

S03E25 - Our Other Nearest Neighbours

The Multiverse Employee Handbook - Season 3

The Multiverse Employee Handbook has this to say about Interstellar Travel.

It is the process by which a species attempts to leave home for so long that "home" becomes a theoretical concept discussed in footnotes.

Interstellar travel is widely regarded as the next logical step after mastering orbit, landing on nearby moons, and realising that everything interesting is inconveniently far away. The distances involved are best described as discouraging. Even the nearest stars require journeys measured not in years, but in generations, which introduces the administrative challenge of handing over the mission to people who were not present for the initial enthusiasm.

The Handbook notes that interstellar travel forces a reconsideration of urgency. When your destination is decades or centuries away, deadlines become aspirational, and progress is measured in fractions of a lifetime. Meetings are brief, but the agenda is permanent.

In summary, interstellar travel is less about going somewhere else and more about committing, with extraordinary confidence, to a direction — and then continuing in that direction long enough for it to become meaningful.

You're tuned into The Multiverse Employee Handbook.

Today, we are going on a tour of the neighbourhood. Not a particularly dramatic tour — there will be no refreshments, the distances are unreasonable, and several of our destinations are invisible to the naked eye, which does make the trip harder to justify. But a tour nonetheless.

Ten star systems. The ones right next door, cosmically speaking — between six and eleven light-years away. A light-year, for reference, is roughly 9.46 trillion kilometres, or approximately the distance your patience travels when someone says "it's just a short detour."

A brief administrative note: we are skipping Alpha Centauri. It got its own episode — Season 3, Episode 7. Thoroughly covered, admirably close, and frankly a bit smug about it.

Humanity has been staring at these stars for thousands of years — building

calendars, writing mythology, erecting monuments — without the faintest idea that they were other suns. The Egyptians based their entire agricultural calendar on the heliacal rising of Sirius. Divine signal. Cosmic announcement. Sirius is 8.6 light-years away. Practically the back garden. They just didn't know that. To them, it was a god. To us, it is a binary system with a white dwarf the mass of the Sun compressed to the size of the Earth — which is, if anything, more impressive, and considerably harder to explain at a dinner party.

This is the story of our nearest stellar neighbours. Most are invisible. Several are dangerous. At least one is moving towards us, which the optimists among you will find encouraging, and the rest of you will correctly identify as a matter for the risk assessment team.

But first, gather 'round the quantum water cooler, my cosmically displaced colleagues, for a tale that would make even Friedrich Bessel question his measurements.

In the fluorescent-lit realm of Quantum Improbability Solutions, specifically in the Territorial Expansion and Acquisitions Division — which existed in a superposition of "aggressive growth strategy" and "we have no idea what we're doing" — Brad from Sales was having what could charitably be called a cartographic crisis.

It had started, as these things often do, with a mandatory Q4 territory review. The square-haired boss stood at the whiteboard with the quiet confidence of someone who had prepared exactly one slide. Brad had a spreadsheet. Brad always had a spreadsheet. On this occasion, Brad's spreadsheet was essentially a list of reasons why this meeting should not be happening.

"Right," said the boss. "Ten nearest star systems. Assigned territory. I want quotas."

Brad took a breath.

"Barnard's Star," the boss began. "Six light-years. First stop."

"No confirmed habitable planets," Brad said. "Also it's ten billion years old and moving away from us at considerable speed. As leads go, it is not warm."

The boss made a note. Possibly the word "potential."

"Luhman 16. Two brown dwarfs. Binary system."

"Brown dwarfs," Brad said carefully, "are stars that attempted fusion and thought better of it. Their atmospheres are essentially Jupiter during a breakdown. There is no addressable market."

"WISE 0855."

Brad looked at his screen. "Surface temperature of minus twenty-three degrees Celsius. It is, technically speaking, colder than a freezer. It may not be a star at all. It is certainly not a sales territory."

The boss pressed on. Wolf 359 — an active flare star, prone to violent X-ray outbursts. Brad noted that the Federation had lost thirty-nine ships there and QIS had a worse safety record. Lalande 21185 had confirmed planets and was the brightest red dwarf in the northern hemisphere, which the boss found exciting until Brad pointed out that nobody had actually been there and the name had now been mispronounced four different ways in a single meeting.

Then came Sirius. The boss brightened. Everyone had heard of Sirius.

"Binary system," Brad said. "Sirius B is a white dwarf — the mass of the Sun compressed into something roughly the size of the Earth. Cold-calling is logistically complicated."

Luyten 726-8, Brad read aloud, brightened seventy-five times its normal intensity in twenty seconds in 1952. He said nothing further. He felt the data spoke for itself.

Ross 154, the boss noted with enthusiasm, was actually moving towards them. "A warm lead," he said, visibly pleased with this. Brad wrote "approaching flare star" in the risk column and said nothing.

Ross 248, Brad explained, would become humanity's closest stellar neighbour in approximately thirty-three thousand years. The boss asked if they could get ahead of the relationship. Brad asked if the Q4 deadline could be moved to the year thirty-five thousand. This was noted as "pending discussion."

"Epsilon Eridani," the boss announced, arriving at the final entry with the energy of a man who had been saving this. "Confirmed planet. Debris belts. Enormous potential."

Brad looked up from his spreadsheet for the first time in twenty minutes.

"It hosts the Babylon 5 station, sir. And the Reach colony from Halo. It almost

certainly already has representation."

There was a long pause.

The boss capped his marker. The territory review was submitted. Brad's objections were logged as "under consideration," which in QIS terminology meant they had been placed in a shared drive that existed in a superposition of "accessible" and "IT hasn't migrated it yet."

The quota remained. The stars remained. The distance between the two remained, as it always had, politely but firmly astronomical.

And that brings us to the fascinating science behind our nearest stellar neighbours. Unlike Star Trek's conveniently populated galaxy, where every system within range seems to harbour a humanoid civilisation with strong opinions about honour, the real neighbourhood turns out to be considerably quieter. And considerably older. And, for most of human history, completely misunderstood.

Because here is the thing. Humanity has been staring at these stars for tens of thousands of years. We built calendars around them. We named constellations, erected monuments, and wrote mythology onto the sky in ink and stone. The Babylonians were cataloguing celestial omens as far back as 1200 BCE. The Egyptians constructed their entire agricultural calendar around the heliacal rising of Sirius — the moment each year when it first reappears at dawn above the horizon, signalling the imminent flooding of the Nile. To them, it was a divine announcement. A cosmic memo from the gods, arriving on schedule.

Sirius is 8.6 light-years away. By galactic standards, it is practically next door. They were consulting a neighbour for their farming schedule and had absolutely no idea.

The Greeks formalised the forty-eight classical constellations and made genuine progress on the mechanics of the sky. Eratosthenes calculated the circumference of the Earth with impressive accuracy using shadows and geometry. Hipparchus catalogued hundreds of star positions. These were not small achievements. But the stars themselves — what they actually were — remained entirely unknown. They were lights. Fixed, eternal, and arranged, apparently, for human benefit.

This assumption held, more or less, for a very long time.

The first crack appeared in 1838, when the Prussian astronomer Friedrich Bessel successfully measured the parallax of a star called 61 Cygni — the tiny apparent

shift in a star's position when viewed from opposite sides of Earth's orbit. It was a fiendishly difficult measurement, and several astronomers had tried and failed before him. When Bessel got it right, the result was quietly staggering. 61 Cygni was approximately ten light-years away. Suddenly, for the first time in human history, a star had a distance. A real one. A number so large it required an entirely new unit of measurement to express without filling a page with zeroes.

The universe, it turned out, was not a ceiling. It was a volume. An almost incomprehensible volume, populated by objects that were not lights at all, but suns — each one a potential centre of its own system, its own worlds, its own story.

And the nearest ones? The ones we'd been navigating by, worshipping, naming after dogs and hunters and bears? Right there. Practically underfoot. Between six and eleven light-years away, sitting quietly in the cosmic equivalent of the adjacent postcodes, waiting to be properly introduced.

Most of them, as we'll discover, are red dwarfs — small, dim, ancient, and almost entirely invisible to the naked eye. Which means that for all of recorded human history, we were largely ignoring our actual neighbours in favour of more photogenic strangers considerably further away. Which is, when you think about it, very human behaviour.

When we return from this brief interlude of stellar recalibration, we'll meet the neighbours properly — starting with the one that's been sprinting across the sky for ten billion years and still hasn't arrived anywhere in particular.

Welcome back, my gravitationally bound companions.

Let's meet the neighbours. And to do that, we first need to talk about red dwarfs — because five of our ten nearest star systems are either red dwarfs or things that tried to become red dwarfs and didn't quite manage it. Understanding what a red dwarf actually is will save us considerable confusion later.

A red dwarf is a small, cool, dim star — typically less than half the mass of our Sun, burning hydrogen so slowly and efficiently that it can remain in its current state for not billions but trillions of years. The universe is currently 13.8 billion years old. A red dwarf can live for up to ten trillion years. Every red dwarf that has ever formed is still alive. Not one has died yet. In stellar terms, they are the universe's most patient life form, and they make up roughly seventy-five percent of all stars in the Milky Way. They are, in other words, the default. Our Sun, with its comparatively flashy luminosity and ten-billion-year lifespan, is something of an outlier.

First up: Barnard's Star. At 5.96 light-years, it is the nearest single star to our Sun, and it holds a record that has nothing to do with brightness or size. Barnard's Star has the highest proper motion of any star in the sky — meaning it moves visibly against the background of more distant stars over human timescales. If you photographed it every few years, you would actually see it shift position. It covers a distance equal to the Moon's diameter every 180 years, which sounds modest until you remember that stars are not supposed to do this on any timescale a human could observe. It is approximately ten billion years old — roughly twice the age of our Sun — and is heading in our general direction, though it will make its closest approach in about ten thousand years, at which point it will still be nearly four light-years away. There are no confirmed habitable planets. Brad was right.

Next: Luhman 16, discovered in 2013 — which deserves a brief pause. The third closest star system to Earth was discovered eleven years ago. By a single astronomer, trawling through infrared survey data. It had simply been missed. This is either a testament to how dim brown dwarfs are, or a commentary on how thoroughly we had been looking in the wrong direction. Possibly both.

Brown dwarfs are the relevant category here. Luhman 16 is a binary system — two brown dwarfs orbiting each other — and brown dwarfs occupy an uncomfortable middle ground between planets and stars. They are too massive to be planets but not quite massive enough to sustain hydrogen fusion the way a proper star does. They glow faintly from residual heat. They have stormy, turbulent atmospheres remarkably similar to Jupiter. They are, in the most affectionate sense, stars that gave it a go and thought better of it.

Then there is WISE 0855–0714, also discovered by Kevin Luhman, also in infrared data, and arguably even more peculiar. This is a sub-brown dwarf — a single free-floating object with a surface temperature of around minus twenty-three degrees Celsius. That is colder than many winter nights on Earth. It is the coldest known free-floating object outside our solar system, and whether it qualifies as a failed star or a rogue planet or simply a category error is still, technically, under discussion.

Wolf 359 sits at 7.86 light-years and is one of the faintest stars visible from Earth — or rather, it would be, if you could see it at all without a telescope. What it lacks in brightness it compensates for in temperament. Wolf 359 is a flare star — prone to sudden, violent eruptions of X-rays and ultraviolet radiation that can briefly multiply its energy output many times over. Any planet unfortunate enough to orbit nearby would need substantial magnetic shielding and a very good insurance policy.

Lalande 21185, the quiet achiever of the group. It is the brightest red dwarf visible

from the northern hemisphere — which still means you need binoculars to find it — and it has at least two confirmed planets. It is also the most overlooked star in this entire list, which feels almost rude, given the circumstances.

Five down. Five to go.

Our second group of neighbours begins with the one star on this list that absolutely everyone has heard of, and ends with the one that astronomers are most genuinely excited about. In between, things get somewhat volatile.

Sirius. The Dog Star. The brightest star in the night sky, sitting at 8.6 light-years and utterly impossible to miss on a clear winter evening. It has been meaningful to humans for longer than recorded history. The ancient Egyptians revered it. The Romans blamed it for summer heatwaves — the phrase "dog days" comes directly from Sirius's association with midsummer heat. It is, in the most literal sense, a star that has shaped human civilisation.

It is also a binary system. Sirius A is a large, brilliant main sequence star about twice the mass of our Sun. Sirius B, its companion, is a white dwarf — and white dwarfs deserve a moment of proper attention. When a star like our Sun exhausts its fuel, it eventually sheds its outer layers and collapses into a white dwarf: an object roughly the mass of the Sun compressed into a volume roughly the size of the Earth. The resulting density is almost insultingly extreme. A teaspoon of white dwarf material weighs approximately five tonnes. Sirius B was the first white dwarf ever identified, in 1862, and astronomers were so baffled by what they were seeing that it took decades to accept the implications. It remains one of the most studied objects in the sky.

Next: Luyten 726-8, a binary system of two red dwarfs, and home to UV Ceti — the star that gave its name to an entire class of stellar behaviour. In 1952, UV Ceti brightened to seventy-five times its normal luminosity in approximately twenty seconds. This was not a malfunction in the equipment. This was the star. Flare stars have since been studied extensively, and the implications for any nearby planets are not encouraging. The ultraviolet and X-ray bombardment during a major flare would be, by most definitions, incompatible with unprotected surface life. This has not stopped science fiction from visiting — UV Ceti appears in various hard sci-fi settings as precisely the sort of destination that sounds interesting in a briefing and terrible in practice.

Ross 154, at 9.68 light-years, is another young, active flare star — and it is moving towards us. Not quickly enough to cause immediate concern, but directionally committed. It will make its closest approach in approximately thirty thousand

years. It is also, for the record, a major location in the Elite Dangerous universe, where players can visit it without the radiation risk. Which seems preferable.

Ross 248, at 10.3 light-years, is notable for something entirely temporal. In approximately thirty-three thousand years, it will pass close enough to our Sun to briefly replace Proxima Centauri as our nearest stellar neighbour. It is the target of the interstellar probe in Alastair Reynolds' novel *Pushing Ice* — a book in which this unremarkable red dwarf turns out to be considerably more interesting than expected. We will say no more on that front.

And finally: Epsilon Eridani. Known in some circles as Ran. Known in others as the location of Babylon 5, the Halo Reach colony, and the most scientifically interesting system in this entire list. It is a younger analogue of our Sun — a K-type star still surrounded by massive debris belts, with a confirmed gas giant called AEGir, and strong evidence of ongoing planetary formation. It is, in short, our solar system as it may have looked several billion years ago.

Which means, somewhere out there, around a star we've known about since antiquity, the story might just be getting started.

Well, my perihelion-approaching podcast companions, we have reached the end of our neighbourhood tour. No refreshments were provided. Several destinations were invisible. At least two were actively trying to irradiate us. And the most promising stop on the entire itinerary may already have a Babylon 5 station on it, which does complicate the planning permission.

But let's take stock of what we've actually found.

Within eleven light-years of Earth — a distance so modest, by galactic standards, that it barely registers — we have ancient red dwarfs older than our solar system, failed stars with Jovian storm atmospheres, an object colder than a winter's night that may not technically be a star at all, a white dwarf with the density of a bad decision compressed into the volume of a small planet, and one young, promising system that looks uncannily like home used to look, a few billion years ago. Our actual neighbourhood is, it turns out, considerably stranger than anyone gazing up at the night sky would ever have suspected.

The Egyptians built their calendar around Sirius. The Greeks mapped the sky and named what they saw. Bessel measured the distance to a star in 1838 and quietly broke the ceiling humanity had been staring at for millennia. And we are still, in many ways, only just beginning to understand what's actually out there — which is either deeply humbling or enormously exciting, depending on your temperament

and how recently you've read about UV Ceti's 1952 flare event.

As for Brad's territory review — it remains pending. The quota remains assigned. The stars remain, on the whole, indifferent. Ross 154 continues its slow approach. Ross 248 has thirty-three thousand years and is in no particular hurry. And somewhere in QIS's shared drive, in a folder that may or may not be accessible, there is a spreadsheet that was right about everything and will never receive credit for it.

If you'd like to explore the one nearby system we didn't cover today, that would be Alpha Centauri — Season 3, Episode 7. It's been waiting patiently. Much like Ross 248, though considerably closer.

And if today's tour has left you with a slightly different view of the night sky — if you find yourself looking up at Sirius and thinking about white dwarf density, or squinting in the direction of Epsilon Eridani with something approaching wonder — then tell someone about it. Share this episode with a friend, a colleague, or someone who recently made the mistake of saying space is boring within earshot. Spread the signal. Like light from a red dwarf, it travels slowly, but it goes an extraordinarily long way.

For more cosmic neighbourhood dispatches, science deep dives, and the ongoing administrative struggles of Quantum Improbability Solutions, find us at multiverseemployeehandbook.com.

This is your quantum-coherent correspondent, reminding you that in the multiverse of stellar exploration, we are all just red dwarfs — ancient, dim, frequently overlooked, and capable of outlasting almost everything else in the universe.

The sky is not a ceiling. It never was. It just took us a while to look up properly.

Until next time.