# S03E24 - Is Tau Ceti Our Project Hail Mary?

## The Multiverse Employee Handbook - Season 3

The Multiverse Employee Handbook has this to say about Tau Ceti:

Tau Ceti is the sort of star system that appears in conversations the moment humanity becomes slightly too confident about rockets.

Located about twelve light-years away, Tau Ceti is widely regarded as “nearby,” which in astronomical terms means you could reach it in a few tens of thousands of years if you left immediately and packed responsibly. This has not prevented humans from discussing it as if it were a weekend destination with limited parking.

The star itself is pleasant enough—smaller than the Sun, older, and surrounded by a generous quantity of debris that astronomers describe with words like disk and system but which would, in practice, make interplanetary navigation feel like driving through a very enthusiastic gravel storm.

Nevertheless, Tau Ceti has achieved a comfortable position in human imagination, appearing in science fiction, star charts, and at least one extremely optimistic interstellar rescue mission in Project Hail Mary by Andy Weir, in which a lone astronaut travels an absurd distance to solve a cosmic problem with science, improvisation, and the emotional resilience normally associated with caffeinated squirrels.

The Handbook notes that this is typical of humans. Present them with a distant star and they will immediately begin planning not only how to get there, but what snacks to bring and whether the atmosphere will support breathable optimism.

In summary, Tau Ceti is not currently inhabited by humans, though it has been thoroughly occupied by their expectations. Should they ever arrive, the star will likely greet them with the same calm indifference it has shown for the last six billion years, which the Handbook considers a promising start to any relationship.

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You're tuned in to The Multiverse Employee Handbook.

Today we're exploring Tau Ceti — the Sun-like star eleven point nine light-years away that astronomers, SETI researchers, and science fiction writers have been collectively obsessed with since 1960, using science, satire, and the kind of logic that only makes sense if you're travelling at seventy-three thousand years per

destination and have already accepted the terms and conditions.

Tau Ceti is close, stable, ancient, almost certainly planetary, and — as of this very week — the destination of Ryan Gosling. Whether any of those things are related, we will endeavour to find out.

But first, gather 'round the quantum debris field, my fellow interstellar filing clerks, for a tale that would make even Frank Drake question whether listening for signals from strange stars was entirely worth the bother.

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In the fluorescent-lit realm of Quantum Improbability Solutions, specifically in the Department of Astrophysical Data Compliance — which existed in a superposition of "essential to operations" and "does anyone actually know what they do in there" — Dave from Accounting was having what could charitably be called a solar crisis.

It had started, as these things often do, with a spreadsheet.

Not just any spreadsheet. A hyper-intelligent, self-replicating Excel file — internal designation: Astrophage.xlsx — that had somehow achieved sentience somewhere between columns AZ and BA, begun consuming the energy output of the Sun at a rate of 0.17% per year, and was now auto-filling cells across the entire inner Solar System. The pivot tables were inexplicable. The conditional formatting had become philosophical. And no one — not IT, not the solar physics team, not the very expensive consultant from Edinburgh — could find the close button.

The Square-Haired Boss had been granted emergency executive authority by a coalition of world governments who hadn't fully read what they were agreeing to. He had the PowerPoint ready before anyone sat down. Slide one: The Problem. Slide two: The Mission. Slide three: Dave.

Dave pointed out that he was an accountant. The Square-Haired Boss said this was precisely why.

The mission was straightforward, in the way that only genuinely catastrophic missions ever are. Tau Ceti — the Sun-like star eleven point nine light-years away — was the only star in the local neighbourhood whose output appeared completely unaffected by Astrophage.xlsx. Someone needed to go there, find out why, and bring the answer back. In time. Dave's crewmates were two astrophysicists and a systems engineer, all considerably more qualified than Dave, who were put into hibernation pods for the journey, leaving Dave alone with the ship's AI, a packet of digestives, and the file itself, which he had been specifically, formally, and in

writing instructed not to open.

He opened it on day four.

His crewmates did not survive the journey. The AI logged the cause as macro execution. Dave felt responsible, which was fair.

He woke up alone, some indeterminate time later, unable to remember who he was. He could not recall his name, his mission, or the Square-Haired Boss. He could, however, still perform a VLOOKUP from memory, which the ship's AI took as sufficient evidence of consciousness and began the revival protocol.

Dave was attempting to remember his own surname when something knocked on the hull.

Docked outside — gently, politely, in the manner of someone who has travelled an enormous distance and would very much appreciate being acknowledged — was an alien spacecraft. Its occupant communicated by vibrating the docking tube in rhythmic patterns, which the ship spent three days decoding and which translated, roughly, to: "Hello. I have also had a very long journey. Is now a good time?"

Rocky — as Dave named him, because it seemed to fit and nothing else came to mind — was a small, spider-like entity from the Eridani system, built, as far as Dave could tell, entirely out of goodwill and structural integrity. Rocky had also come to Tau Ceti because something was consuming his star. Rocky had come to defeat Astrophage — the actual biological microbe, the genuine extraterrestrial organism quietly feeding on stellar energy across the local neighbourhood.

Rocky had the science. Rocky had the solution. Rocky had, in fact, a remarkably elegant biological intervention in a small canister on his belt, and he was enormously proud of it. The only problem was the mathematics. The delivery calculations required a precision that Rocky's instruments, extraordinary as they were, could not quite achieve. The margin of error was catastrophic. Rocky needed help.

Dave looked at the numbers. Dave understood the numbers. Dave had, after all, spent eleven years reconciling quarterly reports for a company whose accounts existed in a state of permanent quantum uncertainty, and this — this was just a very high-stakes version of that.

He fixed Rocky's calculations in an afternoon.

The intervention worked. Rocky's star was saved. The Eridani system would survive, thrive, and continue its nine-billion-year relationship with a star that had,

it turned out, been in considerably more peril than anyone had admitted in the mission briefing.

Earth, meanwhile, did not survive.

Astrophage.xlsx ran its course. The Sun dimmed. The pivot tables won. For a moment, nothing happened. Then, after a second or so, nothing continued to happen. Then, after a considerably longer period, during which the oceans cooled, the lights went out across seven continents, and the last auto-save notification pinged into an inbox no one would ever open, nothing happened again, this time permanently.

It was, by any measure, a bad outcome, and Dave — floating eleven point nine light-years away in a ship with no crew, no fuel for a return journey, and a biscuit supply that had run out somewhere near the heliopause — was forced to confront the fact that he had, technically, failed his mission.

Rocky, to his enormous credit, did not leave Dave behind.

Dave now lives in a carefully climate-controlled habitat pod on Rocky's home world — comfortable, well-lit, maintained with genuine affection by a species that finds human beings absolutely fascinating and slightly baffling. They give him spreadsheets to work on. He seems to enjoy it. The local inhabitants queue, in their thousands, to watch him do his quarterly reconciliations. It is, by most measures, the most-visited exhibit on the planet.

The Square-Haired Boss's final memo — unauthorised mission deviation, failure to file interstellar expense forms, reminder that saving an alien civilisation does not constitute an approved project outcome — arrived fourteen years later via a relay signal. Rocky had it framed.

And here is where it gets interesting. Because somewhere in the vast, branching corridors of the multiverse, there is a version of this story where Dave solves the spreadsheet. Where Earth lives. Where the Square-Haired Boss sends a different memo — one that might, if you squint, contain something resembling gratitude.

In that universe, Dave goes home.

In this one, he has a very nice pod, an appreciative audience, and all the time in the universe to wonder which version of events was, on balance, better.

The multiverse, as usual, declines to answer.

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And that brings us to the fascinating science behind Tau Ceti — the star at the centre of all this fictional carnage. Unlike Star Wars, which has the creative freedom to invent entirely fictional stellar systems whenever the plot requires a convenient destination, Tau Ceti is absolutely, stubbornly, magnificently real. It has been sitting there, eleven point nine light-years away, for nine billion years, entirely indifferent to whether we noticed it or not.

We noticed it.

Tau Ceti lives in the constellation Cetus — the Whale, or the Sea Monster, depending on which ancient civilisation's mythology you prefer, and whether you find whales or sea monsters more alarming as cosmic neighbours. It is a G-type main sequence star, which is the polite astronomical way of saying it is broadly Sun-like, yellow-white, stable, and quietly getting on with the business of nuclear fusion without making a fuss about it. At an apparent magnitude of plus three point five, it is one of the very few Sun-like stars visible to the naked eye on a clear night — a faint, steady point of light sitting in the body of the Sea Monster, roughly between two stars whose names — Diphda and Menkar — sound considerably more dramatic than anything they actually do.

It is, in short, the kind of star that looks unremarkable from a distance and turns out, on closer inspection, to be extraordinary.

It is older than our Sun by nearly five billion years. It is smaller, cooler, and significantly less metallic — which in astronomy means it contains fewer heavy elements, not that it has a disappointing record collection. It almost certainly has planets, though as of 2025, our best instruments are having a genuinely difficult time confirming them, which is either a detection problem or an existential one, and the scientific community is currently arguing about which. It has a debris disk of such staggering proportions that any planets within it face an asteroid impact rate roughly ten times higher than Earth — which is the universe's way of giving with one hand and taking aggressively with the other.

And yet. Nine billion years is a very long time. Long enough, in principle, for life to arise, adapt, evolve, develop language, philosophy, mathematics, interstellar travel — and still have several billion years left over in which to wonder whether anyone else is out there.

We have been wondering the same thing about Tau Ceti since 1960. We have not yet had an answer. But we have better telescopes than we did in 1960, and considerably more determination, and the universe has yet to tell us to stop asking.

When we return from this brief interstellar transit — economy class, no windows, complimentary existential uncertainty — we'll dive into the full history of how we came to know this star, what we've actually found orbiting it, and why it refuses, despite everything, to stop being interesting.

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Welcome back, my fellow cosmic cartographers.

Now. Tau Ceti.

The name itself is a piece of history worth unpacking, because it tells you a great deal about how astronomy used to work and, honestly, still does.

In 1603, a German celestial cartographer named Johann Bayer published a star atlas called the Uranometria — a comprehensive map of the heavens that introduced what became known as the Bayer Designation system. The principle was elegant: take a constellation, assign its stars Greek letters roughly in order of brightness, add the constellation name, and you have a permanent address for every significant star in the sky. Tau — the nineteenth letter of the Greek alphabet — was assigned to our star. Ceti refers to Cetus, the constellation of the Sea Monster. And so Tau Ceti became, officially and permanently, the nineteenth-brightest star in a mythological sea monster, which is either a distinguished address or a concerning one depending on your feelings about sea monsters.

Cetus itself has an interesting mythology. In the Greek tradition, it was the beast sent by Poseidon to devour Andromeda — chained to a rock as sacrifice — before Perseus arrived, showed it the head of Medusa, and turned it to stone. There is a pleasing irony in the fact that one of humanity's most hopeful candidates for life beyond Earth sits inside the petrified remains of a monster sent to destroy a princess. The universe has always had a complicated relationship with narrative tidiness.

Tau Ceti is visible to the naked eye at apparent magnitude plus three point five — faint, steady, yellow-white, requiring dark skies and a reasonable degree of patience to locate.

Now. What is it, actually?

Tau Ceti is a G8.5 main sequence star — slightly cooler than our Sun, slightly smaller, with a surface temperature of around five thousand three hundred and forty Kelvin compared to the Sun's five thousand seven hundred and seventy-eight. Its mass is approximately seventy-eight percent of our Sun's. Its luminosity

is just fifty-two percent. It is, to use the technical terminology, a solar analogue — which is to say, Sun-like in the ways that matter and different in the ways that complicate things.

Its age is estimated at nine billion years. Tau Ceti has been quietly fusing hydrogen for nearly twice as long as our Sun has existed, which means that if anything is living around it, evolution has had an extraordinary amount of time to get interesting. Or, alternatively, an extraordinary amount of time in which nothing happened at all — both of which are, as I say, live scientific possibilities.

There is one further complication worth noting, and it is a genuinely strange one. Recent interferometric measurements using the CHARA Array — an extraordinary instrument that combines the light of multiple telescopes to achieve remarkable precision — suggest that Tau Ceti may be oriented nearly pole-on to Earth. We are, in other words, looking almost directly down at its north pole. This matters enormously for planet detection, because the radial velocity method — our primary tool for finding planets around nearby stars — measures the wobble a planet induces in its star as seen from our perspective. If we're looking at the pole, the wobble is mostly sideways to us, and what we measure is only a fraction of the true signal. Any planets we detect may be far more massive than they currently appear. Neptune-sized, perhaps, rather than super-Earth. The universe, characteristically, has made the most interesting nearby star as difficult to read as possible.

And then there is the debris disk.

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Infrared observations from the Herschel Space Observatory reveal a vast belt of dust and rocky material extending from roughly one AU — Earth's distance from our Sun — out to approximately fifty-five AU, wrapping the entire inner system in what can only be described as a perpetual cosmic bombardment. The total mass of this disk is more than ten times that of our own Kuiper Belt. For any planet sitting in Tau Ceti's habitable zone, the resulting asteroid impact rate would be roughly ten times higher than present-day Earth. The impact that finished off the dinosaurs was, on Earth, a one-in-tens-of-millions-of-years event. At Tau Ceti, the geological record would suggest it was more of a recurring agenda item.

And yet. And yet.

Astronomers have been finding reasons for cautious optimism since 2012, when statistical analysis of the star's radial velocity data first suggested the presence of multiple planets. A refined four-planet model followed in 2017, with the most tantalising candidates being Tau Ceti e — approximately four Earth masses,

orbiting every hundred and sixty-three days — and Tau Ceti f, sitting further out at one point three AU, potentially within the habitable zone. A 2020 study by astronomers Dietrich and Apai went further still, predicting, on the basis of statistical patterns drawn from hundreds of other planetary systems, at least one additional undetected planet within the habitable zone — a candidate they designated, with the careful optimism of people who have been disappointed before, PxP-4.

Then, in 2025, the ESPRESSO spectrograph weighed in.

ESPRESSO is one of the most precise instruments ever built — sensitive enough to detect planets as small as one point seven Earth masses with orbital periods up to a hundred days. It looked at Tau Ceti carefully and thoroughly. It found nothing. No Tau Ceti e. No convincing signal for f. A faint whisper of something at a twenty-day period, not statistically significant, filed under "interesting but unconfirmed" — which is the scientific community's way of saying "we are not ready to be excited about this yet."

So as of 2025, Tau Ceti may have planets. Or it may not. The signals that looked like planets may be planets, or they may be the stellar equivalent of background noise — the star's own surface activity mimicking the signature of worlds that aren't there. The universe is, as ever, keeping its own counsel.

What we do know is that the next generation of instruments — the Extremely Large Telescope, the Thirty Meter Telescope, the Nancy Grace Roman Space Telescope — all list Tau Ceti as a priority target. The Roman telescope has atmospheric characterisation of Tau Ceti's candidate planets listed as a stretch goal, which in the language of space science means "probably not yet, but we're thinking about it with considerable intensity." Direct imaging. True mass measurements. Atmospheric spectroscopy. The possibility, extraordinary and distant but not impossible, of detecting oxygen or water vapour or methane in the air of a world eleven point nine light-years away.

Because here is the thing about Tau Ceti, the thing that keeps it on every list, in every mission proposal, in every science fiction novel that needs a destination worthy of the journey. It is close enough. It is stable enough. It is old enough. And nine billion years is, by any reasonable measure, enough time for something remarkable to have happened.

Whether it did is, for now, a question the universe is sitting on.

We are working on better ways to ask it.

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Well, my fellow exoplanet enthusiasts, we've reached the end of another interstellar commute. Today we've learned that Tau Ceti is simultaneously humanity's greatest nearby hope for a second Earth, a nine-billion-year-old stellar neighbour that may or may not have planets, and the destination of both Ryan Gosling and Dave from Accounting — one of whom handled the journey considerably better than the other, and neither of whom got their expenses approved.

We've discovered that the universe has handed us a star with everything we could want — proximity, stability, age, a habitable zone — and then surrounded it with enough asteroidal debris to make the whole enterprise feel like being given a beautiful house directly beneath a flight path that the previous owners forgot to mention. We've learned that our best instruments are still arguing about whether the planets are real. And we've learned that in at least one version of the multiverse, the answer to all of this is a comfortable pod and a very appreciative audience.

Somewhere in the quantum foam of possibility, there is a version of Tau Ceti with a warm, wet, ancient world sitting quietly in its habitable zone, populated by something that has had nine billion years to develop culture, technology, and — one imagines — a significantly better filing system than we managed. They may be looking back at us right now. They may have been looking since 1960, when Frank Drake first pointed a radio telescope in their direction and waited. Perhaps they heard us. Perhaps they're still deciding whether to reply. Perhaps they looked at our pivot tables and thought better of it.

We cannot know. Not yet. But we are building the telescopes that might one day tell us. And that, genuinely, is one of the most remarkable things our small, asteroid-dodging, spreadsheet-adjacent civilisation has ever attempted.

If you'd like to keep up with the show — and we rather hope you do — we have a mailing list. Think of subscribing as your own personal Hail Mary: a small act of faith, sent outward into the void, in the hope that something wonderful comes back. You'll find the link on our website at multiverseemployeehandbook.com.

And if today's episode has left you staring at the night sky trying to locate a faint yellow-white point of light in the body of a mythological sea monster — good. That's exactly where we hoped to leave you.

This is your quantum-coherent correspondent, reminding you that in the multiverse of stellar exploration, we are all just pale blue dots in somebody else's debris disk, squinting at the stars and hoping, with everything we have, that we are not entirely alone.

Dave's pod, for what it's worth, has excellent views.