)

Miles Wartes ..... 2  
 0203 (MP); 0210 (MP #4 / Moffett)

Carole Weyers ..... 5  
 0101 (Elodie); 0103 (Elodie); 0105 (Elodie); 0109 (Elodie); 0111 (Elodie)

Jefferson White ..... 7  
 0102 (Iowa); 0103 (Cole 'Iowa' Dunlavy); 0104 (Cole 'Iowa' Dunlavy); 0107 (Cole 'Iowa' Dunlavy); 0108 (Cole 'Iowa' Dunlavy); 0110 (Cole 'Iowa' Dunlavy); 0201 (Cole)

Ben Whitehair ..... 2  
 0203 (Nervous Private); 0206 (Gore)

Rebekah Wiggins ..... 3  
 0101 (Gladys); 0103 (Gladys); 0104 (Gladys)

Olivia Williams ..... 1  
 0203 (Liza Winter)

Danny Winn ..... 3  
 0205 (Trooper Moran); 0208 (Trinity Employee H-326); 0209 (Trinity Employee H-326)

David Grant Wright ..... 1  
 0203 (General Barnes)

————— Y —————

Shawn-Caulin Young ..... 1  
 0201 (Agent Jones)

————— Z —————

Harry Zimmerman ..... 1  
 0112 (Mr. Epstein)

Daniel Zubiata ..... 3  
 0106 (Control Room Supervisor); 0107 (Control Room Supervisor); 0110 (Military Police)