Episode 19 - The Science of Interstellar, Plus it’s Christmas

The Multiverse Employee Handbook - Season 1

HOST: Welcome back, my temporally tangled tinsel-hangers! I'm your quantum-superposed Saint Nicholas, simultaneously naughty and nice across all possible timelines. You're tuned into "The Multiverse Employee Handbook" - the only podcast that treats your holiday office party like a relativistic event that might just collapse the wave function of festive cheer!

Speaking of relativistic events, I hope you all caught Interstellar's 10th anniversary IMAX re-release last week. Oh, who am I kidding - nobody got tickets. They disappeared faster than coherence in a quantum system. The screenings were rarer than stable wormholes and harder to get into than a black hole's gift exchange. Though I hear some lucky viewers in the back row are still watching it, thanks to time dilation.

Our automated response system tried to buy tickets across multiple realities but only succeeded in creating a temporal paradox where it became its own scalper. It's now alternating between TARS-style 95% humor setting and calculating the exact gravitational forces needed to slingshot itself back to December 6th for another chance at tickets.

I should note that Dave from Accounting actually managed to see it, though that might be because he's still stuck in that time dilation field from last episode. He keeps insisting the movie is both "about to start" and "just ended," which is either a fascinating demonstration of relativistic time effects or just Dave being Dave. At this point, even Kip Thorne would have trouble calculating his actual lunch break duration.

But today, dear listeners, we're venturing into territory more twisted than a candy cane in a Kerr black hole. We're exploring what happens when holiday cheer meets event horizons, and why some disgruntled employees might be tempted to use gravitational time dilation to skip the office Secret Santa entirely.

Now, gather 'round the quantum fireplace, my festively fluctuating friends, for a tale that would make even Dr. Seuss question his grasp on spacetime metrics. I present to you: "How the Grinch Stole Spacetime" - a story about why some presents should never be wrapped in exotic matter...

Every Who down in Who-Corp liked Christmas a lot

But the Grinch with his Ph.D. in physics did NOT!
The Grinch hated Christmas! Through all spacetime's range!
(Perhaps it was quantum entanglement strange.)

He stood in his lab on level forty-three,
Watching his colleagues spread holiday glee.
For tomorrow was Christmas! The office party was near!
The thought made him wish for a black hole right here.

"They'll hang twinkly lights!" he growled with a sneer.
"They'll sing carols off-key for all time to hear!
Then they'll gather together, all holding their drinks,
Making small talk that breaks all the laws that Thorne thinks!"

Then he got an idea! A relativistic idea!
The Grinch got a quantum-ly, cosmic idea!
"What if," he grinned, as he checked his equations,
"I could skip Christmas through time's perturbations?"

For Grinch knew of wormholes (he'd studied with Thorne),
And how spacetime could twist like a mobius-formed horn.
With just the right math and some exotic matter,
He could bend time itself – make Christmas not matter!

So he worked through the night with his quantum computer,
While TARS-like responses got cuter and cuter.
"My calculations show 90% chance of success,"
Said the AI, its humor setting causing distress.

Near Proxima Centauri he found what he sought:
A black hole just perfect for warping his plot.
The time dilation there would do just the trick –
One Earth hour there meant years would tick!

He built his device (like Cooper's spacecraft, but small),
And planned to transport the whole office and all.
"When they pass through my wormhole on December two-four,
They'll emerge when all Christmas sales are no more!"

But something went wrong with his relativistic scheme
(As often occurs when you mess with timestream).
The wormhole he'd made had a Novikov quirk:
A closed timelike curve right through Who-Corp would lurk!

Now the Grinch found himself in a temporal tangle,
Caught in recursion from every angle.
He was his own Secret Santa, both give and receive,
Creating a loop he could scarcely believe!

And there in the quantum-entangled night,
The Grinch learned that love, like gravity, might
Transcend all dimensions of space and of time
(Though that sounds much better in Nolan's design).

His heart grew three sizes – though physics maintains
Conservation of mass still somehow remains.
And what happened then? Well, in Who-Corp they say,
The Grinch's wave function collapsed that same day.

He joined in the party, no longer irate,
Though Dave's still near that black hole – he's perpetually late.
And the Grinch raised a glass, understanding at last
That even in spacetime, some moments should last.

And that, dear listeners, brings us to the fascinating physics behind why you can't actually use gravitational time dilation to skip your office holiday party - though not for lack of trying by our research department...

HOST: Now that we've seen how gravitational time dilation can't save you from Secret Santa, let's talk about the man who made traveling through wormholes academically respectable - Kip Thorne. While most physicists were content with making jokes about falling into black holes, Thorne was actually calculating whether you could survive the trip.

You see, back in 1985, Carl Sagan approached Thorne with a seemingly simple request: He needed a scientifically plausible way for his characters in "Contact" to travel between stars. Instead of doing what most science consultants do (looking dramatically into the middle distance while muttering "quantum"), Thorne actually did the math. It's like when someone actually reads the employee handbook – rare, but it happens.

This led to a series of groundbreaking papers about traversable wormholes that made the entire physics community collectively say, "Wait, that's allowed?" It turns out that while Einstein and Rosen had described wormholes back in 1935, Thorne was the first to figure out how to keep one open without it collapsing faster than office morale during performance review season.

The key was something called "exotic matter" - material with negative energy density. And before you ask, no, that's not what powers our coffee machine, though given its behavior lately, I'm not entirely sure. This exotic matter could theoretically hold a wormhole open, allowing for safe passage. It's like having a really good project manager keep a deadline from collapsing, if that project manager had to violate the known laws of physics to do their job.

This work eventually led to Thorne's collaboration on "Interstellar," where he insisted on scientific accuracy so strict it would make a tax auditor blush. Take Gargantua, that gorgeous black hole that makes your desktop wallpaper look like a kid's crayon drawing. That way the accretion disk appears to wrap both above and below the black hole? That's actual gravitational lensing at work, not just someone having fun in After Effects.

When we return after this brief singularity, we'll dive deeper into the actual physics behind traversable wormholes. Plus, our automated response system will explain why even if we could build one, using it to escape mandatory team building exercises would violate causality. Though I suspect for some of our colleagues, that's a feature, not a bug.

Stay tuned, my relativistic revelers! We're about to explore why "love transcending dimensions" might sound silly, but it's still more plausible than the office printer working on the first try...

HOST: Welcome back, my festively fluctuating friends! While you were away, our automated response system finished calculating exactly how much exotic matter it would take to keep the office holiday party from collapsing into a singularity of social awkwardness. Spoiler alert: more than currently exists in the known universe.

Now, let's dive deeper into the mind-bending physics of traversable wormholes, and why Kip Thorne's work on "Interstellar" made most sci-fi look about as scientifically accurate as using a TARDIS to deliver your TPS reports.

First, let's understand what makes Thorne's wormholes different from your average sci-fi space tunnel. Most science fiction treats wormholes like cosmic subway stations - convenient shortcuts through space that somehow never have system-wide delays. But real physics is a bit more demanding than your average Hollywood script editor.

You see, Einstein's field equations - which describe how space and time curve - allow for wormholes to exist, but they're incredibly finicky about keeping them

open. Left to their own devices, they collapse faster than employee motivation during a Monday morning meeting. This is where Thorne's genius comes in.

In his work for "Interstellar," Thorne insisted on solving actual equations for every major plot point. The movie's iconic black hole, Gargantua, was rendered using real physics calculations so accurate they led to new discoveries about how light behaves around the edges of a black hole's shadow. It's like submitting your expense report and accidentally discovering a new form of mathematics - except this time it actually happened.

The time dilation effects shown in the film? All carefully calculated. When the crew visits Miller's planet, every hour there costs them seven years on Earth. This is actual relativistic physics, not just a convenient plot device. Though I should note that several of our employees have tried using similar calculations to explain their extended lunch breaks. Looking at you, Dave from Accounting, wherever... or whenever... you are.

But perhaps the most fascinating aspect of Thorne's work was how he handled the movie's controversial "love transcends dimensions" theme. While it might sound like something from a quantum physics greeting card, there's actually some fascinating science behind the idea of information transcending the boundaries of space and time. Though I should note that "love transcending dimensions" still doesn't explain why the office printer only works when IT isn't watching.

When we return from our quantum water cooler break, we'll explore what Thorne's equations mean for your daily commute through spacetime. Plus, our automated response system will share its calculations on whether using a wormhole to attend multiple holiday parties simultaneously violates causality or just good taste.

HOST: Gather 'round the quantum water cooler, my relativistically racing reindeer! It's time to explore when Hollywood actually got the physics right - something rarer than stable wormholes in our universe of infinite content.

Now, let's address the five-dimensional elephant in the room - one that's simultaneously occupying all points in spacetime while asking for its TPS reports: 'Interstellar' didn't just make physics look cool, it made it work. While most sci-fi treats physics like optional guidelines, Nolan and his team treated them like actual laws. Under Thorne's guidance, they created visuals that would satisfy even the most pedantic physicist's peer review - though I should note that citing these principles to justify your late arrival will not, in fact, impress HR.

Then there's the time dilation on Miller's Planet - every hour costing seven years of Earth time. Unlike that "quick meeting" your supervisor promised that somehow consumed an entire afternoon, this effect was precisely calculated using Einstein's

field equations. The physics is so accurate that several of our employees have tried citing it to extend their lunch breaks. Dave from Accounting's temporal displacement claim form is still being processed, though given the relativistic effects near his favorite deli, we're not sure if he filed it yesterday or seven years ago.

Even the movie's most outlandish-seeming element - the tesseract's fifth-dimensional space - has solid theoretical foundations. While the ability to treat time as a physical dimension you can move through might seem like a convenient plot device (and the perfect solution to retroactive deadline management), it's actually grounded in real physics. Though I should note that the gravity-as-love metaphor might seem a bit cheesy, quantum entanglement across spacetime barriers is a real phenomenon. Still doesn't explain how the office printer knows exactly when you're in a hurry, though.

Speaking of hurry, let's talk about those stunning visuals of gravitational lensing. The way light bends around the black hole, creating multiple images of the same object? That's exactly how it would look - unlike your teammate's understanding of how calendars work. And while it's true that time moves slower near massive objects, this still doesn't justify scheduling meetings for 2:65 PM.

Now, if you'll excuse me, I need to explain to our automated response system why creating a wormhole to peek at its performance review violates both causality and company policy. Though given the accuracy of Thorne's equations, it might actually have a case this time.

HOST: Well, my relativistically rushing revelers, we've reached the end of another spacetime-bending episode. Today we've learned that while Kip Thorne's physics might let you travel through wormholes, even he can't help you escape the office holiday party - though his equations do explain why it feels like it lasts forever.

We've discovered that "Interstellar" got the science surprisingly right, even if most of us got the timing wrong for the IMAX re-release. Our automated response system is still trying to calculate whether it could send itself back in time to get tickets, though it notes that creating a closed timelike curve just to see a movie about avoiding closed timelike curves might be a bit too meta.

Dave from Accounting remains in his time-dilated state, though he's now claiming it's just an elaborate scheme to avoid participating in Secret Santa. Given that he exists in a superposition of all possible gift exchanges simultaneously, we're inclined to let him stay there.

And speaking of simultaneous states, prepare yourselves for our next reality-bending adventure: "The Employee of the Multiverse Awards!" Join us as we

celebrate excellence across infinite dimensions, where everyone is simultaneously Employee of the Month and that person who keeps microwaving fish in the break room.

We'll explore why quantum superposition makes every acceptance speech both moving and monotonous until observed, discover how to calculate performance metrics across parallel universes, and finally answer the question: If an employee achieves excellence in a universe where no one is watching, do they still get a gift card?

Plus, our automated response system will be hosting the ceremony - though it insists on calculating the probability of every possible winner before announcing any results. Early estimates suggest the awards ceremony might last longer than the age of the universe, but hey, at least there's an open bar in some timelines.

Until then, this is your gravitationally-bound guide, reminding you that in the multiverse of corporate culture, every holiday party exists in a superposition of success and disaster until someone spikes the quantum punch. And as TARS would say with his humor setting at 95%: "The only thing that transcends dimensions is the awkwardness of office karaoke."

Remember, if you need support with this episode, our Help Desk exists in all possible universes between 9 AM and 5 PM local time. Though given relativistic effects, "local time" is more of a suggestion than a constraint. And somewhere out there, through one of Kip Thorne's traversable wormholes, Dave from Accounting is still trying to expense his time-dilated lunch break.