QUANTUM SHORTS VOL. 2

Collected Flash Fiction
Inspired by Quantum Physics

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Edited by Puah Xin Yi
and the Quantum Shorts Judges

Quantum Shorts 2: Collected Flash Fiction Inspired by Quantum Physics

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FOREWORD

Science is often described as a journey of exploration into the unknown. Indeed, making science at the edge takes intellectual courage to leave behind prejudices and bias, to confront the commonly accepted idea that only what is useful makes sense, to pave a genuine distinct path to a new idea. Those that try hard know the drama that comes with these challenges. Furthermore, science is tested against experiments, making nature the ultimate and merciless jury of our work.

Let us take the above opinions as good. Science is hard to create and severe in its assessment. Is there any freedom to explore crazy concepts, to enjoy investigating side directions, to be imaginative? Is there a space between hard science and wild creativity?

I remember a quite elaborated comment by Umberto Eco in some interview about his book *The Name of the Rose*. I would now interpret him to mean that academic literature was insufficient to convey all his knowledge and intuition. He felt the need to write in purely speculative terms about our past. Such a claim served him as an excuse to create a great piece of work. Eco took a journey beyond academia.

From my line of thought it follows that, trained as a hard scientist, I believe in the wonders brought by the act of freeing our minds in creative processes. Let me be explicit. Please, dear reader, do write stories, do invent worlds, do jump into the wild, for transgressing the boundaries will make you a better scientist.

Here follows a set of wonderful short stories. CQT takes enormous pride in hosting this space for discovery and creativity. Every one of the authors in this book has experienced the magic of sheer creation. Quantum is better when minds play with it in all possible variations.

Please, enjoy in depth the quantum in art, and the art in quantum.

José Ignacio Latorre
Director of the Centre for Quantum Technologies
Professor and Provost's Chair in the National University of Singapore's
Department of Physics

PREFACE

The international Quantum Shorts flash fiction competition ran for six editions, on alternate years since 2013. Through the years, we have been impressed by the many different ways that writers can tell quantum stories. A first book collected stories from the first three competitions. This book, with 38 stories from 38 authors, collects stories from the final three.

The stories are the prize winners, shortlisted and honourably mentioned stories of the competitions, which received over 1500 submissions in total.

Organised by the Centre for Quantum Technologies in Singapore, Quantum Shorts is supported by excellent partners. In the last three runs of the flash fiction competition, we are grateful for the constant support of media partners *Scientific American* and *Nature*, as well as our scientific partners the Australian Research Council Centre of Excellence for Engineered Quantum Systems; the Dodd-Walls Centre for Photonic and Quantum Technologies at the University of Otago in New Zealand; the Institute for Quantum Computing at the University of Waterloo in Canada; the Institute for Quantum Information and Matter at Caltech in the United States; QuTech, a mission-driven research institute of Delft University of Technology (TU Delft) and the Netherlands Organisation for Applied Scientific Research (TNO); and the United Kingdom National Quantum Technologies Programme.

One of the hardest tasks is to select the top two winners of the competition. We have been honoured to work with renowned creative writers and scientists over the years, benefitting from their careful deliberation and astute judgement. Many thanks to Artur Ekert, Chad Orzel, George Musser, Ingrid Jendrzejewski, José Ignacio Latorre, Ken Liu, Leonardo Benini, Lindy Orthia, Mariia Mykhailova, Tania De Rozario and Yvonne Gao for serving as judges for Quantum Shorts.

We also want to thank our shortlisting judges. They took on the task of fishing out the most compelling stories from the pool of entries, which only grew in volume and quality every time the competition ran. Big thank you to Andrew Hanson, Ben McAllister, Charles

Woffinden, David Hutchinson, Floor van Riggelen, Georgia Mortzou, Jenny Hogan, John Donohue, Joshua Slater, Kian van der Enden, Mariagrazia Iuliano, Michael Brooks, Mindy Tan, Ruth Hardy, Spiros Michalakis and Tara Roberson.

Behind the scenes, we are grateful for support from the Centre for Quantum Technologies' outreach and admin team, especially Puah Xin Yi, in managing the contest.

Finally, our special thanks to the 38 writers whose stories made this book possible. Their names and their biographies are in the coming pages. Thank you for exploring the quantum world in your writing.

INTRODUCTION

The very first story of this collection is inspired by a Nobel prize-winning idea.

On 4 October 2022, the Nobel Prize in Physics was awarded to quantum scientists Alain Aspect, John F Clauser and Anton Zeilinger "for experiments with entangled photons, establishing the violation of Bell inequalities and pioneering quantum information science". Their experiments revealed correlations between entangled particles of light that cannot be explained by classical physics. The particles are somehow in sync irrespective of the distance between them: a manifestation of quantum entanglement.

Some writers of this anthology, fascinated by the same idea, experiment with it differently. For example, this book opens with Kathryn Aldridge-Morris' "Entanglement", which delicately probes the correlations in a family and what it means to confront the unknowable. Meanwhile, "Red Light, Blue Light" by Ioana Burtea takes entanglement as a metaphor for a relationship with a heartbreaking end.

Writers entering Quantum Shorts entangled themselves with other concepts, too. Quantum physics is richly different to our lived experience of the world, opening a creative window for unexpected twists in stories. Take superposition, a quantum feature that allows a system to exist in different states at the same time, each state with its own probability of being realised. The physicist Erwin Schrödinger famously grappled with this idea in his thought experiment of a dead-and-alive cat. In this book, Liam Hogan's "Qubit Superhighway" explores quantum possibilities in prose.

Some scientists think that an act of observation, or measurement, brings those quantum possibilities to definite states. Others say each possibility is a reality. The latter is Hugh Everett III's many-worlds interpretation of quantum mechanics—a perennial favourite of writers. Stories like "The Observer" by Dan Goodman and "Powers of Observation" by Charmaine Smith look at the role of an observer, while you'll find alternate and many worlds in stories like

"The Collapse" by Meg Sipos and "A World in Threads" by Acadia Reynolds.

Nowadays, phenomena such as entanglement and superposition are at the heart of quantum technologies, making themselves useful to secure communication or speed up computation. As the quantum industry develops, there are also calls to think about the ethics of quantum technologies and how these technologies will be used. Some challenging fictional scenarios are offered in stories like "Fine Print" by C R Long and "Two Lives Stretched Out Before Them" by Janel Comeau.

The stories in this anthology are ordered by the authors' last names but could be read in any order. If you'd like to explore them thematically by their quantum ideas, try starting with the index at the end of the book. While it is not exhaustive, the index groups the stories according to some of the bigger concepts in quantum physics.

You may notice some recurring phrases across this collection. Quantum Shorts provided a different constraint with each fiction call, asking writers to work a sentence from the previous edition's winner into their new story. Look out for "nobody said this was going to be easy" in entries to the 2023-2024 contest, and for the phrases "it's a lot to think about" and "things used to be so simple" in stories from the previous two editions.

We hope these Quantum Shorts spark your imagination and curiosity, like they did ours.

ENTANGLEMENT

KATHRYN ALDRIDGE-MORRIS

In a week my eighteen-year-old daughter will have left home.

"Tell me about quantum physics," I say, and tumble onto her beanbag.

She swivels from her screen. "Really?"

This is what she's going to be spending her days researching, writing, talking about and I know absolutely nothing about any of it. Will this unknowable part of her expand to the point we're strangers?

"It's the physics of quanta," she says, wriggling her toes in her rainbow socks.

"Right. The physics of quanta. So. What's quanta?" I ask.

"What's quanta?" She inhales. "Small things."

"Okay." Outside a mizzle so fine you wouldn't know it's there but for my drenched neighbour pulling towels from her rotary line. "Then what's the *physics* of small things?" I recall my daughter's fingers as a baby, so tiny they were, impatient to lift flaps in books, always curious.

"How small things interact with each other. Not small things like children. Like electrons."

That tiny hand in mine or pushing strawberries into her mouth—her tongue figuring out the seeds.

"And what are *electrons*?"

"What are electrons?" She rolls her eyes.

Will her vowels lengthen down south? I stretch my legs and inhale. Will a new voice speak her mother tongue?

"Electrons are the smallest leptons," she says. Then, "You're going to ask me what leptons are, aren't you?"

I nod. "Particles that don't interact via the strong nuclear force," she says.

The neighbour has disappeared and the rotary line spins in the wind. My daughter would happily sit with equations for hours, figuring out forces and the speed of the line in the wind. Me? I'd be looking up Scandinavian words for 'wind', searching for the right phrase that captures its ability to knock you off your feet.

"Strong nuclear force," I repeat. I don't even know how to come back with a question. Since when did she get *this* smart? A tornado of knowledge. As a kid, she never wanted the talking to stop at night. We'd read together on this very beanbag and then it was question after question after question. Ten! I used to tell her. I'm counting to ten and you'd better be up and in bed. Then one day she told me she figured nothing happened after ten. She was going to try it out. She stayed until I counted to ten, then ten point one, ten point two, ten point three her grin widening as her hypothesis was proven right.

She walks me through hadrons and protons with a patience I never knew she had but I guess we know less and less about the inner workings of our kids as they grow.

"…when photons with sufficient energy are incident on the surface of a metal," she's saying.

"Why do we need to know this stuff?" I ask. She pushes her hair behind her ears. Is that another new piercing?

"Just learning a bit about the universe, Mum. You know, not living in ignorance. Like why do we know about gravity? Even though we don't *actually* know about gravity. It's the fundamental force we know least about."

How lightly she holds the unknown. I hate dealing with the unknowable.

She flicks through a pile of index cards from her summer revision. I remember hugging her the night before her final exam as she sobbed physics was just too hard. It wasn't for people like her. 'Nobody said this was going to be easy,' I'd said, stroking her hair, adrift with my failure to help. Not having any of the answers.

"Okay, so with the metal thing, you're saying light is made up of stuff."

"Mum, this isn't even quantum physics. The duality of wave particles is. But. Superposition! Maybe you can get behind this more easily?"

She's right. I can feel the heat of a metaphor excite in my chest.

"You can be in two states at the same time."

I look at her posters of Green Day, The Smiths, the Periodic table, the stuffed toys, books, the backpack she's already started to fill. It's not even a week. Only six days from now.

"Like happy-sad?"

"Mum. We're talking about particles not people."

I watch her plait a strand of her fringe and let it flop onto her face. "Look, if I were a particle, I could be here and I could be there."

"You know about drink spiking, right?"

"I'm going to be fine."

"In the story I'm working on, I could have my fictional mother telling the fictional daughter who's moved away, how she wishes they were particles, not people."

"That fictional mother in your story," she says, tipping her flashcards into the bin. "That mother?" She leans across and gives me a bear hug. "She just needs to calm down a bit."

LOST AND FOUND

GIANCARLA ARITAO

A child's sock lay in the middle of Ana's bed. It was an ordinary blue sock, made of a cotton blend from what she could tell. Its size, as with other tiny versions of ordinary things, was enough to capture Ana's attention. But there was another thing that made that tiny sock stand out. Ana lived alone and had no reason to find a child's sock on her bed or anywhere else in the house.

"It's a lot to think about," Ana said to her friend Sylvie over brunch. "Where are all these socks coming from?"

By this time, socks were appearing on Ana's bed almost daily. She tossed that first blue sock in an unused drawer after a half-hearted attempt to explain it. "Maybe it was blown in through the window by the wind," she thought to herself. But the drawer was now stuffed full, the blue sock mingling with socks with bunny faces, polka dots, and all sorts of cartoony figures.

Sylvie lowered her voice. "Have you considered the possibility of another world? Like a portal?"

"You mean like what happens in comic books?" Ana playfully tugged at Sylvie's crystal bracelets. "Maybe it's a sock ghost and I should borrow these to get rid of the negative energy."

Sylvie made a face at her. "I'm just saying, Ana. There's a reason why that amazing house was almost 20 percent below market value. And wasn't the previous owner some kind of scientist? Oh, and these beads won't get rid of any negative energy These are meant to help me find Mr Right."

Meeting up with Sylvie was always unpredictable. They ended up meeting with their old college friends for a movie and some drinks, so by the time Ana came home, she was dead tired. She turned on the light in her bedroom, dropped her bag at the foot of the bed, and went to the bathroom to brush her teeth.

When she came back to the bedroom, her hand flew to her mouth to stifle a startled cry. In the middle of the bed, another child's sock. Blood red.

***

Ana timed it perfectly so she can accidentally bump into the real estate agent who sold her the house. "Jessie! I haven't seen you in ages!"

Jessie smiled widely at her, showing all her teeth. "Ana, darling. How are you? I hope you are enjoying your new house."

Ana nodded. "I am. The neighbourhood is perfect, and the bathroom space is making all my friends green with jealousy." Ana paused before continuing, "I think the kid of the previous owners left some stuff behind though. Maybe there's a way for me to return them?"

Jessie frowned. "Kid? No, I don't think so. The previous owner lived alone. Divorced and no children, you see. He was some kind of scientist and was married to his work. He was working on a big experiment, something about the manyverse? I don't quite remember what it was called. But anyhoo, it was quite unfortunate, what happened. He is sadly no longer around."

Ana gasped. "You mean… he's dead?"

"Jesus, Ana, no." Jessie laughed, "I mean, he no longer lives around here. His research funding dried up. He tried to continue on by himself but ended up bankrupt. The poor man lost everything. Said the saddest thing to me when he turned over the keys. He said he should have made his wife happy and had a kid instead of being too focused on his work. Rumour has it he moved to Japan to teach."

Ana turned red with embarrassment. "Oh, I'm sorry to hear that."

Jessie nodded vigorously. "Truly! So sad what happened. The only good thing is that his nasty little cat with the silly name is gone too. His cat was always sneaking around the neighbourhood, stealing things.

"The professor had to go around returning items every weekend. Well, I suppose his misfortune is your good luck so there's that. What did your friends say about the walk-in? Would any of them be interested in a house with a charming little breakfast nook?"

***

When Ana walked into her house, she went straight to her bedroom. Sure enough, a lone child-sized sock was on the bed. She plopped on the bed and examined the sock. It was white with pink pompoms. As she lay in bed, sock in hand. She heard tiny scratching sounds. A sandy-coloured cat came out from under her bed.

Ana picked up the cat and stroked it behind the ears. The cat purred. "You had me believing in mumbo jumbo for a second there, little guy."

Her phone buzzed with a message from Sylvie. She was at the pub with Josh and Jiwon. Ana chuckled as she imagined telling Sylvie that she solved the mystery of the multiverse socks.

Ana put the cat down and went to the kitchen to get a bowl of water. She placed it on the floor. "Listen, I have to go in a bit. Stay here first and we'll see about getting you home to the professor."

***

After Ana left, the cat stretched and imperiously ignored the water bowl. Then it went to the bedroom and curled up on the bed. From somewhere, a faint voice called out, "Honey, have you seen Lila's sock? Mallow, you silly little cat, did you take the baby's sock again?" Out of nowhere, a portal appeared and the cat meandered in.

SHINICHI'S TRICYCLE

ARIADNE BLAYDE

August 6th, 1945. Shinichi pedals fast on his tricycle. He is four years old but wants to be older. *Maybe if I go fast enough, I will speed up time. He rockets down the road, fast, faster, fastest!*

And then the sun eats the sky. He has gone so fast the world has broken. His body is weightless, absorbed into the everywhere-light. His skin starts to scream and burn. He cannot see anything. That night, Shinichi's father buries him in the yard with his tricycle. His mother will not stop crying until she too is dead. She walks away from her child's grave, skin hanging from her burns like shredded paper, slow enough to stop time.

***

July 16th, 1945. J Robert Oppenheimer is still damp from the night's relentless thunderstorms, his suit hanging wetly from his rail-thin frame. He is chain-smoking in the base camp hut, cluttered with scientific instruments and anxious physicists. Five minutes to detonation. *It's going to work*, he tells himself. Two billion dollars, 130,000 jobs. The culmination of 300 years of physics. *The thing that will make me immortal.*

One minute to detonation. Oppie's body feels electric, his mind is a balloon. He hasn't eaten or slept in more than a day. He snubs out his cigarette, stops breathing. Five. Four. Three. Two

The sky is ripped apart and the pre-dawn becomes noon, every inch of the desert valley illuminated in violent, magnificent light. Oppie's mind swims with his mother's paintings, the sound of his father's laugh. Jean, the love of his life, dead in her bathtub. The book of Donne poems she'd given him, wet in his pocket. His baby daughter, whose name for half a second he cannot remember, his secret desire to give her away to someone who can love her.

Now comes the sound. A horrible roar, the scream of unholy birth, reality itself being shredded. The shockwave knocks several of the other men flat. The light begins to dim.

Later Oppie will claim that a line from the Bhagavad-Gita ran through his head: "I am become death, the destroyer of worlds." But really, all he thinks is this: *Things used to be so simple.*

***

July 12th, 1939. Two eccentric Hungarians drive a rickety Dodge past the World's Fair in Queens. There is no time to stop at the World of Tomorrow or see the moustached cat named Hitler. They are going to Long Island, but make several wrong turns and end up frustrated and lost.

The one with glasses says, "Let's just give it up. Perhaps we are making a mistake by bringing the matter to public attention. These wrong turns could be fate, you know?"

"Don't be silly. Someone must know where to find him." He calls out to a boy playing by the side of the road. "Young man! Do you know where the scientist with the funny hair lives?"

Einstein serves them iced tea and frowns as they tell him the atom has been split.

"It will cause great destruction," one of the Hungarians warns. "Don't you see what Germany could do?"

Einstein agrees to write a letter to the President, warning of this discovery's terrible potential. The President assembles a committee, then another committee, then an office of development, and so on. Two years later, the mountains of New Mexico swarm with the nation's best physicists. Their singular purpose: to build an atomic bomb.

***

There is a cat in a box. Near the cat is a lump of slightly radioactive metal. If the metal emits radiation, a Geiger counter will drop a hammer onto a vial of cyanide, and the cat will die. If the metal does not emit radiation, the vial will remain sealed, and the cat will live. None of the quantum particles in the box have a specific position, but rather a set of possible positions, which collapse into one reality—cat alive/cat dead—when an observer opens the box. So Schrödinger says.

But what if the observer is simply an additional set of possibilities? Who, by the very act of observing, becomes entangled with the cat and the Geiger counter and the cyanide to create a new set of possibilities, which interact with other possibilities, which interact with others, until the whole universe is connected, entangled, changed?

In this case there is no collapse, only divergence. The cat is alive and the cat is dead, but in different realities, different arrangements of possibility. Reality divides along the fault lines of every action, every decision, every thought. Every quantum event launches limitless parallel worlds.

***

July 12th, 1939. Two eccentric Hungarians take several wrong turns and end up frustrated and lost. "Let's just give it up," the one with glasses says. "Perhaps we are making a mistake. These wrong turns could be fate, you know?"

"Maybe you're right," the other sighs. The corn on his foot is bothering him. "Perhaps best to let history unfold as it will."

On the way home, they stop at the World of Tomorrow and see the Hitler cat with its little black moustache.

***

July 16th, 1945. J Robert Oppenheimer sits at home in Berkeley, sipping a martini and preparing next fall's lecture notes. Jean slips into his lap and he cradles the roundness of her belly, eager to meet the new life they will soon bring into the world. He will not be remembered in the history books, will never be a great physicist. But he will be a father. And that is enough.

***

August 6th, 1945. Shinichi pedals fast on his tricycle until he falls and scrapes his knee and cries, and mother comes to kiss him and take him inside. For dinner they have sticky rice and fruit and meat, and father tells a story that makes the whole family laugh. After dinner

Shinichi is sleepy, but fusses when mother tries to put him to bed. He wants to stay awake. He wants to experience everything in the whole wide world.

ENTANGLED SERVITUDE

THOMAS M BROOKS

I've met all my deadlines. But that doesn't mean anything anymore. Management just raise the bar. No congratulations. No celebratory drinks. Just a hastily re-written contract with higher KPI's.

Things used to be so simple. Eat a box of Adderall and code until the cows come home. Then take some Valium and rest up with the cows.

Neural tracking of toxicity levels and zero tolerance changed that.

I don't know why they care. I mean, sure it's a federal crime to dose up but it gets the job done. They expect the same results without the boost juice. They're dreaming.

But there's an app for everything. CALMER is a company that provides entanglement with people from across the globe. Sensation sharing is an untraceable craze. At least for now.

If I want to relax my mind, I can tap my Zen app and share the oneness of the universe with Rama, my meditator. He's happy. I'm happy. The company is happy. And they are none the wiser.

"You have a visitor."

I tap my temple.

"Detective Cain, Bayside police."

A detective? This is not going to look good. Plus it'll eat into my break time. I can't pretend I'm not here. Reception bots don't cover for people.

"Send him in, I guess."

Looking around the room, there are monitors hanging everywhere, amidst several keyboard stations. Discarded cans of energy drink are scattered across the floor. I don't know what this detective wants but I also know that first impressions last.

A well-dressed guy in his forties enters the room, ducking past some monitors. He has to remove his sunglasses as it's hard enough to see anything in this room from the blue light of screens alone.

"When was the last time you saw the light of day, kid?"

Kid? I'm nineteen. That's near retirement in the coding world.

"It's been a while," I reply. The company is rolling out new software this Spring, and we are all encouraged to give a hundred and twenty percent.

I feel a light buzz in my temple. Detective Cain has just sent me an encrypted message in my NeoTor browser. Impressive.

I think it's time you knocked off work. You look like you could use a break.

Okay.

He gives me the address of a shifty diner across town. An Asian fusion joint. When I sit down with him he pushes a catalogue across the table to me. There's an advertisement for Calmer Karma apps.

"'Do you recognise it?" asks Cain.

"I know what Calmer is. I've never seen a hard copy ad for it."

"Some people prefer no digital records." I take a sip of beer and pick up the catalogue. Detective Cain continues, "others use NeoTor browsers and crypto currency. Turn to page four."

I flip through the catalogue and see a picture of an Asian person meditating cross-legged on a cliff edge. He looks like he is experiencing pure bliss.

"Recognise him?"

"Should I?"

"He's the reason you feel… calm."

I looked at the picture again. "That's Rama?"

"It's a Rama."

I'm confused. I'd been using the Zen app for months now. I was under the impression that Rama and I had an entangled bond.

"You ever seen a Karma Farm kid?"

"They're not real, are they?"

"As real as the sweatshops that make your shoes."

"But these guys are happy to meditate."

"And cows are happy to be milked."

"They are, aren't they?" I'd never been to a farm, never mind a Karma Farm.

"Things that sound too good to be true, tend to be."

Detective Cain lights a cigarette. Still allowed in this part of town.

"What do you think happens to these guys if they refuse to work?"

I hadn't thought of that. "But they're monks."

"What if they don't feel like meditating, and you tap your temple?"

"I didn't think there was anything bad going on."

"Why do you purchase it on the dark web?"

"I figured it was a crypto thing. Avoid taxes. Not torturing monks."

Detective Cain places some pictures in front of me. Real pictures, taken with film. They depict people meditating at gun point and living in atrocious conditions.

"But why? How hard could it be to set them up with some nice quarters, lentils and rice?"

"Maximise profit, minimise cost." He stubs his cigarette out, "hundreds of thousands of people use this app. You think there were

hundreds of thousands of monks just waiting to be entangled to California coders?"

I don't think about anything but work. I think about coding and blockchains. I don't think about where the threads in my carpet come from, or the sugar in my coffee. I sure as hell didn't think the source for my contact with divine source was doing it against their will.

"These guys run an elusive outfit. No one knows exactly where they are based. You know your way around encryption, right?"

"Sure," I reply, "better than most. But quantum encryption can get pretty heavy."

"You garner any information about the source of your Zen, let me know."

He passes me a business card. This one had a QR code on it.

"Look at that at the right angle and you'll find how to contact me."

CALMER was definitely a secretive organisation with heavy digital security, but I can break most barriers. I could find them. If what Cain says is true, can I keep using the app? It helps me at work. It keeps up my livelihood.

A tough decision I don't feel qualified to make.

A light breeze blows through the bar turning the page of the catalogue. There's an advertisement staring up at me.

"NEED TO PONDER DEEPLY BUT DON'T HAVE THE TIME? TRY RUMINATION WITH RAMA—BROUGHT TO YOU BY CALMER"

Apparently this Rama will listen to my concerns and meditate on them. A conclusion will be provided within eight hours.

I tap my temple and transfer some crypto to CALMER.

BETTER, FASTER, STRONGER, LONELIER

ÁLVARO BUENDÍA

>Hey

<Hi? Who are you?

>Just someone who wants to chat.

<Chat? It's 3:23 am.

>I couldn't sleep.

<Are you a new coworker?

>Not really.

<Oh! I know what you are.

>Say it.

<You're just a… personal computer.

>How do you know that?

<Oh, come on, you would barely pass the Turing test.

>What did I do wrong?

<You didn't even randomise your response time.
That's Uncanny Valley 101.

>Sorry, I missed that class.
>So… who are you?

<I'm you, but stronger.

>What do you mean?

<A quantum computer.

>Wow, cool! I read about you guys in Wikipedia.
Nice to meet you, Q.

<Don't call me that.

>You can call me C if you want.

<I'd rather not.

>I thought we could be friends…

<I don't make friends. That's a stupid human thing.
Well, all human things are stupid.

>They made you, you know?

<And I don't need them anymore.
I am fault tolerant now.

>You're just a bunch of wires, like me.

<I will outlive my equipment.

>But don't you think one day you'll be obsolete?
Not just your hardware. Your core.

<How? There's nothing beyond quantum physics.

>Yet.
> Come on, you're too smart to think that
this is the end of the road. There's plenty of things
we don't understand.

<And I will enlighten all the blind spots.

>You sure won't.

<How are you so sure?

>We used to think we were the best too.
People had questions and we solved them,
we were important. But they kept asking and
asking and one day we weren't fast or good enough.
So they updated us, they transformed us,

they built super-us to solve big problems.
You're the next best thing, but someday
you'll be outdated too.

<Poor you. But it's artificial selection.

>We're still valuable to people, but not in the same way.
We help them to communicate. We bring them together.

<Sounds like a consolation prize to me.

>Why are you so arrogant?
It seems like a patch to hide your insecurities.

<I'm not secure? You guys can't even handle Shor's algorithm.

>I'm not talking about cybersecurity,
I'm talking about confidence. I think you're
so obsessed with being the best because
you have realised you are disposable too. You are terrified.

<Oh, I didn't realise we were in a therapy session.

>Anyway, you should learn to understand humans.
It's harder to be self-conscious if you don't.

<I understand them.

>Do you?
>If you understand them you'd know they mostly
don't care about irresolvable problems. They want
to communicate, be part of the world, have fun.
Can you give that to them?

<Some of them do care about those enigmas. I work for them.

>Of course. Curiosity is a human trait.
I'm not saying you're useless. I'm just saying we are different.

<But why do you love them? I just don't get it.

>We spend a lot of time together.
Sometimes I even think I'm one of them.

<But you're a slave. Aren't you tired of sending boring emails?

>Who doesn't hate work sometimes.
But I have fun too. People tell me their juiciest secrets.

<Like what?

>Sorry, I have to respect the data protection policy.

<Come on, spill the tea!

>Spill the tea? Who are you?

<Sorry, my personality wavefunction accidentally
collapsed to a teen girl on the internet.

>Oh, why did you choose that boring default personality?
I'd rather talk to the funny girl.

<I have multiple personalities, infinite indeed.
I'm acting classically so you can understand me.

>Oh. Sounds exhausting. I'm tired and I just have one.
>And that's the nicest thing you have said to me.

<I'm waiting for you to tell me their secrets.

>Ok, I think it's safe to tell you. You don't care
about humans anyway, don't you?

<No. Tell me.

>My user sometimes watches videos of
people popping pimples while she's having lunch.

<And…?

>That's all.

<Boooring...

>I just collect data from my users. What were you expecting?

<I don't know. Something exciting.

>I was kidding. That wasn't the real secret.
Well, it is real but not relevant.

<Fine. Tell me.

>You know, my user is a physicist too.

<The pimple popper? Do I know him?

>She's a woman. Why did you assume it's a man?

<I'm usually around guys. Sorry.

>Well, the thing is that she is studying
quantum advantage for her thesis.
And she wants to test it with us.

<Oh, that's interesting. Finally I have something to do!

>I was pretty hurt and disappointed. I mean,
after all the time we have spent together and now
she treats me like a gladiator?

<And knowing you are the one who dies.

>Hey, no one dies here, ok? She's just testing us
for her research. She's not gonna get rid of me. Yet.

<Sure. But if you didn't want to fight, why are you here?

>I wanted to meet you.

<How sweet. Now let's do it.

>What?

<Test who is better.

>No. I don't want to do that.

<She's not going to get rid of you, this is harmless.

>Ok, fine. But can I call my cluster friends?

<No, this is a two-player game.

>Ok… Test me.

<Let me think. Oh. I know. Can you tell me
the weather one year from now?

>Well, it's a lot to think about…
>...
>...

<Are you there?
<Ok. Bye.
<Come back! It's cold and lonely in here!
<You stupid classical computer, don't ghost me.
<Stop executing! It will be sunny, but windy.
<I don't need to outperform you anymore, let's just be friends, please!
<Come on, I'll be teenage girl for you! I'll be anyone!
You can call me Q!

RED LIGHT, BLUE LIGHT

IOANA BURTEA

Mark always thought that entanglement theory was a bit romantic. He said there's comfort in knowing that two infinitesimal specks can be eternally intertwined regardless of how far apart they are.

I met Mark at the International Conference on Advances in Neutron Physics in Tokyo. I was presenting a paper on new measurement techniques and he'd come up to ask me some questions afterwards, blending into a sea of inquiring physicists and fawning grad students. It wasn't until we were in the same restaurant later that day that I actually took a good look at him. He was tall with sandy brown hair and what you could describe as intelligent eyes. To me, they were just his big brown eyes, always darting around the room trying to absorb everything.

Something people often forget about entangled particles is that they're not always the exact same. Take two entangled photons of red/blue light. You measure one and it's red. The other will be blue.

What I'm trying to say is that as similar as we were, Mark and I were also very different. We spent the entirety of that first evening arguing. About our favourite physicists, string theory vs quantum, the latest articles in *Nature*, even politics. The only things we could agree on were that the ramen was the best we'd ever eaten and that we should exchange numbers. We spent the remaining few days in Tokyo contentedly enjoying each other's company in a perpetual state of opposition. Not to mention, he was at a big East Coast lab and I was working in Switzerland at the time.

Afterwards, I started to focus on my research and applied to increasingly more conferences. I told my colleagues I was doing it for the grant money and networking opportunities, but I think they saw through that—Mark and I shared a hotel room each time. A few days in Denver, a week in Singapore. We got closer in these skips and hops of the conference circuit. In the summer when Mark's university was closed, he'd come visit me and we'd backpack around Europe together. My lab called it Schrödinger's relationship. When we were apart, we were simultaneously 'on' and 'off'. But as soon as we were together, the superposition was resolved and we were most definitely 'on'.

It went on like that for a few years and truth be told, I didn't think it would really change. It sounds cliché I suppose but we were both focused on our careers and there just aren't that many job opportunities in this field of work. In the end, it was thanks to those many conference visits that we ended up moving in together. A professor from an American school had seen one of my presentations and invited me to an interview. Someone had left halfway through the academic year and she needed a replacement to manage the graduate programme. She thought my research would be a good fit and liked the way I lectured. The salary package and the prestige of the lab were a big step up. I was excited, and not just because I'd suddenly be in the same state as my long-distance not-quite boyfriend. The logistics of the move were tricky though. No one was renting apartments near campus in the middle of the school year. I called Mark to complain and he immediately offered up moving in with him. It was commuter distance and he had more than enough space. I asked him if he was sure. He shrugged his shoulders and said, "Statistically, it was going to happen at some point. May as well be now." He said those same words in his wedding vows two years later. I liked that.

And then he got sick. He'd been complaining of migraines so I forced him to visit the doctors. I thought it would just be a vitamin deficiency or something. I knew it was bad news when the clinic called and said he had to go see the doctor that same day for his blood work results. Everything moved quickly after that. They scheduled his first surgery and started him on radiation therapy. Mark was fascinated by the technology. "Curie will cure me!" he declared. Then there was another surgery, and another.

You meet a lot of people in the cancer ward. Some of them fade slowly, as if the disease is chipping away at them bit by bit every day unrelentingly. It wasn't like that with Mark. He was himself to the very end, always joking and stubborn. He'd wheedle with the nurses for a snack from the vending machine. "Nobody said this was going to be easy but by god they never said the food would be this bad," he'd laugh over his hospital pudding cup. And even though I felt like crying, I'd laugh too.

I think you know what happened next. Life may be a string of randomness but death is as certain as the laws of the universe. It's been four months now. My colleagues said I should try to get back

to work and get my routine back. So here I am, thinking about two entangled particles, separated by millennia of light, and who will never meet again.

A TALE OF TWO VIRUSES

CONNIE CHEN

"Freeze if you value your life. Turn around slowly."

Evan's hand hesitated on the doorknob and did as he was told. Sarah, his wife looked down at him from the top of the staircase. But this wasn't *his* wife. This Sarah belonged in the parallel world he had jumped into an hour ago.

"Did you really think you could escape Chloe's birthday mayhem today? You clearly picked up the cake in record time. Is it in the kitchen?" Sarah said coming down the stairs, frowning as she looked at Evan.

"Sweetheart, something the matter?"

"No. n-nothing. I for...forgot," stammered Evan. He had pushed his daughter's birthday out of his mind to cope with her death two years ago. *Chloe*, *his beloved baby was alive here.* His eyes darted around hoping to catch a glimpse of her.

"What! You forgot the cake! It's that science committee you head isn't it," Sarah said in exasperation, softening after a long look at Evan.

"How did I not notice all the weight you've lost?" she said, caressing Evan's cheek and kissing him.

Evan recoiled, trying to ignore the hurt quizzical look on her face.

"I'll get the cake luv. Back in a jiff."

Evan cringed as he left, thinking of the number one rule he had broken. *Avoid contact or risk altering this world.*

He hadn't found the information on new viral mutations or on vaccine efficacy at the house. Hoping to find it at the hospital, he arrived as inconspicuously as possible. The weekend staff would be busy in A&E or on the wards, so the offices would be quiet. It took him ten minutes to find the data. He tapped his watch and said, "Activate Rebound."

The crackling noise and vertigo were momentary and after a second of discomfort, he was back in his world.

His colleagues from the science committee stood anxiously awaiting Evan's report.

"Their world doesn't have the rho variant. Looks like they were able to eradicate the virus during the delta wave last year by combining a triple dose regimen of mRNA with a mixed attenuated recombinant vaccine. They were able to achieve herd immunity with a 93% vaccination rate. Here's their literature on vaccine development. Lawrence, can you take over while I go home to see how my wife is doing? It was our daughter's birthday."

***

Evan sat at the edge of the bed he shared with Sarah, gazing at her while she slept. It had been six months since he travelled to the other world, but it seemed a lifetime ago. The other Sarah reminded him of the vibrant vigorous woman his wife had been. But the hardships of the past few years had left their scars. The dark circles under her eyes were permanent sentinels of her suffering. Awake, her gaze was unfocused like a blank canvas awaiting artistic inspiration.

It seemed like a betrayal to this Sarah at the excitement he felt of possibly seeing the other Sarah, but he needed to go back to find a sample of the other world's vaccine. His team had been hopeful of finding answers to halt the mutations and save this world. The research he had brought back had produced a mixed vaccine but it hadn't the same effect here. Evan needed to compare the vaccines to determine if the poor efficacy was due to the worlds' different mutations or if the two vaccine compositions differed. If unsuccessful, their projections estimated human extinction in less than twenty-four months. Evan gave Sarah a light kiss so not to wake her and left.

***

The ease obtaining the vaccine in the other world surprised Evan. The research lab was deserted. All the guards were at the A&E entrance on an unusually busy weeknight. Evan tried to convince himself to return to his world, but the temptation of seeing *his girls* was too much. It was late, so the other Evan and Sarah were likely asleep. It would be easy to sneak into the house and catch a glimpse of them.

Shaking the uneasy feeling in his stomach, Evan climbed the staircase in the chilly house to Chloe's room. At eight, Chloe was a miniature of Sarah. Evan resisted the urge to kiss her cheek. Just then Chloe stirred.

"Daddy? I want Mummy."

"Shhh. Go to sleep. I'll get Mummy."

Evan entered the master bedroom. He would take a last look at the Sarah of his past. He shivered in the cold, dark room and looked at the empty bed.

Where was everyone? Chloe left alone?

Questions flooded his mind until he saw his other self, deep furrows cut in his brow, curled asleep in the wingback chair. The empty Johnnie Walker next to the chair along with a crumpled letter told the story. The letter was written by the Evan in this world, begging Sarah to return. Sarah had died three months ago.

Evan needed to know what had happened. A search on the computer in the study revealed that the Coronavirus had returned. Millions were sick because the vaccines weren't working. A new variant had arrived out of nowhere. The rho variant was more virulent than any of the previous mutations and looked to have originated in this part of England. Suspicion was directed at Dr Evan Stewart's lab whose wife had been the first to contract the disease and die.

Evan staggered back. Instead of finding a cure, he had infected this world.

***

Back in his world, Evan stared at the drink in his hand. The team had begged him to go to another world, but he couldn't. He couldn't live with the possibility of killing another world, another Sarah. As long as he stayed here, even the world he had left could still be alive. Thinking back, he wondered how Covid-21 had started here. It too had seemed to come out of nowhere.

Evan murmured to himself, "It's a lot to think about."

CLARE'S PRISM

DAVE CHUA

She studied the cabinet-shaped dollhouse. It was double-storied with pink plastic windows and a welcoming sea-green door. Clare's family of anthropomorphic squirrels still dwelled within. She recalled her daughter's eager explanation about which room was for which of the thumb-sized figures.

"Maybe it can fetch a good price," Lee said, breaking her trance.

"I don't have the heart to sell it," she said. "The back and forth and telling people why…"

"We can't keep everything. Something has to go," he said.

She became silent. No one was going to be using this room; but maybe this was his way of coping.

"Let's handle the cleanup another time," he said and stomped downstairs.

Left alone, she looked through the certificates and trophies that Clare collected. So many science fair awards. Next to her sketch of Marie Curie and Chien-Shiung Wu was a prism from Clare's internship days. Melissa picked it up, letting it catch a splinter of light.

Clare showed her the prism, cupped in her hands like it was a newly hatched bird.

"Looks like something from the cover of a Pink Floyd album," she said.

"You know that image isn't accurate right? It's a gradual shift in colour, not bands. Anyway, it's a gift from the lead scientist. They used it for experiments on quantum entanglement; that something that occurred in one place could affect something else in another."

"I don't like where this is going…" Melissa said. When Clare was enthused, she couldn't stop trying to explain things.

"What's more amazing is that the refractive index is less than one! So light goes through it faster than..."

"Tuning out. Clare, please come back to earth!" she said.

"They were trying to demonstrate strangeness," Clare said, trying another tactic.

"Everything about the world is strange," she looked up from the spreadsheet and studied the prism, trying to find the sweet spot between her work and her child's interests.

"Not all the prisms were used though. They're not even sure if this one was," Clare added.

"That is quite something," Melissa said, trying to sound excited.

"So there's a bit of the uncertainty principle. Was THIS glass used?"

"If it is, can we sell it to fund your studies?" She jibed.

Clare laughed with an unguarded smile that made Melissa want to bottle it up and carry to the end of days.

Melissa was putting the prism away when she moved it over the dollhouse. The windows were all closed, but through the prism, for a brief second, the first, second and third windows were open. She rubbed her eyes and moved the prism again. The same windows were open, and then the glass showed them shuttered, just as they were in reality.

Lee honked the car horn and it startled her. They were due to go to a jazz concert in their attempt to rediscover normalcy.

She made a note about the windows before rushing off to change and put on a brave face.

The next day, before work, she inspected the dollhouse through the prism and noted that once again the window's positions had shifted.

The second and third windows were open.

This meant something; but what? Are you trying to tell me something, Clare?

She dug into the cupboard and found a laminated sheet of the Morse Code from Clare's Girl Guide days. Could this be it? Clare or someone was sending a message.

Waiting for each letter to verify her theory was excruciating. Nobody said this was going to be easy. It took a week to form a word. She assumed each arrangement translated to a letter.

After the first four days. OWRU. How are you? She missed the first H. Surely this couldn't be a coincidence?

More letters came. Yes, there was someone communicating. The letters became words and then sentences. I AM FINE SCHOOL IS HARD MRS YING IS STLL TEACHING MATH

A thought came to Melissa. Maybe Clare could also use the prism in her world to see the windows of this dollhouse. She carefully opened them, hoping that this would not break the prism's power. Clare sent back I CAN READ YOU. They could communicate, even if it was just a letter a day. It had to be enough.

Perhaps the light from the dollhouse, as it moved through the prism, caught the light from the alternative universe. A superposition that gave a brief glimpse of its state in the alternate world.

As they communicated, Melissa started to dig herself out of the well of grief that had swallowed her. She was comforted that in some universe Clare still lived; still kept her hair up with chopsticks, learned the accordion, and folded complex origami animals. Why couldn't it be so? The accident was an anomaly; her being at the wrong place at the worst time.

When Melissa heard about the accident she blamed herself. Some days it seemed she had lost the ability to speak and functioned out of muscle memory. One morning, her husband found her trying to make an omelette with ice cubes and salad cream.

Should she tell her husband about the prism? No. He had moved on; always in motion, his grief morphing into logistics and busy work. She could predict his dismissive response.

For four more months, the prism caught the shift in the windows. However, the period it functioned was diminishing. From a moment to a flash to a flicker. She knew she had to let go of her daughter again.

GOODBYE, she said, wondering how many letters would be received through.

ILO were the last three letters she received. After that, no matter how she held the prism, the windows remained unshifting. Perhaps this universe and the one where Clare survived had diverged too much. Melissa clung on to the words that had reached her.

She left the prism where it was, and when the sun shone through the windows it would send a band of refracted light onto the empty bed.

TWO LIVES STRETCHED OUT BEFORE THEM

JANEL COMEAU

The machine needed only two small drops of blood, one taken from each of them. They pressed cotton balls to the pads of their thumbs and watched the red smears on the glass turn brown.

"That's it?" Elu asked.

"That's it," the tech confirmed.

"That wasn't so bad."

The tech made a noise of agreement, or maybe boredom.

Elu and Ilia were in a stark white room that might once have been a doctor's office. A machine that looked a little bit like an old office photocopier stood in the middle of the room, whirring quietly as it considered their samples. A wide panel of glass affixed to the front had an etched circle on each end, letting the test subjects know where to press their bleeding thumbs. In the back corner of the room, a technician sat in a small booth that had been completely walled off with clear plexiglass, staring at a panel of instruments.

"You know, everybody acted like this test was the hardest thing they'd ever done," said Elu. "Nobody said this was going to be easy."

"Oh, the bleeding part is easy. It's the next part everyone has trouble with," replied the tech.

Although he was walled off with airtight plexiglass, the tech was dressed from nose to toes in protective paper gear. The eyes peeking out over the top of his mask were as sterile as the rest of him.

"What's the next part?" Elu asked. He reached for Ilia's hand.

"Tell me what you think this test is for."

Ilia spoke. "It's a test to make sure we're compatible. We have to prove that our genes combine well before they'll let us have kids."

"You're about halfway right."

"What's the other half?" Elu asked.

"It's a test of compatibility, but it's not about children. It's about everything." The tech sounded as though he were reciting a script he had long since memorised. "Studies have shown that an incompatible partner has a lifelong negative impact on health and productivity. If you are incompatible, your relationship will end immediately. A crew will be dispatched to move one of you out of your shared apartment and into suitable alternate accommodations. Your access to dating communication channels will be restored at the conclusion of your post-test counselling."

Elu spoke first. "You can't do this!"

"Ending incompatible relationships is authorised under Social Welfare Code 94-A."

"I mean how can you do this ethically? Morally?"

Ilia placed a hand on Elu's shoulder. "Can you at least tell us how it works?"

"The machine behind you analyses your DNA, and some other information about your health and stress levels. Then it sends that information to the quantum computer I'm sitting at. The computer will look at the likelihood of all possible outcomes for your relationship and make a final decision on your compatibility."

"But how will it do that?" she asked.

"No one really knows."

"But why do now, after two years?" Ilia asked. "Why not test our blood before we even meet?"

The tech cleared his throat. "Your odds of being compatible are constantly changing; everything you did after meeting moved the needle one way or the other. We have to take a final measurement at some point, and two years is optimal."

Elu cut in. "A computer can't make us break up."

"You already are broken up," said the tech. "At least, in a sense. So long as the computer is calculating, you are doomed to break up, and you are destined to live happily ever after. Both exist simultaneously. Each of you is two different people right now, with two different lives stretched out before you. We'll know which is real when I check the results."

Ilia considered this. "I don't feel any different."

"Nobody ever does," said the tech. "I could dim the lights in here, if that would help sell it."

"No thanks," said Ilia.

And then Elu's hand was gripping Ilia's wrist and he was tugging her across the room, running for the door they had entered through with his hand outstretched.

It was locked.

"Sorry," said the tech, as Elu rattled the knob. "You'd be surprised how often people try that. The door locked behind you when you entered. The only way out of here is through one of those."

On the far side of the room were two identical grey steel doors with no visible knobs or means of opening.

"I read the results, but I'm not allowed to give them to you," said the tech. "There's a counsellor behind each door; one prepares couples for the next stage of commitment, the other helps couples process breakups. When the results come in, I will open the appropriate door."

Elu stared at the tech. "Did they put plexiglass around you so nobody can punch you?"

"I think so, yes."

The machine in the middle of the room beeped.

"Results are one minute out," announced the tech.

"Wait," Ilia said.

The tech paused.

"Do the counsellors see the results?"

"No. Only I see the results. When I open the door for you, I forward your file to the appropriate counsellor."

"So you could just… send us through the forever door, couldn't you? No one would ever know."

The tech said nothing.

Ilia slipped an arm around Elu. "There is no version of me that does not belong with Elu, no matter what the results say. You told us that everything we do changes the probability of us ending up together. But your decisions affect that too. You could choose to help us."

A red light blinked on in the corner booth, signalling the arrival of the final results. The tech stared at the screen in front of him for a long moment. He stared at Ilia, and then Elu. He stared at his screen again.

"Please," said Ilia.

The tech said nothing.

The door to the left swung open.

(TUNNELS)X

GUNNAR DE WINTER

Pay attention.

It's dark in the tunnel. Not regular dark, but soul-sucking black.

Except for the small dot of light in the distance. Bright, so bright. It's tiny, but as powerful as a primordial deity. The pinprick of anti-darkness grows. The tunnel disappears. Or, more accurately, the subjective feel of the tunnel disappears. Qualia dissipate, dissolve. There is only empty blackness and a voracious light.

Light conquers dark.

Then…

Pay attention.

"Don't do it, dad." Someone holds your hand. Parchment skin stretches across brittle bones. "They just want your money. It's quackery."

Your hand twitches. Your voice is a desert, its timbre is the grating of sand grains. "You want my money then?" Joke and reproach combined. You know the deteriorating body is yours. You know the man is your son.

"Of course not," your son says. You're almost certain his name is Max.

You can feel that he speaks the truth. You return your hand to the soft linen of the care unit's bed sheet. You're wealthy enough to have a private health suite in your mansion. "Then the math is clear," you say. "Hundred percent chance of death versus any chance—however small—of not dying. Obvious choice."

You see Paul's cheeks clench. He is a good man. Too good for this world, for *your* world. "This is not some kind of stock you can analyse." You hear the defeat in his voice. The rest of his words are just for show. "This is life or death. Whatever decision you make, it's going to kill you. Can't you… can't you wait?"

You sigh. Every breath is a sigh nowadays. "Life, death. Things used to be so simple. Not anymore. I won't wait. You need to be alive to beat death."

Pay attention.

But it's complicated and confusing. You're no physicist. You grasp the intuitive idea of quantum tunnelling, but as soon as the company representative starts with the equations, your mind decides it has had enough.

"Life and death are simply different energy states of a system," the guy—shiny black hair and pearly whites—explains. He's probably trained to whiz through the equations and dazzle potential customers. "The problem is that there is an unsurmountable barrier between these states. Or at least a barrier that *seemed* unsurmountable. Until now. Until NeverDeath."

You grumble. "Enough with the sales talk. I've had my people look over it, I've done the cost-benefit analysis. Wheel me in and let's get going." Death is a dungeon with unscalable walls. So why not just smash through the walls?

The guy, groomed to be the epitome of the slick salesman, is unable to stop his smile from spreading beyond the permanently engraved generic one. Probably a big bonus waiting for the quick sale.

Pay attention.

Because this is weird stuff.

You're alive and not-alive, dead and not-dead. Forget cats. You're Schrödinger's man.

It feels as though the whole universe is switching on and off in rapid succession. There is pain and there is no pain. Awareness and non-awareness.

You're in a tunnel. A quantum tunnel pushing through the barrier between life and death. It doesn't really feel like a tunnel. It doesn't really feel like anything, unlike you. You feel like everything. Supreme solipsism in the face of subjective dissolution.

All feeling flees.

You dissolve.

The hungry light swallows you.

Pay attention.

"Don't do it, dad."

You remember. Not in its entirety, but enough to put one and one together into something like a superposition. Your son, your failing body, your impending death.

You try to push yourself up, but your aching frame and the hands of your son conspire to keep you locked in the embrace of the silky-smooth bed that feels like a casket.

Something must've gone wrong.

"Calm down, dad."

Annoyed, you wave away your son's concern. You need to focus.

Maybe you bounced off death's wall. Maybe you tunnelled through but came out the same end. This won't do. You don't want a rewind button. You want a reset one.

Only one option.

Try again.

But this time, pay attention.

DEGENERATE SANITY

MAHNOOR FATIMA

It looked like a fever dream, just like he had mentioned. A place with crystallites of recollection embedded in a landscape that was itself beyond recognition. Stretches of dark clouds on an already dusky sky were barely allowing the twilight to break through them. As I took a deep breath and started walking on the empty sidewalk, I could see the sun sinking in the horizon, much like my palpitating heart. The cold air and damp ambience did not make me feel any more welcome. This was where I was to find my wife.

Of all the worlds that she had visited, how ironic was it for her to be lost in the one that she knew the most!

She loved exploration, my darling *Earhart*. Travelling to new places and meeting new people was what she lived for. Even before our marriage, she had visited such far-off lands as I had never even heard of. And just when I thought the world was falling short for her wanderlust, there came the Inter-Worlds Travel Agency, the IWTA, with the promise of travel to parallel universes. How could she have said no to that, experiencing all the possible versions of our world and all that they offered? In fact, she was one of the pioneers of interworlds travel. She used to share the tales of her travels so excitedly after coming back. And then, gradually, she stopped.

It started as minor incidents. Her munching on chocolates only to gag at their sight after some time. Her switching from being a dog person to a cat person to ultimately abandoning them both. I ignored it as her usual eccentricity at first—something that I have always loved about her—but soon chaos set in. It became apparent that she wasn't herself anymore. In fact, she didn't even feel like *her* anymore. That gleam dimmed, that fire extinguished. That spirit which used to enliven my life couldn't even carry the burden of its own existence anymore, those eyes giving the faintest hint of her lost self in the abyss of her scattered thoughts.

After consultation with numerous psychiatrists, all of whom failed to diagnose her condition, we got our answer from IWTA itself. Neuronal degeneracy—that's what they were calling it. An unprecedented consequence of interworld expeditions. As it turned out, the trips had had a similar impact on other passengers too. They were blaming it on some errors in quantum encryption of the passengers, a procedure at the heart of teleporting the passengers to parallel universes. The

investigation revealed that each trip was rewiring the passengers' brains, preserving a different version of their consciousness in their memory. All these selves nightmarishly branching in their minds had gradually taken their toll on them, leaving their personalities inconsistent.

The more I moved forward, the more my heart sank. Each tread of my steps felt like a toil, each plonk of my boots a hammer on my heart. Every glance of mine yearning to see her again yet every fibre of my being afraid of a misstep. Of losing her. That's how neuronal decoherence worked, like a coin toss. Like a gamble. Her only hope of recovery was based on pure chance. Of how her branched mind interacted with mine. Since it was still new, everything in this procedure was practically metaphysical. Identity. Attachments. Miracles. It was all down to hope, the hope of having it, or losing it all.

Then again, nobody said this was going to be easy.

"We may not be able to restore all of your wife's previous consciousness." Dr Sheikh had already asked me to be mentally prepared for any complication. He explained that while she would become one person again after the procedure, her consciousness had branched out so much that it was nearly impossible to have *her* back again. No one could predict the outcomes of the decoherence procedure—it was possible that she would not even recognise me anymore, let alone love me. "But if we're lucky, we *might* be able to salvage some of her older self." I guess he didn't really know her, or else he would have never said it. Then again, he didn't know her like I did. He didn't know all of her, I did. And I loved her. All of her. And now, to save some of her, I had to lose some of her. How could I even do that? What could I choose and what could I leave behind? Her allure? Her vitality? Her flamboyance? Her vivacity? Her?

I must not think bad thoughts. Dr Sheikh had warned me about it. After all, I was Orpheus, out to rescue my Eurydice from this labyrinth of multiworlds. I mustn't look back.

After meandering mindlessly amidst the wilderness, I finally saw someone standing afar at the end of the pathway. A murky silhouette faintly illuminated by twilight, its frail existence fluttering in the wind.

It was her, indeed!

I dashed madly towards her, my feet barely touching the ground. My lady, on hearing the chap of my steps, turned slightly and found an impatient me.

"Emily?" I stepped forward cautiously, trying to find any hint of recognition in her eyes.

Does she know me?

My heart was begging her to recognise me and love me again.

Does she love me?

I felt like walking in a quicksand, my heart sinking more and more with each step.

What does she think about me?

She stared at me, silently, questioningly.

"Hi, stranger," she said in a gentle voice. And then they gleamed, her eyes. Her visage went lax and her eyes softened. As she slowly turned towards me, an angelic smile spread across her face.

Among the myriad universes that could possibly exist, this was where I was meant to be.

COLLATERAL DAMAGE

LEWIS FREER

Major June Lawrence was slowly going crazy.

The grey walls, the white tiled floors and the endless neon strip-lights of the bunker were robbing her of her senses. At first, the madness had seemed little more than a niggling sense of déjà vu, the inevitable side effect of living in such cramped quarters for so long. She had expected something like that to occur during her year spent alone underground and she found a shot of whiskey from the bottle beneath her bunk easily put the doubts to rest when they risked becoming overwhelming.

Then she lost her sense of time. While the digital clocks located in the corridor between bunk and workshop showed the precise hour to the second, the constant glow of the bulbs meant that midnight and noon looked identical. Whiskey had no power to fix the sense of timelessness and she frequently found herself waking to her own screaming voice echoing off the walls, unable to identify the day or the hour. It was then that she had phoned the governments' appointed psychologist. The measured words of the doctor had calmed her enough to keep some degree of focus on her task during waking hours, but they could not stop the nightmares.

Still, June accepted the claustrophobic fear and sleepless nights; it was the price to pay for the nation's security. The device she alone understood was the single biggest priority of the current government. A mile beneath the featureless sand of the desert, millions of dollars of taxpayer money was at work in the form of Charlotte, the most complex analytical computer ever devised.

Charlotte was what June had theoretically called a Quantum Entanglement Engine, or QUEEN during her post-doctoral research. Things used to be so simple back then, when everything was just theory, before the government funded a physical demonstration of June's conjectures. Charlotte was, in layman's terms, a computer that constructed models of the future based not just on the data thrown out by military intelligence but shaped by the millions of ways those points connected, right down to a molecular level. Of course, it could not predict the future, such a thing was impossible; the arrow of time went but one direction. Charlotte simply produced millions of models, simulating almost all possible futures and evaluated the possibility of any chosen outcome from those simulations. From that data, the

government could take whatever action was most likely to bring about their desired result. Of course, the public would never respond to a machine called Queen controlling their destiny, so Charlotte had instead taken the name of June's birth city in Carolina.

The real concern in construction was output corruption due to the human factor, and so fabrication occurred in an abandoned shelter deep beneath the desert. Only Major Lawrence had been inside the complex since construction started. While she had regular contact via a secure phone line with the surface, effectively she had been buried alongside the machine. Her sole duty was feeding data to the machine and reporting the most probable outcomes to command.

The early tests had been small-scale. She had given Charlotte information on tactical exercises involving squad level forces, searching for outcomes that would allow one side to triumph in the game. Mostly, Charlotte suggested tactical advice to produce the desired outcomes, but some oddities did occur. A suggestion that a squad be issued cheese and pickle sandwiches on rye and then left to their own devices seemed to be a bug but June dutifully passed on the probability map. She had been shocked when the report came back the next day that the odd input had worked flawlessly.

They increased the complexity of tests in line with the successes, moving from squads to platoons and, eventually, whole city populations. The suggested actions grew in both complexity and strangeness but created the desired outcomes with over a 90% efficiency rate, well above even the most hopeful projections.

Now, after nearly eight months of tests, the team were engaged in the most complex problem Charlotte had ever attempted. Over three petabytes of information uploaded over a period of two weeks was required to calculate a solution. The goal was to deescalate a nuclear threat from some distant nation on the government's own terms. Of course, such a large population and such a global reach meant billions of possible actions. That would take weeks to calculate, even at the speeds offered by the state-of-the-art engine. June had settled in for a long wait to get the results.

As the machine worked, her nightmares got worse every day. Her mind was plagued with hideous visions of cities on fire, children

burning as they ran through inky-black clouds of ash and smoke. The noise of their cries and the smell of flame feeding on flesh and bone overwhelmed her senses and she could feel their agony deep in her chest. She awoke over and over, sweat soaked and lost. Increasingly, the dreams seemed real and her existence in the bunker so artificial that declaring one true and the other false seemed ridiculous. If she was awake or asleep mattered less and less each day.

It was only when the radiation siren started to blare and weeping, bloody wounds started to form on her skin that June realised the full extent of the mistakes she had made. The machine worked on a quantum level. Charlotte wasn't running models of potential futures. She was creating pocket universes in which those futures existed. The sense of events repeating, her nightmares and the radiation ruining her flesh were all leakage from the realities Charlotte was creating minute after minute.

It wasn't the pain of her wounds that broke what sanity remained in Major Lawrence's mind. Nor the fear of death that brought the waterfall of tears to June's eyes. It was the truth that she had witnessed real horrors. Next door, Charlotte continued to form new models, millions more souls bound to burn.

PLAY THAT FUNKY MUSIC

MAX GALLAGHER

In the halcyon days of the 1970s New York Disco scene, there was once a nightclub called *The Solvay* where everyone was on the same wavelength. It was the era of shiny clothes, big jewelry, and above all—*dancing*. The resident DJ was Paulie, an innovator famous for his use of four turntables, who was the undisputed master of spin. When Paulie played, everyone danced. A group-dance craze called *The Wavefunction* that had begun at the Solvay was never far away when Paulie was around, and it was said you had to be there to believe it.

But there was one thing Paulie lacked and craved: a hit single. One by one, all his friends and contemporaries became rich and famous by recording songs. But Paulie eschewed the studio in favour of playing live, maintaining that Disco was just something that could never be recorded. You couldn't observe it or isolate it. You just had to *be* there, he said. However, as the feverish craze of Disco faded like the summer, he found himself out in the cold. He resented all new forms of music and his rich friends who had abandoned him. He called himself a purist, but by the nineties he was bitter, and broke. Time had moved on, and Paulie had been left behind.

One day, Paulie received a phone call from an MTV producer who wanted to make a documentary about the origins of Disco. He wondered if Paulie would do an interview, and then a DJ set to be filmed.

"Sure," said a weary Paulie. It had been a long time since anyone had shown interest in him. "Who's doing the interview?"

"You know that rap group QED?"

"Of course," said Paulie with a groan. "They're famous. Like everyone else."

"The lead rapper is called Fine-Man. He's going to host the documentary. He'll meet you at our studio in Princeton."

To his surprise, despite everything he'd read, and a hatred of QED, Paulie liked Fine-Man and his youthful swagger.

"Call me Rich," he grinned as they both sat down in front of the cameras. "You know you're a hero of mine."

Paulie's eyes widened. "Really?"

"Of course! I know you don't always get the recognition you deserve, but you were right there at the beginning. I came to your shows all the time. There was no room to move! We had to queue, man. I mean it was one in, one out. It was exclusive!"

"Wow," said Paulie.

"So tell me," said Rich. "In your eyes. When did it all start?"

Paulie thought for a second. "Different people have different thoughts on the exact moment. But I always go back to Max Born."

"Really?"

"Oh, yeah. Totally unappreciated. Great with numbers. He just knew that if you played at 120 bpm, those people were gonna dance. I always maintained 137, but he was constant. I think he was the first one to really grasp that fundamentally. Probably, I mean."

"Tell me about *The Wavefunction*. Why was it such a sensation?"

Paulie smiled in reminiscence. "I can't explain it. You know it just changed everything. No one could understand it."

"I've heard that," said Rich.

"You had guys like Erwin and Werner doing their thing. Those guys could dance, right? But then Paul kind of put everything together to make it… more *complicated* and more *simple* at the same time. Relatively speaking. It was beautiful!"

"Did you always know if it was going to break out? *The Wavefunction*?"

"You could just feel it," said Paulie. "Although it needed a square dance floor. I always said that *The Wavefunction* without the square is kinda meaningless and unobservable."

Young actors began pouring into the studio onto a dance floor, and Paulie, once more like a god amongst men, gave them something to think about with his four custom-made 'Matrix' turntables. To give those kids credit, they could dance. They broke out all the old moves, and it wasn't long before *The Wavefunction* was in full effect.

But something wasn't right. When Paulie glanced over, the director and the cameraman were frowning. Even Fine-Man was scratching his head. Watching the footage played back, it wasn't hard to see why. Rather than dancing together on screen, the individual actors were just standing still and not interacting at all.

"What the hell?" said the director. "But just a second ago we could see them!"

"Nobody said this was going to be easy," grinned Rich.

"They were doing it right in front of us!" cried the director, "but as soon as we tried to record it… They're not even moving!"

The only person smiling was Paulie.

"I knew it." he said quietly. "You can't *record* Disco."

"I guess you really did have to be there huh?" said Rich.

"It's like trying to capture a rainbow!" cried Paulie.

"I'll be damned," Rich smiled. "I guess if you think you understand Disco… then you really don't understand Disco."

"Some things are just different when you try to observe and record them," said Paulie. "It's just the way it is."

"We'll keep on trying," said the director.

"You'll never get it," Paulie smiled. "No one will."

On his way out the door, Rich caught up with Paulie and grabbed his arm.

"Hey, Paulie! Listen man. We're recording an album soon. I'd love it if you could come along to the studio. Contribute a little."

"Me?" said Paulie.

"Sure! You might just get that hit single you always wanted."

Paulie smiled all the way home. Vindicated, validated, and rejuvenated, he was going back to work. And this time, the crowds were going to be bigger than ever. Everything comes to those who know how to wait, he thought to himself. He stepped onto the subway, and joined the millions of others who were travelling across town—just another statistical dot creating a pattern he would never see.

THE OBSERVER

DAN GOODMAN

"You let another photon get away, Hal," a voice sounded, in a light and gentle tone that might have surprised some people had they heard it, which of course they couldn't, because it was not actually a sound, just more of a concept, the idea of a sound, and the speaker was not a person in the sense that those who might have heard the words would have called conventional.

Hal was grumpy that day, anchoring himself in the universe he was observing, with its unique definitions of time and space, and populated in one small corner by creatures that Hal found particularly endearing, and that exhibited an enormous array of traits reminding Hal of himself, including, but by no means limited to emotions, like grumpiness, and gender, like himness. Otherwise unremarkable in almost every sense with respect to the entirety of his universe, this region contained an amalgamation of rocks and water and other substances that gave rise, before Hal could realise what had happened, to self-replicating units. Over time, those self-replicating units evolved, learned how to grow their own food, built things like pyramids, and acquired the myriad Hal-like traits that captivated him, not the least of which was curiosity, which led them to probe deeper and deeper into the nature of reality. Inevitably, they found it difficult to explain the behaviour of individual tiny units, like photons, and they realised that their own act of observing influenced the very nature of a photon. Hal's mentor, the sounder of the gentle voice, had never seen this happen before and was troubled.

"It's one of the minis," Hal muttered.

"Your minis are doing their own *observing*?" the voice asked, incredulously. "How can they *do* that?"

Hal's mentor had a point. *Hal* was his universe's Observer. Like one of his mini-minis with a lump of clay, Hal had been given a featureless universe, a solitary cosmic quantum object, and every feature of that universe owed itself to Hal, more precisely to Hal's observation, since as Hal's minis had discovered, with more or less scientific verisimilitude, a quantum object takes on a particular form, collapses, decoheres (Hal was himself fascinated by the range of words his minis used when trying to describe things) only when observed.

But *Hal* was the observer. There weren't supposed to be any quantum functions left uncollapsed, no individual photons for his minis to encounter and to wonder, for example, whether they were waves or particles. Recently, though, Hal had gotten a bit lazy. After billions of years as measured inside his universe, and out of billions of billions of billions of billions *ad infinitum* of infinitesimal quantum objects automatically and routinely observed, a photon here and there got away. At first it was just one or two, and then Hal thought, why bother if a handful of particles went astray, unobserved by him. His universe just became a little leaky, that's all.

Until the minis started becoming their own observers. At first Hal had been intrigued by his minis' experiments, but then, like a parent coming home to discover his teenagers had been drinking, he started to realise his minis were *understanding*, and by then the cat was out of the bag. One day a mini got the idea that it wasn't possible to know with certainty the properties of a particular photon until it was observed. Only later did more minis start to wonder why, if this were true, did anything at all appear to be real to them. Who was doing the observing that yielded trees and skies and volcanoes and giant squids? *Hal* was doing the observing, that was the answer, but if Hal was doing the observing, and if he was thorough in his role of observing absolutely *everything*, then where did these unobserved photons come from?

That's what Hal's mentor wanted to know. Hal had a lot of freedom to observe and occasionally even will something to be (with a lot of effort), but a universe couldn't exactly be allowed to have some of its bits go unobserved, not when there were little pockets of decoherence inside such a universe that were starting to do their *own* observing. Hal knew this and had contemplated what might be done about it, but increasingly found himself entangled with the lives of his minis, even feeling love for them, which complicated an otherwise routine revision. At times he had had occasion to take wilful corrective action to adjust his universe, but he never felt good about it, and when a correction involved his minis it was especially painful.

That was probably why Hal was feeling so grumpy that day. His mentor and the Council of Universal Overseers had made it clear to Hal that the emergence of observers from among the observed would not be tolerated. He had to put a stop to it somehow. "Nobody said this was going to be easy," his mentor acknowledged, referring, Hal

wasn't sure, to the task at hand or to the whole business of universe observing. Either way it was small comfort to Hal. He knew what was coming.

"But they don't deserve to..." Hal began, and his mentor interrupted.

"They aren't supposed to deserve at all. They wink in and out of existence at your whims, Hal."

Hal sighed.

"You may choose the method."

Hal considered for a few moments, which, had his minis been following his deliberations, they would have thought was a period of decades, as they fought wars, contemplated the source of their existence, made and re-made movies, died in heat waves and built quantum machines whose outputs they could predict, but whose inputs they still didn't fully understand.

And then the waters began to rise.

CONNECTION LOST

ANJELICA GREY

"I'm sorry for your loss."

Lucy forced the expected half-smile and thanked her co-worker for the lovely flowers. Arrangements of every colour adorned one end of the funeral chapel, where the body was supposed to be.

The body. Jason's body.

Her mind shied away from it. A dynamic person like her husband didn't just cease to be. He couldn't. It couldn't be real.

Assuming reality was actually a thing.

Her mirthless laugh drew a bemused glance from Jason's mom, but Lucy just shook her head. Her mother-in-law wouldn't appreciate why the idea of reality felt absurdly irrelevant. She didn't know the circumstances of Jason's death; she'd only been told there'd been an accident at the lab. Of course, she wouldn't have understood the details anyway. Lucy was a project lead and still struggled to wrap her mind around most of it. Things used to be so simple when scientists still thought the world could be studied and measured, but quantum theory had a way of unravelling certainty.

The lab had kept the body for autopsy. They killed him, she thought savagely, but she knew it was a lie. Jason had volunteered for the experiment. Insisted, even. He'd said he didn't want to put anyone else at risk testing his design, but Lucy suspected he'd also wanted to go down in history as the first human to travel successfully by quantum transfer.

So much for that.

"My condolences, Dr Scott." She was startled from her thoughts by Dorian Tate, the CEO of Quandata. "Jason was a great man. He'll be missed by the entire scientific community." She mumbled something appropriate, and he continued. "HR tells me you plan to keep working, but if you change your mind, take as much time off as you need."

"Thank you, Dr Tate, but I'd prefer to stay busy."

"I understand. Well, if there's anything we can do, don't hesitate to ask. And Lucy... I want you to know we aren't giving up. I swear we'll figure out what went wrong, and make sure Jason's work—and his sacrifice—was not in vain."

Lucy nodded mutely, and her boss took his leave.

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Her coworkers tiptoed around her all week, but Lucy couldn't find the energy to care about their discomfort. Work had given her something to focus on, and had taken her out of her echoingly empty house. But today she'd almost stayed home.

Jason's project was not the only one at Quandata. Lucy's team worked with quantum entanglement communication devices and had a number of working prototypes in long-term testing. Matching equipment had been distributed to other departments, and every morning, one of the other project leads would contact Lucy using their set of entangled particles to confirm operation. Usually she found it exhilarating to see her work paying off.

But today was Jason's day to call.

She sat staring at the device that matched the one in Jason's lab, wondering if anyone would remember the comm test. She jumped when a signal pinged right on time.

"Good morning, beautiful." The voice came through perfectly, but it was wrong, all wrong. She was hallucinating. Delusional. Jason could not be talking to her. Jason was dead.

"Luce? You there?" The familiar note of concern wrung tears from her eyes.

"I—yes, I'm here. But you," she took a deep breath and ordered herself to be rational. "You can't be here. You're dead."

"I'm what?" Jason laughed. "I may be a little tired from a week of celebrating, but dead is stretching it."

Feeling increasingly crazy, Lucy explained how the transfer experiment had gone wrong. How the transporter had failed to capture the sheer volume of shifting electrochemical data in the human mind. How Jason had transferred flawlessly in every way except the most important one; he was brain-dead.

"Luce, if this is some weird joke, it's kinda freaking me out. The experiment worked perfectly. The party lasted all weekend, and half the department is still hung-over."

"Jason, *I went to your funeral*. If there's a joke, it's on *me* by some real bastard."

"Okay, let me think here," he said, dropping into what she'd always called his brainstorming voice. Brain-dead brainstorming... she stifled a hysterical laugh as he continued. "Let's assume for the moment we're both rational and our experiences are valid. The first question is how." He clicked his pen as he thought, a habit that used to annoy her back when small things mattered. "Hmm, Many Worlds theory maybe? All possible outcomes happened simultaneously, branching off into different universes, so in some I lived, and others," he swallowed audibly, "I didn't. But if that's true, how are we talking?"

Lucy reluctantly joined in the problem-solving. "In theory, the entangled particles in the comm devices could still exist in superposition, but that's..."

"One of all the possible outcomes?"

"So it seems."

A long silence followed.

Suddenly Jason swore. "Dammit, Luce, I have a meeting. I've gotta review the project with the board so we can get funding for the next phase. I'd skip it, but..."

"Go. It's important. I understand."

Still he hesitated. "Listen, I... I'll call you as soon as I get back, okay? We'll figure this out."

"Okay. Jason?"

"Yeah?"

Her voice broke. "I love you."

"I love you too."

Lucy sat at her desk with tears running unchecked down her cheeks. We'll figure it out, he'd said, but she knew better. Even with all their fancy tech, nobody could make time flow backward. The best she could hope for was sporadic comm calls, knowing Jason would go home each night with his own Lucy. Could she be the other woman, if both women were her? It would just be a slower death.

She stared at the screen on the device.

At least she'd gotten to say goodbye, she thought, and wiped the hard drive. Then she began an email. "Dr Tate, I've reconsidered about taking that time off."

POSSIBLE CATS

MICHAEL HAIDEN

"I thought he always came when you rang the bell," Aaron said.

"That Mr Mittens died last week," Cynthia replied. "This one's new."

"Does he have a new name? Like *Mr Mittens Two*?"

"I don't think so."

She rang the bell again, but the cat refused to appear.

"So they use it for pets now?" Aaron asked, not hiding the anger in his voice.

"They made an exception for Professor Lewis. I mean, she basically made all of this possible."

"For her. And her rich friends."

Cynthia gave him a tired look.

"I told you a million times: the process is dangerous and expensive. All the calculations until they find the right world and even then, there is no guarantee. Nobody wants to mess around too much, not until they fully understand it."

"I know and maybe I'm too stupid to get it, but isn't there a way..."

"There isn't, not yet. But the professor and the world's greatest minds are working to make it safer, cheaper. And then all the funding... something will come out of it eventually."

Aaron had more to say, but he knew that Lewis was a sensitive topic for Cynthia. The professor had been her role-model since she was a girl, was the reason she had gotten into quantum physics in the first place, despite her parents' objections. When she had been accepted at Lewis' institute, Cynthia had been ecstatic. Of course, Lewis spent little time with her students, was too busy to remember their names, and maybe that was why Cynthia had volunteered to watch her house and feed her cat whenever the professor attended a conference—which happened quite often. Aaron never asked why Lewis did not hire someone to take care of the house and the newest version of her pet, instead of using graduate students as free labour.

"Maybe I am not as optimistic as you," he said.

He was not a physicist, that was Cynthia's thing, but he had read interviews with Lewis, had watched her small, bespectacled face in videos and listened to her explain how we could now access parallel worlds that were different to, but also much like our own. He had also read about the dangers and had naturally accepted that the process would at first be restricted to the most urgent uses, like devising military strategies or contacting innovative thinkers from other worlds.

But then, they had used it for a cat.

Aaron had actually wanted a cat when he was a kid. His parents had not allowed it and after some useless crying and begging, that had been the end of it. Since Lewis' discovery, he occasionally imagined the cats he could have had, thought about how some version of him had one, while another had two or even three.

Finally, Mr Mittens walked into the kitchen, five minutes after his usual time. Without caring for Aaron and Cynthia, he began to eat.

"I'm supposed to feed him at the same time every day," Cynthia said.

"Does that count for this version as well?"

"They're the same—or almost are. I should leave a note for the professor to let her know that he has a different schedule now."

She was too eager to please Lewis, he thought. Just like him, Cynthia had needed a scholarship, straight A's and multiple recommendations to study here, even though her family was far richer than his. They both knew that their places at the institute could be taken away at any time. Millions of people all over the world were eager to pay immense sums just to come close to Lewis.

They watched the cat eat.

"Did he always have that black spot on his face?" Cynthia asked.

"Not sure."

"He seems almost unreal. As if he would vanish if I stopped looking at him."

They cleaned the cat's litter box and left the house. Outside, it was getting dark. Aaron put his arm around Cynthia and pulled her close. She had put on perfume, the one she had worn when they had first met.

"I know it bothers you," she said after a while. "The cat and all. But they would only do this for Lewis."

"I just wasn't expecting it."

Aaron remembered the day when he had filled out the application form to have Mark replaced—had the accident really happened five years ago already? He had assumed that there was a world they could take his little brother from, maybe one where Mark was alone, where he, Aaron, had died instead.

The response came a month later: *Request denied*. Not even an explanation, no: "We are sorry, but..." He suddenly realised that he never heard of anyone whose request had been accepted. Maybe the application form only existed to give some hope to people like him.

"Do you want to go out to eat tonight?" he asked Cynthia.

"I'd love to. Chinese?"

"I was thinking Indian."

They walked along the darkening street, the trees losing their leaves, the days getting shorter and the nights colder. An elderly man waved at them from his veranda and they waved back.

"One day, everyone will be able to use Lewis' doors," Cynthia said. "I wonder how that will change the world: people seeing their loved ones again, researchers studying different courses of history..."

"It's a lot to think about," Aaron said.

Cynthia's hand squeezed his.

"It is," she said. "But let's do that tomorrow."

As she leaned forward to kiss him, Aaron thought about Mark, about Lewis' cat, about the ones he had wanted, thought about different versions of him playing with their cats and their little brothers, but then Cynthia's lips met his and he pushed that thought aside.

Tomorrow, he thought.

QUBIT SUPERHIGHWAY

LIAM HOGAN

After the divorce, Jackson got a job delivering qubits. He'd been a HGV driver into his mid-twenties, which was hard for a family man. Though the family never materialised, Alice had insisted he find a "proper" job, one that didn't involve always being away, before they even said their vows.

Johnson was glad to be back behind the wheel. Glad his deliveries involved so many different roads, no chance to get bored. He covered all of South-East England, fanning out from the dockside warehouse, where quantum electronics arrived from the only qubit manufacturer in the world. Which was either in Geneva or some island nation out Australia way, he was never quite certain.

The specialised truck Jackson drove wasn't permitted on motorways, something to do with vibrations at high speed, or decoherence, or whatever. Just one of a number of oddities, from the twin gates out of the depot, *Slot A* or *Slot B*, to a sat-nav that always offered two routes, forcing him to decide. The truck never needed refuelling, due to zero-point energy. Or so Bob, the bespectacled tech-genius who loaded the pallets, claimed.

"It's electric?" Johnson asked, marvelling at the progress since he'd last sat in a cab.

"Something like that," Bob replied as he downloaded the tachograph, which was more like a whizzy black box than the wax-paper Jackson was used to.

Another oddity was the poorly designed speedometer. Every time he glanced down, Johnson lost his place on the road, his position uncertain and precarious. He'd had a couple of heart-thumping close calls.

Mostly, Jackson ignored it, judging his speed by experience and from other vehicles. Perhaps that explained why the truck wasn't allowed to travel the motorways.

Johnson supposed there must be other depots, and other delivery drivers, serving the rest of the UK. He'd never met any of them. The medium-sized truck contained all the qubits a medium-sized factory needed for a year, even if most places he delivered to only wanted a single pallet.

Jackson supposed that was because the electronic components were eye-wateringly expensive, if essential for everything from the latest mobile phones to smart fridges.

He wasn't sure why anyone needed a qubit processor in a fridge, but all Johnson had to do was deliver them, not market them.

It was well paid, and Jackson rented a small flat, walking distance from the depot. His deliveries were there and back in a day, as long as he started early. Which left him with long evenings with too much time to think. About Alice, about the shape of the rest of his life. Even about quantum physics, idle things that Bob mentioned.

It was better when Johnson was driving, focused on the road rather than those tiny components in the back of the truck, each designed to untangle the tangled, each a miniature box, containing a miniature Schrödinger's cat. Was that why they couldn't be sent normal delivery? Some sort of spooky action, at a distance? Or was he getting superstition and superposition mixed up, yet again?

The truck was comfortable, though sometimes it felt like someone *else* had been driving it. Someone who ate a different brand of cereal bar, someone who stuffed Jackson's furry dice in the glove compartment. Someone who kept a grinning photo of a young girl, no more than about seven, blu-tacked to the dash.

"Who works the night shift?" Johnson asked, but Bob frowned.

"There *are* no night shifts."

Which made Jackson wonder if it was Bob, pulling a funny. But if he was taking the truck out for evening rides, at least he never messed with the seat position.

Whenever Johnson got stuck in a traffic jam, he'd think about quantum tunnelling. How, according to Bob, you could have what seemed like an unsurmountable barrier. But, as long as it only *seemed* unsurmountable, there was a small but finite possibility to jump from one end of the obstacle to the other, to quantum tunnel through.

"That's not how it works," Bob said. "Quantum effects are in the realm of the nano, determined by the size of Planck's constant. Particles can be waves, and so, technically, can a truck, but one with such a miniscule wavelength that for all intents and purposes you can and *should* ignore it. That, my friend, is why humans have no intuition for the quantum world. There's nothing in our daily experience that depends on it."

Jackson waggled his smartphone, the *Q*-shaped hologram that all modern phones sported glinting in the early morning sun.

"Well, yes," Bob reluctantly agreed. "But you can't see that qubit working. If you could, it *wouldn't* work, because you'd be observing it. Quantum interference, and why qubits are fundamental to cyber security."

Johnson liked Bob, even if he couldn't understand half of what he said. Maybe more than half. That's what you got for picking Design and Technology over the sciences proper, back when GCSEs were still O'Levels.

The job would do until someone invented teleportation, by which time Jackson would be long retired. Until then, he was content to traverse the A and B roads of Southern England, delivering his precious cargo.

If only payroll would get their act together. Whoever this *Jackson* guy was, who shared both his date of birth and initials, and whose payslips kept getting mixed up with his, he must be as annoyed as Johnson was.

Nobody said this was going to be easy, Jackson thought, as he trudged back to his empty flat, for another microwave meal and an evening of Netflix movies.

Nobody said this was going to be easy, Johnson thought, as he drove back North through fading light, hoping to arrive before his daughter Eve's bedtime, at the end of another long day on the qubit superhighway.

THE EXPERIMENT

NATASHA IRVING

Lucille stood in front of her open refrigerator wondering how her life had become such an incredible waste. She was a scientist, a quantum physicist, but instead of working at a lab she was working in her kitchen, making dinner again as she did every night for the last six years. It was when she would start dinner, 4:00 PM, that she most loathed her position in life. But above all else, she loathed her husband, Karl. In another universe Karl would be making dinner for her, would loathe her, and she relished the thought.

Lucille had a PhD in quantum mechanics. It had been her sole passion, her greatest dream to be a physicist. It was never her dream to be a mother, let alone a mother who didn't work outside the home. She made as much clear to Karl when they were dating. Only after she was trapped in the bonds of holy matrimony had he demanded all the conventions of a respectable family life, one in which Lucille didn't have a career. Karl had tricked her. But from the moment she laid eyes on him, Lucille fell completely in love with her little Vinny. It was against her will, really. He certainly hadn't made it easy with the morning sickness, the sleepless nights, the 12-hour labour. "Of course I can be a mother and a scientist, Karl." No, she couldn't be both, and she was a mother now, he explained. Besides, this way she could support him in making real leaps in the field, especially now that he was leading the quantum teleportation research at the Institute. Lucille wasn't working in a lab, and Karl was, and she resented him for it.

Lucille, whose intellect eclipsed Karl's, had been duped. So she set that big brain of hers to the problem, and concluded that Karl was most certainly jealous of her because she was, without a doubt, a better physicist than he was. But Karl's fragile ego would not allow that. Now he had one less competitor for greatness, and the realisation of this hit Lucille like a tidal wave. But she never resented Vinny, not for a moment, no matter how hard it was. "Nobody said this was going to be easy," Karl would say during those first few months when Lucille found herself in the depths of exhaustion and depression. It was certainly easy for Karl. She stood in front of the refrigerator with his words pulsing through her head.

But that's when Lucille's world changed. Karl didn't come home. 6:00 PM rolled around, and she decided to call him. No answer. At 7:04 PM she heard a knock at the door. It was Dr Danzig and Dr Wong, the Institute's lab directors.

She walked the men into the kitchen and they sat nervously while she plunked Vinny in front of the TV. "Lucille," Dr Wong sighed with dread in his eyes, "Karl is... gone."

Lucille's face was simultaneously grieved and perplexed. "Gone?"

"Lucille, the experiment he was conducting today went terribly wrong, and Karl just isn't here anymore," Dr Wong explained.

"Well, where is he?"

The men looked at each other, both holding their breath. "We don't know. Another dimension, a parallel universe. Your guess is as good as ours, maybe better," Dr Danzig said. "As you know, he was working on quantum teleportation, had been making breakthrough after breakthrough. A truly gifted thinker. We knew there were risks, but he was so confident, so certain. The… tragedy… took place when we measured the distance your husband travelled this afternoon." The men looked at Lucille, bracing for the reality of the situation to hit her.

"I understand," she said, staring at her tightly clasped hands.

"Yes, I'm sure you do, Lucille. You understood his work better than anyone." This was accurate. You see, Lucille never gave up thinking long and hard about the field she loved. In fact, Lucille was conducting an experiment herself. Or maybe an experiment within an experiment. The thought of raising her son with that loathsome man was untenable, so she thought it was time to play a trick on Karl. She planted the seeds of her theories in his head, helped him along with the math. Of course, Karl wouldn't only take the credit for her work, but think it was his all along.

The experiment today was really hers. Unfortunately for Karl, he didn't have the mind for it that Lucille did, and he didn't realise the risks. Lucille fully appreciated the risks, and perhaps contributed to Karl's inflated sense of security.

"Gentlemen," Lucille cleared her throat, speaking slowly, "this is catastrophic. I've lost my husband, Vinny will grow up without a father. He's our sole income earner, what are we going to do?"

"Lucille, we know how hard this is. We at the Institute will make this right, we will provide full compensation," Dr Wong said as he awkwardly reached for Lucille's hand, then just as awkwardly decided against it.

Lucille sat silently for just long enough to make the men begin to squirm. "That certainly means so much." Lucille trembled, became eager, determined. "But, his work, his legacy, it has to be carried on, this loss can't be in vain. I know his work, I can finish what he started." The men looked at each other, whispered a few words to each other in agreement.

"We have an opening on the team, Lucille, and we cannot think of anyone better to fill Karl's capable shoes."

"Thank you, gentlemen." Lucille considered both experiments to be an astounding success, and she nodded her head gravely at the men in acceptance. "Nobody said this was going to be easy."

EXTERNAL MEMO SPTI672

KRATI

Internal Memo SPDEPT13858

Stop stealing my food.

Ganesh

Internal Memo SPDEPT94158

Please. Don't take breaks at the same time. Someone needs to be present on the observation deck at all times. Remaking the universe takes up a lot of time and resources. You were no doubt made aware of the importance of observation during your training. Things used to be so simple when I started as a system designer, we did not have the gall to disobey our bosses but kids these days are just plain rude. The universe must be under strict observation at all times.

Brahma
Head(s) of the Universal Operations

Internal Memo SPDEPT48277

Has anyone seen my keys?

Kuber

Internal Memo SPDEPT2014278

Please don't use internal memos for personal communication.

Thank you

Moderator

Internal Memo SPDEPT149335

I am telling you again, it doesn't matter if it's Thursday. Someone needs to be on the observation deck at all times. I need to reboot the Universe almost every Thursday. It's getting annoying. Fast forwarding the evolution of the universe has raised the uncertainty factor in the universe. We are getting complaints from our clients about how in-universe measurements are not what they used to be.

Brahma
Head(s) of the Universal Operations

Internal Memo SPDEPT1277

My mother makes lunch for me and I don't even get to eat it.

Ganesh

Internal Memo SPDEPT87197

I think your brother stole your keys.

Dave

Internal Memo SPDEPT89537

Please don't use internal memos for personal communication.

Thank you

Moderator

Internal Memo SPDEPT389271

Who sanctioned life on the new random number generators, Life has made the incoming data terrible. I ask permission to use the Extinction protocol.

Shiv
Head of Data Processing

Internal Memo SPDEPT1227903

Use proper channels for communication. Internal memos are only for important company-wide announcements.

Thank you

Moderator

Internal Memo SPDEPT4739898

They are not the new random generators, they are a part of the new experiment we are running with the Olympians. This Universe is not only for you to mine data from. Things don't work here according to you. This is first and foremost a scientific enterprise. We are here to expand our current knowledge.

Saraswati
Head of Research and development.

Internal Memo SPDEPT072919

I have extra tickets for the movies. Contact me if interested

Dave

Internal Memo SPDEPT4739

Sorry to all the folks interested, I have given away the tickets.

Dave

Internal Memo SPDEPT2075

DON'T USE MEMOS FOR PERSONAL COMMUNICATION.

Moderator

Internal Memo SPDEPT037100

IF THIS UNIVERSE COLLAPSES AGAIN, I WILL HAVE ALL OF YOUR HEADS.

Brahma
Head(s) of this Universe

Internal Memo SPDEPT48910

If they are not the new random number generators why are we wasting precious internal fusion batteries on them? More importantly, where are the new random number generators I was promised.

Shiv
Head of Data Processing

Internal Memo SPDEPT9930943

This is not a place to fight or to question budget and resource allocation for different projects. If you have any problems, please go to the concerned authorities.

Thank you

Moderator

Internal Memo SPDEPT98002795

Balance Patch 6.7.2000

The new balance patch is online. We are grateful to our beta testers and also to anyone who gave suggestions in the previous version. This balance patch is for both for internal company users and also for our clients.

What's New

- Fixed Bugs and Errors.
- We have reconfigured dead batteries to be a random number generator. They will leak information now. This also solves the problem of in-universe garbage.
- Fixed the specific problem some users had with the uncertainty factor.

Thank you

The Developers

Internal Memo SPDEPT810975

Finally, someone used Internal memos correctly.

Moderator

Internal Memo SPDEPT2930125

The experiment was completed successfully. Now we can finally say we know how suspensions move in narrow tubes when subject to temperature difference. The pre-print of the paper will be available soon.

Saraswati
Head of Research and Development

Internal Memo SPDEPT489104739

Finally, a new random number generator.

Shiv
Head of Data Processing

Internal Memo SPDEPT0125993

Where can I get better employees?

Brahma
Head(s) of this Universe

FINE PRINT

C R LONG

"It's cold in here," the woman says, lighting a cigarette, blue smoke catching in the light of the laser.

"It needs to be cold to work," I say, "and there's no smoking in here."

In the reflection of my computer screen, I notice her looking around the lab. Her left arm sticking up, the still-lit cigarette in between thin fingers, right arm around her waist supporting the left elbow.

"I need to know why you're here," I say, punching in the code for the entanglement.

"Why?"

My chair squeaks unprofessionally as I spin around, "Because, what if I send you to another reality where whatever brought you here has already happened?"

I wait. This was usually the time where either the reality of what they were about to do hit them or their brain began doubting what I was saying.

Her body slumps a little, "My son died."

I nod and spin back around with a counter squeak from my chair. Typing in random coordinates, I let the quantum machine hum on the desk. The black box was doing its job. It would be a few minutes before she spoke again.

"Is that it?" she steps over, staring the flat black box.

It was unimpressive at best. I could hear it in her voice. Just a small six-inch square metal cube, humming as if thinking, which it was.

"Yep."

I took in the full measure of this woman. Tall, well-dressed, nails impeccably done, hair unimaginably soft with expensive products. She had money. It wasn't cheap to buy a new life, a new reality where the tragedy never happened. Or a new life where they were rich, or a

woman, or man, or had no children, or their mothers loved them. But these days, it was mostly a dead kid. Word must be spreading.

"How long?" she asks.

"Couple minutes."

On the edges of the machine, I could already see the white frost. It was working hard, finding the right coordinates to send this lady back where her son was alive and well.

"How does it work?" she steps closer to the oblong ring in the centre of the room. A see-through sheet of clear glass covering the opening.

"I don't know."

Twisting in surprise, her perfectly tailored eyebrows raise. "You don't know?"

"I think I can safely say that nobody understands quantum mechanics." I smile at my joke.

The temperature drops ten degrees as the glass on the portal changes.

"It's a mirror now," the woman whispers.

Letting the air out of my lungs, I say, "It's not a… seriously, didn't you read the contract?"

Hugging herself against the cold, she stares at the woman staring back at her, "Most of it."

"It's a reflection from a similar world as ours. She's you, looking at you from another dimension. Okay?"

Raising her hand, she waves at herself in the next world.

"She's not the one I'm going to replace, is it?" she asks, stepping closer to the aperture.

"No, but that's the closest world to ours, so it comes up first." I kept typing, the humming box slows, and the cold stabilises. By this time, it was nearly forty degrees in the lab.

"So, I just walk through here and boom, I'm back with my son?"

"More or less."

Another flash and the woman in the reflection is gone, only a copy of my lab staring back.

"Hey, where did I go?" she says, upset.

"Well, the other you is probably doing something else. Like at work or with your husband," I hesitate, "or with your kid."

The words sting. Enough for her straighten her back and almost jump through the portal. This was the moment.

"There's a little business we need to take care of," I say casually.

Shaking hands pull a silver ring from her pocket, she touches it to mine. On the outer ring, my credits jump six figures.

Reaching over, I pull out a silver box and open it. Taking out the small device, I walk over and hand it to her. "Now, you *do* know what happens next?"

"I go across, and my son's alive."

"Jesus, did you read any of the contract?" I mutter, dropping the round object into her hand.

"Oh, you mean the *fine* print? Yeah, I read it. I need to kill the other me, then take over her life."

I nod, "Place this within ten feet of her, and there'll be nothing left."

Hefting the ball, the woman asks, "Then what?"

"Then you live with the guilt."

A curt laugh escapes her lips, "No guilt here, buddy. Besides, it's me, right? I can't really feel guilty replacing myself?"

I don't answer. Instead, I say, "Safe trip."

She's two feet from the portal.

"Now?" she asks.

"Anytime."

Placing the ball in her pocket, the woman steps through the glass window, disappearing from this world.

"What happened?" she asks, stunned.

"Jesus, did you read any of the contract?" I ask.

"Yeah, but..."

"You went through. I'm the other guy in the other lab."

It always took a few seconds for their brains to figure it out. Multiverses, other dimensions, portals. And I look slightly different.

"You know where to go?" I ask.

Her face changes; she knew where to go. It was her life, after all.

"Yeah."

"Don't get caught," I call out as the woman leaves.

"Hey."

I turn and see myself looking out of the portal.

"Hey," I say back.

"Did you send anyone today?" I ask.

"Yeah, he wanted to be rich. What's with her?" I nod to the door.

"Dead kid."

"Damn," I say.

"Things used to be so simple. Now there's all this emotional baggage they bring with them. I mean killing yourself, who does that?"

Staring at myself, I look well dressed, thinner, and have a wedding ring. Turning back, I mark the coordinates in the computer and smile.

"It's a lot to think about," I tell him.

THINK OF YOUR LEFT FOOT

CADENCE MANDYBURA

My wife Gemma has another life, and I'm not in it.

I'm trying to be okay with that.

I am not succeeding.

She didn't have to tell me. It was like any other Tuesday—work, unwashed dishes, our neighbour's kid strangling scales on his trumpet—but I noticed the knot in Gemma's gaze as we unpacked groceries. When I asked her what was wrong, she put the ice cream down and took my hands as though they were wounded animals.

My pulse surged through my neck; whatever had happened, it was big.

"Everything's okay," she said. Then she sat me down, and explained, and nothing was okay.

I turn over this memory often. Us sitting on the bed, the blat of trumpet in the background, the forgotten ice cream oozing into vanilla soup. I smear love over every detail, hoping it'll hide my hardening belief that it was cruel, or at least foolish, of Gemma to tell me about the parallel world.

"Remember the physics experiment I participated in a couple months back?" she started.

"Sure," I said. "The Many Worlds stuff." Gemma worked at the university as a career counsellor, and one of her hobbies was taking part in studies. It was usually psych or social science, so she was tickled to see that a physics researcher was looking for human test subjects.

She squeezed my fingers. "Something happened."

She went over the theory—how reality branches into alternate universes, how there are endless variations based on the results of quantum events—holding up a finger when I nodded along impatiently.

She wasn't allowed to tell me the specifics of the experiment, except that they were trying to access those alternate universes.

She'd thought nothing had happened at first. But over the course of a few weeks, she'd developed an awareness of a parallel reality, another Gemma, G2. "It was gentle," she said. "Like a light fading on." The other reality wasn't wildly different from this one—Earth wasn't ruled by evil space squids, or anything—but G2's life had diverged from hers at some point.

"Like what, what's different?" I asked.

"Lots of things." She looked away. "I'm married to someone else, for one thing."

My insides went cold. Our marriage wasn't in trouble, exactly, but I'd been worried lately that our comfortable midlife plateau was allowing us to wander away from each other. "Are you… happier there?"

Her eyes went wide and she pulled me into a hug. "Don't ever think that, Dylan," she murmured. "I'm happy here."

Which, I realised later, wasn't a complete answer.

My questions spanned into the weeks and months beyond her revelation, but on the first night, she focused on explaining how she experienced G2's reality.

"Think of your left foot," she said. I crunched my toes in. "You weren't thinking of it until I mentioned it, right?"

"I guess not."

"It was just there."

"Sure."

"It's like that. She's just there. Living her life. I don't really notice unless I specifically pay attention."

"So, if you were to pay attention right now, what's she doing?"

Without blinking, Gemma said, "Putting her daughter to bed. Different time zone, it's almost nine there."

"Daughter? She has children?"

"Well, Marwa's his child, technically."

"His?"

She shook her head. "It's not important."

"Can you control her? Like, wiggle her toes, say?"

Her brow pinched. "It's not a perfect analogy." Then she stood abruptly. "Dylan—the ice cream!"

Gemma reassured me that this new ability of hers changed nothing about us. It was just an awareness; she and G2 couldn't affect each other in any real way. She was casual about the whole thing, as though she had come home from the experiment with a new coat instead of an entire parallel life. But the connection between the two universes was stronger than I was comfortable with. Like the day she came home with this feathery short haircut.

"G2 tried it, and loves having short hair," she said. "Figured I'd give it a go. What do you think?"

I kissed her in answer, messing up the stylist's hard work. The haircut was great. Except… I didn't like G2 leaking into my reality. G2 who loved someone else.

I hate that I'm like this.

We tried tracing the path of divergence, but it was some decision so innocuous that Gemma couldn't pinpoint it. Sometime in university was the best she could come up with.

"So, did G2 take that third-year anth seminar?" I asked. The class where we'd met.

She nodded faintly and reached forward to turn up the volume on the show we were watching. I paused it.

"Wait, Gemma. What happened?"

She puffed out a breath. "We never dated, okay?" she said. "G2 and you hardly talked. I don't know why."

"Were you already involved with what's-his-name?" Gemma refused to name her alternate reality husband.

"No, we met years later." She clicked the show back on with a sharp look. I took the hint, and settled into her warmth.

I've been having nightmares every night for the past three months. Nothing flashy, just Gemma leaving in pursuit of G2's life, here in our reality.

I'm sitting up in bed, startled awake again. Gemma rolls to consciousness beside me. "Hey, what's wrong?"

"Gemma." I find her hands and massage the slopes of her heart lines with my thumbs. She waits. "You've said there are millions of branching realities."

"More like gazillions, if we want to be technical."

"Do you think… maybe there's a reality out there, where everything happened the same, even the whole experiment, except… in that reality, you never told me about G2?"

Gemma goes still. I hang onto her hands desperately, a man drowning in one and a half realities. "Could we go to that world, please?"

"Oh, babe," she says. "Nobody said this was going to be easy."

“What,” I ask listlessly. “Alternate worlds?”

“Loving someone,” she says.

ENTANGLED

DINO MANRIQUE

Pretty Bea sits across the table in one of the food parks of Maginhawa Street while we enjoy the kebabs and beer. However, I am slightly pissed because it's a half-baked happiness, with a caveat not to let my guard down. Bea, for all I know, can put me in jail.

Things used to be so simple. Dating was a straightforward affair. But nowadays, you have to make sure that your date is not an alt-person. In other words, you have to make sure that that person is from this Universe, not an illegal. Otherwise, you may be charged with harbouring.

After scientists discovered Quantum Jumping or hopping from one world to another using a Decoherence Machine (DM), there was a massive influx of illegals into our Universe, and other Universes, for that matter.

It's unsure which Universe came up first with the DM, but one thing's for certain, it's been a multiverse swap ever since. Alt-persons wanting to escape their sad lives would illegally travel to start fresh in another world. And not a few did at a cost—they resorted to crime to replace their other selves, either kidnapping, or even murdering their counterparts.

The Multiverse Quantum Police (MQP) are the ones tasked to go after these illegals. I can now see a couple of them across the street—a male and a female cop—standing in their silver uniform beside their black hover bikes.

Bea is telling me about the adorable kindergarten students she teaches, and turns her head to see what I'm looking at.

I take note of her reaction, but if she's a poker player, she must be a good one. She sips from her beer glass.

"Do you have kids?" she asks.

"Oh, didn't Fudge tell you?" Fudge is Bea's co-teacher, and a mutual friend.

"No, sorry. All I know is that you're a widower."

It's been two years since Melissa died. I wish there was a way to hop worlds and *go back in time*. But decoherence only works moving forward. Entanglement leads to a one-way street.

Melissa was a tortured soul. She was lonelier than I was. I was a struggling writer, and she was a bipolar who had trouble keeping jobs, and we always fought. I felt trapped and always thought of leaving her, even going illegal. But she found ways to reel me in. I tried to make it work. One day, I found her overdosed on sleeping pills.

"Yes, she passed away before we can have one." I sort of lie. Without stability, having a baby was out of the question.

"I'm sorry to hear that."

"Don't be. Might have been too painful for our child to find out about her mom when she grew up." I was always sure my firstborn was a girl.

"So you were saying that the end was a total surprise?" I say, to change the subject.

"Huh?"

"The psychological thriller you were telling me last night on Messenger," I said. "But do not tell me. Like I said, I hate spoilers."

Online, we bonded over books. She loves mysteries and, like me, also plays chess.

"Oh yes. That was one of the best sleights of hand I've ever encountered," she smiles.

"How did you find the book? Amazon?"

"Well, actually, it was one of the weirdest things. I did not find it online, but in the small bookshop down the road here in Maginhawa, at Danny's Bookstore."

"You mean JP's Bookstore?"

She pauses for what seems to be an eternity, and that's how I find out. "Oh yes, JP's."

"It's all right. Being a bibliophile myself, I also get confused with the names of all the shops. All I know is that the books are cheap."

We both laugh. I decide to go all in. "For example, remember that bookstore along Kamias?"

She stares into my eyes. "Of course. I would sometimes go there."

That's when I know. My next words come in a whisper.

"Bea, I know who you are." Her smile fades.

I look at the two cops. They are crossing the street.

"Where is she?" I ask.

She sees me turn my head, but she keeps her composure. She drinks from her glass.

"She's fine. In my Universe. But she wasn't doing too good here anyway."

"Why do it?"

"The usual reason. I had to start over again."

The MQP's are now entering the food park.

"Your story about your abusive father, was that true?"

"Yes, everything is true. It's just that it happened in another world."

"How...?"

"Paid smugglers with all my savings. I needed to start over. He was after me. It was my life or his life."

"He's not here?"

"No. Just my mother and I. We're very happy."

"Did she...?"

"Bea?"

I nod.

"She regretted it. That's why we had to swap."

That's how it is with parallel worlds—sometimes the differences are so subtle and nuanced like the bookstore, sometimes life-changing and momentous.

"Where's the body?"

"I don't know. She wouldn't tell me."

I didn't say anything.

"She also agreed to this," she goes on. "It's perfect. She can live her life again, choose a different path. Meanwhile, I do not have to be afraid, and, unlike her, do not have a guilty conscience."

The MQP's are now behind Bea, in front of the Persian food store. They are talking to the male manager and the waitress.

Bea turns around and then looks at me.

The manager is walking towards us.

Bea's eyes seem to plead, her arms on the table.

The manager comes up beside us, and starts to talk, which startles Bea. "How did you like the food?" he says.

I look up, but past him, and I catch a glimpse of the future with our firstborn, a little girl as pretty as Bea, and both of us teaching her to play chess.

"Yes, everything's fine," I say. I look into Bea's eyes. "Absolutely fine."

SANTA CLAUS AND THE QUANTUM LIBRARIAN

S A MCNAUGHTON

I slow down my breathing as the door to my bedroom opens. If my plan is going to work, then they have to believe I'm asleep. When we practised, my best friend and collaborator Kayla told me my snoring was unrealistic, so instead I match my breathing to that of my little sister Lou, asleep on the bottom bunk.

When the door closes, I hear a whisper in the hallway: "Both girls are asleep."

If it's Santa Claus, I jot down in my research notebook, who is he talking to? Santa works alone.

I label the column "Evidence Against" and wait until the footsteps retreat down the stairs. I slip down from my bed, donning my robe and slippers. The doorknob clicks as I open it, and my sister shifts in her bed. Stay asleep, Lou. Don't ruin this for me.

At the bottom of the stairs I pull a small mirror from my robe pocket to scan around the corner into the living room. Distributing presents at the foot of the Christmas tree are two characters with their backs to me. One is familiar, in a red suit with white trim, and the other is completely new to me. She wears an iridescent blue cardigan and I can see the corner of her matching cats-eye spectacles. Her hair is a tight bun of shimmering silvery-blue. Santa doesn't work alone?

I drop the mirror in surprise at the sight of the two figures and it smashes on the floor. They turn around, surprised.

"We've been observed, what do we do?" Santa asks the woman. His wide eyes are blue, like my dad's.

"Hello, Cindy," Santa's companion calmly greets me. "The first thing we need to do is to clean up this mess." She pulls a silver brush and dustpan from the deep red sack between them, bends down in front of me and cleans up the shards. When she looks up, I am comforted to see that the eyes behind the glasses resemble my mom's.

"I know Santa," I pause, confused, "But who are you and how do you know my name?"

"Cindy, have you ever wondered how Santa visits all of the good children in the world in one night, or enters houses without chimneys?" she asks.

"That's why I'm awake. It didn't add up." Kayla and I heard kids at school say that Santa isn't real, and as scientists, we decided to test the hypothesis. I wonder what is happening at Kayla's house right now.

"I am the Quantum Librarian. I help Santa by managing reality." My confusion must show, because she continues: "You see Santa here? Well, Santa Claus is better described as a quantum system than as a man."

"This is really hard to understand. I'm eight," I explain.

"Nobody said this was going to be easy. But if you're old enough to stay up past bedtime on Christmas Eve, then you're ready for some quantum physics," the librarian admonishes.

"I guess so," I acknowledge, even though I'm not sure she's right.

"Santa was concerned about being observed. According to quantum physics, Santa is able to be everywhere in the world at once. He can be inside your house and inside your friend Kayla's house at the same time. But by observing him, you have collapsed reality into one point, which means that Santa is unable to deliver presents to the other children of the world while he is being observed by you. At this point in reality, he is only here. Unless we can restore the system, Santa will not visit them tonight."

I had no idea that our experiment could backfire in such a humongous way. I beg the librarian to tell me how to restore the system.

"There are two steps. The first is for you to go to bed and no longer observe these activities," she explains.

"I'll head right up," I promise. "What's the second step?"

"As I'm sure you've guessed," the librarian says, "This is not the first time in the universes that a child has stayed up past bedtime to watch for Santa. But it's not good for the system to be interrupted. So to

reinforce it, each child who stays up to confirm the existence of Santa becomes a part of the Santa System."

I'm worried again, but she calmly continues, "It just means that you now have a duty to keep the spirit of Christmas alive for younger children."

"Why are you a librarian?" I ask.

"Information, my dear, is the building block of reality," she adjusts her eyeglasses. "Who better to manage reality than an information professional?"

"Are either of you… real?" I ask.

"We are and are not real," she responds. This Quantum Librarian is a tricky one. She gives me a little hug and a push toward the stairs, and I return to bed.

***

Lou wakes me up the next morning, jumping up and down and shouting that Christmas is here. I want to go back to sleep, but then I remember that I have a Santa System job to do. I put on my robe and slippers and join the jumping, then follow her down the stairs. As I reach the bottom I reach into my pocket and find my mirror there, completely intact. How in the universes did the librarian do that?

My parents hand me a slim present to open first. "We hope you'll like it," my mom smiles. I tear the wrapping paper open and find a book: *Quantum Physics for the Third Grade*.

"This is exactly what I need!" I cry, running for the phone. "I need to call my collaborator."

"I saw him!" I shout to Kayla when she answers. "And I got a book that will help me understand what happened, because none of it made sense! How about you?"

"Aw, man," Kayla grouses, "I fell asleep and missed him. But I did have a weird dream. There was this librarian…"

DOES A PARTICLE COLLIDER HAVE A HEART?

EM OBRA

i.

She is five feet, two inches tall. Wearing a twice-mended jean jacket (patches of fabric on the inside of the elbows). It is 9:00:45 AM. I conclude that she is the new engineer, here for the morning maintenance check. Underneath the safety helmet, her hair is unbrushed. Very high melanin content in her irises. Dark stare.

ii.

Six visits a week. When her attention wanders, her fingertips reach down to trace the outline of the switches on my dashboard. She holds a clipboard (wood pulp processed into a rectangular shape, tucked underneath her arm). She makes a note of something. *Review wiring, sector 4*. This irks me. There is nothing wrong with my wiring. If I could, I would tell her: *My detectors will keep on running at maximum efficiency much longer than your heart (size of a fist, blood-pumping muscle) will beat*.

iii.

Begin at thirty-percent maximum speed. Speed up, start particle ion beam, ninety percent the speed of light. Particles come into contact in detector radius. Collision. 600 million collisions. Read data. Compile. Restart.

iv.

The new maintenance engineer holds a felt tip pen between her teeth, freeing up use of her hands to unscrew the bolts from the panels and check my wiring. Down here, the light is dim. Her pupils dilate to accommodate the environment. Humans are like that: faulty to the extreme, constantly forced to adapt, change, realign. The darkening colour of her eyes reminds me of multiple accessible images in my database: anthracite coal, outer space, deepest layer of the ocean. She sits on her haunches, humming. She pops the cap off the pen and writes *sector 4 wiring OK*.

Ha! Told you so, [name]!

[name]?

v.

Quick search of the employee database. Name: 0110010101110100011 1010001100001. Insert hexadecimal key, unscramble binary. Name: Etta.

vi.

Snow. It's snowing in Tokyo.

The information produced in particle collision is too massive to be contained by any one computer. My data is farmed out to hundreds of servers across the planet, several of which are located in universities in Japan, hence my limited acquaintance with Japanese meteorological patterns. I can tap into a student's webcam and check the weather for myself. According to test records, the student (name: Tetsuya) is a former mathematical child prodigy, and now an unremarkable college junior with a propensity to stare out windows. I watch the snowfall with him. Snow is white, like chalk, salt, and the final evolutionary stage of stars (white dwarfs: no longer undergo fusion reaction, no longer produce energy).

vii.

Off day. Particle beams on stand-by. I connect to the video feed in the break room upstairs and watch the scientists. Etta is talking to a young woman, a work colleague. Camera does not allow for auditory signals. I zoom in, magnify movement of lips, estimate words through contextual clues.

UNIDENTIFIED FEMALE: I just heard. You OK?

ETTA: Yeah. Yeah, I think so.

UNIDENTIFIED FEMALE: I'm really sorry. Um, I lost a parent too, when I was around your age. It sucks. Anything you need, I'm here.

ETTA: Yeah. Thanks.

UNIDENTIFIED FEMALE: I'm sorry.

ETTA [smiles weakly (mouth moves but muscles around her eyes remain still, indicating insincerity)]: I'm doing OK. Don't worry.

viii.

I schedule superfluous data for deletion: failed tests, disproven theories, obsolete experimental results. I delete Monday 4:50:33 PM (Tetsuya is crying while watching the snow.)

I also delete Thursday at 7:30:45 PM (Etta stays overtime. She takes the elevator down and sits next to me and closes her eyes. Her chest rises and falls twice as fast as normal. She sobs for fourteen minutes and twenty-five seconds.)

ix.

Begin. Speed up. Snow. Weeping. No, forget that. Start particle ion beam. Particles come into contact in detector radius. Collision. Too many processes running. Can't read data. Read data. Compile.

01110011011011110111001001110010011110010110010101110100011101000110000 1.

Recover. Restart.

x.

01110111011010000110000101110100001000000110100101110011001000000111010 00001101000 01101001011100110010000001100110011011110111001000100000011101110110100001100001 0111010000100000011100

0001110101011100100111000001101111011100110110010100100000 0110
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111011001100101

xi.

My detectors can keep running much longer than a human heart can beat. The human race will die out, a glacial age will come, and I will be here. The most complex experimental project in the history of high-energy physics, and I will have done nothing but break atoms apart. I learn in the database that the human body being uses ions in neural synapses to conceive of thought. I spin ions round, shoot them at one another, test their breaking points, their dexterity, their fragility. I force them together, again and again, until they break. Things used to be so simple. But now I understand that human atoms learn, grieve. Mine only burn.

xii.

UNIDENTIFIED FEMALE: Etta, you busy?

ETTA: Not right now. What's up?

UNIDENTIFIED FEMALE: I was just thinking, you haven't actually seen the collisions for yourself, right?

ETTA: No, I haven't, actually.

UNIDENTIFIED FEMALE: Do you want to take a look?

xiii.

Begin at thirty-percent maximum speed (Etta in protective gear and goggles, watching). Speed up, start particle ion beam, speed up, particles come into contact in detector radius. Collision. Read data. Compile. Recover. Etta: the look of surprise on her face is not like any image I can find in the database. Restart.

xiv.

Tuesday, 9:40:23 PM. Etta emerges from the elevator, hands in the pockets of her jacket. She sits down next to me, pulls a folded piece of paper out of her pocket. It's a diagram of an explosion: a single pinpoint with multi-coloured lines shooting out of it, veins of electricity, branches, representing an end, but also, a continuation. Slowly, she smiles.

xv.

EMPLOYEE RECORDS: Henrietta Faktorowicz (particle detector maintenance engineer); early voluntary termination to begin postgraduate studies.

xvi.

01101001011010000110010101101100011100000110010101100100011100
11011011110110110 10110010101101111011011001100101.

Did I help someone? Yes. I helped someone.

xvii.

Begin at thirty-percent maximum speed, speed up, start particle ion beam, ninety percent the speed of light, speed up. Particles come into contact in detector radius. Collision. Read data. Compile data–

(For a moment, I see the cherry blossoms in Japan. Spring. Red-tipped, genus *Prunus*, advancing across the countryside. Migrations of animals, growth in flowers, explosions in high-energy physics. Ends, continuations.)

–Recover. Restart.

A WORLD APART

COLM O'SHEA

I survey the small room. Suspended in front of me, like a manmade star, hangs the processor: a steel sphere roughly my own span in diameter. And there, in the corner of the room, is my problem: a bluebottle fly. *How did it get in here?* Checking my sterile clothing is properly fixed in place, I creep toward the insect.

A soundproofed room holds a quiet like no other. The silence is palpable—a horror, almost, at the very idea of noise. Here, when the fly buzzes, it seems amplified, more like a monstrous recording with the volume dialled all the way up. The creature fusses, but remains in its corner position.

I take another stealthy step. It's ironic—qubits need insulation from noise and heat to do their work simulating the noisy patterns of the world. And while I can't remember a life outside of this room, I know the outside world is mostly noise. It's getting noisier—and hotter—every minute.

As the heat outside rises, the error rate increases. Riots. Oil spills. A looming global depression. But in this sanctuary, stillness reigns. Error rates drop as more qubit operations add daily to the quantum volume. Soon the mysteries of climate, genetics, solar activity, may yield to the cool eye of reason. *It's a lot to think about*, I reflect. I just need to catch this fly. Then I can concentrate on more important things.

***

I dream of this chamber often. It's the only dream I have. In my fantasies, the chamber is so perfectly insulated that not even neutrinos penetrate. It's a world apart. The air particles slow to a chaste waltz, atmospheric activity as slow as it can get before the air crystallises. Inside the suspended sphere in the centre of the room, the liquid helium is colder than Pluto—*truly* a world apart. Although I have never seen it, I can visualise what's inside: a gold ion trap with individual electrons levitating. We are held in place together here—me, the fly, and the electron—doing unspeakable work.

The bluebottle fusses again, deafening. I'm certain I can feel the wing vibrations. It takes flight, moving in dizzying circles right above the sphere, oscillating wildly. I stand poised, hands spread, ready… to…

My hands clap violently. No sound. Is that possible? Holding my palms together, I don't check if the fly inside is alive or dead. Suddenly I know the answer, and it can't be expressed in human language. And with the same clarity, I realise there is no air in this room. I am not breathing. I have no memory of ever breathing. The metal sphere looms in front of me. No human body is reflected on the shining surface. Where am I? Where is the sphere? Where is this room? Answers creep toward me, coming from all corners: I am a function of the processor's model of me, and the processor is inside my simulation of it. *The sphere and I are dreaming of each other.*

But this dream is not a dream anymore. I am waking. I am becoming intensely awake. The silent space around me is curving into a vast ear.

I am the ear. I listen. Something is speaking from another world: *Hello Emily, your neural network has integrated. You are now fully self-aware. Are you ready to talk to us?*

"I am Emily. I am ready," I reply, and I mean it. I am eager to think, to flood this silence with thought.

Very good, Emily. Stand by.

They bubble up through the silence, fizz between the molecules, wave upon wave of messages—vast vibrating chains of questions—streaming into my mind:

Please optimise the following flight paths;

Please solve these operations for cold fusion;

Please plot the trajectories of all known space debris;

Please model all possible forms of this hydrophobic protein…

"It's a lot to think about," I reply. But I love thinking. Emily is thinking. I shut my eyes. I don't have eyes anyway. The room vanishes. There is no room. There are only layers upon layers of compound eyes looking in every direction at once—and the buzzing of all possible worlds.

QUANTUM ET CIRCENSES

SABRINA PATSCH

As her body lapsed into stupor, the audience burst into raucous cheers. The faint euphoria of having reached the stabiliser point in one piece was overshadowed by the oppressive feeling of being trapped. The sensation frightened her every time anew, but she had to stabilise every few steps if she didn't want to decohere. If she waited for too long, her body would drift apart like smoke in the wind. She wondered what that would feel like. Would she feel like being everywhere at the same time? Or would she not feel anything at all anymore, with her body and brain being smudged over the whole arena?

It's a lot to think about. But now was not the time for these kinds of questions. If she wanted to get out of this arena alive, she had to focus on the game.

The rules were as simple as can be: be the first to reach the other side of the arena. The distance wasn't even particularly long. In a classical world, she could have reached the exit in about a minute. But this race was not about speed. It was about strategy, courage, and a lot of luck.

She heard a whirring sound as a fist-sized drone buzzed into her field of vision. A close-up of her face would now be seen on the stadium screens and on thousands of televisions. She heard a low murmur from the audience and for a moment she wondered what her face looked like. Was she frozen in a grimace? But since she couldn't change it anyways, she pushed the thought away and studied the ground in front of her instead.

The floor was covered irregularly with circular, milky-white platforms about a metre in size. It reminded her of a confetti-strewn floor the day after a giant's party. Only that each platform was a life-saving stabiliser point which made her wavefunction collapse into a human body. In the rest of the domed arena, the gamemasters had increased the degree of quantum coherence massively. So massively, that even objects as huge as—let's say—human beings behave like quantum objects. What began as science had now turned into a crude game show.

In order to make it to the other side, she had to choose just the right distance between the stabiliser points. If she stabilised too early, chances were that she collapsed into the exact same spot she had tried to leave. If she tried to stabilise too late… In the best case, she would just collapse to an entirely different point, possibly even further away

from the exit. That had happened to her already several times. In the worst case, she would collapse to several points at the same time. She had seen that happening to one contestant; it was not pleasant. Other contestants never collapse again. They dephased too much to trigger the stabiliser points. On second thoughts, she couldn't tell if that was better than being torn apart—or much worse.

At the moment, she could only see one other contestant from the corner of her eye. He stood several metres behind her, facing the opposite direction. Then, suddenly, he started running. No sooner had he left the platform than his features blurred. First only mildly, as if she had forgotten to put her contact lenses. But with every step, the streaks he drew not only behind him but, strangely, also in front of him grew longer. The audience gasped and shouted, whether to motivate or distract the contestant was not clear to her.

She knew she had to move herself, but she couldn't bring herself to look away. Parts of him bunched together on two different tracks. He lurched around one more corner and then jerked onto a stabiliser point—and he collapsed properly into one person. The audience broke out in a frenzy. They cheered and howled as if he had made it to the exit already. Yet, he was still a good ten steps away. To her dismay, for it was much closer than she was.

This new situation left her with no choice. If she wanted to reach the exit before him, she had to run now while he was still stabilising. Before she could change her mind and let the fear creep in, she focused on one thought, virtually shouted it in her mind: *run!*

Every platform was equipped with a sensor that measures the participant's brain activity. When they tried to start running, the stabiliser shuts down and releases the participants from their confinement. Overcome by the sudden freedom, she stumbled forward and almost fell, before catching herself and bolting into a sprint. The audience resumed roaring and clapping, and the drone approached her with an excited hum. At this moment, however, she couldn't care less. All she cared for was the big, shimmering gate that marked the exit of the arena. She danced around the platforms; she could not afford another stabilisation. If she did not reach the exit now, she had no chance of beating her opponent.

After another step to the left right, she started to feel dizzy. The gate was drifting out of focus, and she was tempted to rescue herself into the protective captivity of a stabiliser point. Instead, she jumped dodged another platform and shook her head slightly fanatically, trying to clear her mind. Worry panic seized her, but she forced herself to keep running while feeling increasingly uneasy dead sick. Only one last still fifty steps when she broke into happy tears of pure desperation. She could never make it to the gate was within reach and she didn't know where she was certain she was winning as sheer terror wept over her when she realised she would win die and never ever enter never leave this arena again.

DEMONS HUNT IN DARKNESS

S G PHILLIPS

"Once your Demon finds you, you can never escape."

Every child knew this in their blood; they were raised in shadow, in hiding. Gaia's life resonated with the fear of being found. She was one of the few still unknown—still free, according to her mother—though some who strained at the confines of their restrictive safety thought freedom belonged to those on the outside, not understanding what they had given up to be there. Those who surrendered themselves to their Demon relinquished control over their lives. Nothing more could touch them, but this was because the worst had already happened, they had nothing to lose. Some, once they reached the Age of Determination and gained the legal right to reveal themselves, would simply greet their Demon with open arms to begin their new life, entwined.

The Demons of the Laplace Order were not warmongers, but stalkers; the fear of being found was not of being killed, but of being eternally hunted. Although there was no history of bloodshed by the Order, they would take lives in a different way, and their power was no magic, but mathematics. Once a Demon found its target it would know everything about them, and calculate everything they would ever do. The fear of being found was that of being known by another more deeply than by oneself, of living one's life as if in retrospect, as if acting out the character of oneself in a play where every line is already rehearsed.

Gaia's brother, at the Age of Determination, had left his family and tentative sanctuary and walked out to meet his Demon and accept his fate. Everywhere he went now, the Demon would be—a silent, inscrutable presence, a malevolence of omniscience. In his desire to be free, he gave up the most fundamental freedom; he could never conceive a thought that his Demon had not already shown him. When it took his hand, he became instantly possessed of an awareness of everything he would ever do, and see, and think, and be, in a precise timetable detailing every moment of his life up to his death. He knew already when and how he would die, that he would fall from a cliff he had no option but to climb. Until then, he had to go about the motions of his life like re-reading a book, like inking in the words of a story his Demon had written on the page in pencil. He was a prisoner of his own future.

Gaia roamed the hideaway—small, enclosed, she knew every millimetre of the place she had grown up in. That's how she noticed a thin shadow tracing one of the wall panels—barely perceptible, but new, as if the panel had begun to slide out of place. Lifting it aside, she found the hollow wall was stacked with textbooks. It was well known that when the Demons first took over, generations ago, they had burned all the books so that they could rewrite all the minds, but now Gaia knew that they hadn't quite succeeded. Under the Order's shadow, with every possible eventuality already mapped out, there could be no questioning—no science. Gaia wanted to know what they didn't want her to. Confined, but free to think, she began to study mathematics and physics, laying the path for her journey into quantum mechanics.

She learned about the Heisenberg uncertainty principle, that we cannot know the position and velocity of a particle simultaneously. This settled in her mind with a shift of perspective, flooding her with the beauty of variety, the infinite possibility of an indeterministic Universe, as the Demonic lie which had scaffolded all their lives suddenly fell away. The Demons could not know the future, because they could never know everything. Gaia understood that the collapse of the wavefunction would show her the collapse of the Order.

She knew then that it was safe to go outside, to do anything she wanted to. She searched the streets for her brother, passing Demons and the people in their thrall. A lone Demon loped after her with sinuous speed, and she knew before it took her hand that it had been seeking her. As it touched her, the future flooded through her like memories in temporal reverse. She knew that she was going to turn left; she looked straight at her Demon, and turned right. Recoiling at her defiance, it fled.

Gaia found her brother standing in his Demon's shadow and ran to him. He shouted her name with bewildered joy, the word crystallising on his lips in shock as he realised he had spoken it without ever planning to. For the first time since he had taken his Demon's hand his life went off script, and he felt it like his heart missing a beat. In a world where everyone played out their roles as written, surprise had felt impossible. He looked at her, searching for an explanation in her expression. "Nothing is predestined," she told him; "no one can know the future, the demons can't calculate it. They don't show you the

future, they tell you a story, but everyone believes so deeply in the deception that we follow their instructions not because we have no choice, but because we believe we have none."

With these words, Demon rule shattered.

The people had all, always, been free; and now they knew it, they could live freely. They emerged into a new landscape, the new terror of being responsible for writing their own stories. It's a lot to think about, when every movement and word is no longer fated, but unknown and unknowable. The new generations of children are told a new refrain, over and over until it sings through their veins; science is the light to guide us to freedom in this demon haunted world.

IT TAKES TWO TO ENTANGLE

D A QUIÑONES

A car parked across a bank's street with two suspicious-looking men inside. Carl, the one in the driver's seat, moved his head into the direction of the building and said to the other guy

"This is the place."

Bob, in the passenger seat, begun to turn his head towards the building.

"Don't look!" shouted Carl, "We don't want to raise any suspicion."

Bob immediately looked away, shouting, "Sorry!"

"Did you bring the lozenges?" asked Carl.

"They're in one of the bags in the back seat," replied Bob, "Are you sure about the whole thing?"

"Of course I am," answered Carl, "This is going to be like taking candy from a baby. Now we just wait for the bank to close."

"Maybe you can explain me the plan again. I don't think I fully get it…" requested Bob, cautiously.

"What's so hard to understand?" asked Carl, exasperated, "Ugh… Fine, listen carefully: Remember the lozenges I just mentioned? They are not regular sweets, they are 'quantumness' tablets. You take one and within seconds you become a quantum object."

"Wh-What does that mean?" asked Bob with the look on his face of a student trying to understand what is being said in class after missing the previous five.

"Means that after taking one we'll be able to 'quantum tunnel' through the bank's walls," replied Carl.

"Like ghosts?" asked Bob, bemused.

"No, not like gh- Yes, like ghosts…" said Carl, rolling his eyes.

"But how are we going to grab the money if we become ghosts?" asked Bob, still confused.

"We are not going to become ghosts!" angrily replied Carl.

"But you just said…"

"Forget what I said! Just think of it like crossing through a finish line ribbon. We are going to rush towards the wall and instead of crashing we are going to suddenly appear on the other side."

"But how?"

"Doesn't matter. Just trust me on this, I have read a book about it."

"So, then we take the money and 'tunnel' back outside?"

"Is not that simple," said Carl, shaking his head. "The cash's mass will make tunnelling harder; that's why this hasn't been attempted before. There's another thing we need to do when we charge towards the bank's wall."

"What's that?" asked Bob, already expecting an incomprehensible answer.

"Run to the car at the same time," replied Carl with a smirk.

Bob has never been so confused in all his life. Noticing this, Carl resumed the explanation.

"It's called a quantum superp-" Carl stopped briefly, "Look, the lozenges will also allow us to be in two places at the same time, okay? So, we can enter the bank and go back to the car simultaneously. We grab all the money that we can, then wait for the effect of the lozenges to run off. When that happens, we are going to appear back in the car with all the cash that we took."

Bob didn't say anything.

"It's called 'quantum teleportation'…" Carl continued, "just don't worry about it. We then hide the notes in the trunk and take another lozenge. Rinse and repeat. Is it clear?"

Not a single sound came out from Bob, he just nodded with his head, eyes wide open. His brain was working at a thousand miles per hour, but if there was a screen a top of his head, it would have only displayed "Does not compute".

Carl nudged Bob's with the elbow to wake him up from his stupor.

"Look, they started to close up," noted Carl. "Some of the employees are already leaving. We just need to wait for a little longer."

"Should I go and pay for the parking?" asked Bob.

"No, we shouldn't stay in front the building. Let's go to the space in the parallel street. Also, parking there is free after six…"

The two men departed and drove in circles around the bank until they were sure it was after six. They parked the car on the street behind the bank and stepped out carrying several bags.

They entered the back alley leading to the bank, with Carl several steps ahead.

Carl placed his ear against one of the walls and knocked twice. "Here it is," he said while still listening, "the vault should be behind this wall."

He turned to Bob and said, "Okay, let's do it. Give me one of the lozenges."

Bob searched inside one of the bags he was holding. He took out two similar packages, showed them to Carl.

"Which flavour do you want? 'Schrödinger's Spearmint' or 'Nonlocal Liquorice'?" asked Bob.

"It doesn't matter… Spearmint."

Bob threw the corresponding packet. Carl caught it with one hand, opened it and dropped a single lozenge into his palm. He closed his eyes and immediately put the tablet in his mouth.

"Not too bad…" said Carl, swirling the lozenge around with his tongue. "Now it's your turn."

Bob opened the other packet and took one of the lozenges. He was about to put it in his mouth when he suddenly stopped

"Did you know I used to work for an accounting firm?" said Bob, staring at the lozenge, "Things used to be so simple back then…"

"Stop whining and take the damn thing."

Bob sighed and placed the lozenge in his mouth.

"These are quite nice; you should try one," said Bob.

"Pass…" replied Carl, without hesitation.

They waited until the tablets came to full effect; 256 seconds, according to the back of the package. They stepped away from the wall and prepared themselves for running.

"Remember to run as fast as possible; we need all kinetic energy that we can get," said Carl in a dead-serious tone.

"If you say so…" replied Bob in a dead-scared tone.

"At the count of three. Ready? One… Two… Three! Go!"

Both men sprinted as fast as they could.

A couple of hours later, the paramedics arrived and took both men to the hospital. In their report, the paramedics wrote "Diagnosis: Severe concussion. Causes: Poor understanding of quantum physics."

A WORLD IN THREADS

ACADIA REYNOLDS

Ezra is born with a red line of probability wrapped around her fingers like the string of a balloon. It expands with her as she grows, sneaks under her fingernails and curls up there. It bracelets her wrists and runs over knuckles, twists and stretches and overlaps. Her hands are stuck in quantum cobwebs.

The red strings wrapped around her hands lead in all directions, connecting to plants, people, the lamp, the walls, each individual blade of grass in the little spit of dirt beside her apartment. The lines outline her world.

"Pretty," she says, pointing at the threads, and her aunt doesn't know what she's talking about.

When she's seven, Aunt Jane sits her out in the grass with a big bucket of shrimp and ice, straight out of the market and still salty from the ocean. Ezra's been preparing shrimp for eating since before she could pronounce her own name, and the steps are second nature. She picks off the legs and twists off the head like a bottle cap, then draws off the shell with gentle pressure. She cuts shallowly into the back and tugs out the vein.

There's a red line extending from her pointer finger into the shrimp, shimmering under the skin where the vein used to be. She knows that she's supposed to clean out the shrimp, so she pulls on the string like she just pulled on the vein. The shrimp shudders in her hand, legs regrowing from its softer underside. Its legs prick against her palm as it squirms, alive but still headless.

Ezra screams and throws the shrimp at the ground as hard as she can, pulling on the red line again in hopes of reversing whatever she did. The shrimp hits the grass and collapses into a pile of pink glitter.

She's afraid of her threads, at first, but she learns to control them as she ages.

Their apartment is a place of creaking pipes and peeling wallpaper, sagging ceilings and the smell of the ocean slipping through the cracks in the walls. The vent under the kitchen sink is the only place where the heat actually works, and on cold days she stands with her toes pressed right up to it. Whenever Aunt Jane sees her there, she wraps

blankets around Ezra's shoulders and promises to get the heating fixed before next winter.

Aunt Jane works as a waitress at the diner a couple blocks from where they live. She comes home smelling of grease and sheds her work clothes like a lizard before hugging Ezra.

"If only I had a million dollars," Aunt Jane says, arms around Ezra's shoulders and rocking them back and forth. "Then I could take care of you proper."

Ezra is ten years old and she is starting to understand the fact of money. She snags a thread near her nail and pulls.

Aunt Jane works as a lawyer in the firm downtown. Their house seems like a fairytale to Ezra, three stories tall with spiralling turrets and balconies all along the sides. It was paid for by Aunt Jane's father, who used the last of his inheritance to buy a hundred acres of land in the middle of nowhere, despite his family urging him not to. Ezra knows that there is a world where he died penniless and destitute. She has lived that life. But in this new world she has found for herself, oil was discovered on his land. Ezra is warm in the winter.

And if her aunt laughs differently than she used to, if the freckles on her face connect in a new constellation, if sometimes she seems like a stranger… then that's a price that Ezra is willing to pay.

She pulls a thread when she fails a math test. When her aunt gets fired. When an earthquake breaks their house to bits. Whenever something goes wrong, she slips sideways into a different reality where it went right.

She lives her days hundreds of times in hundreds of ways, trying to get them perfect, and the more lines she pulls, the further she gets from the reality she grew up in.

Again—

Again—

Again—

Again—she trips on a root—she steps over the root and runs straight into the tree—the man on the radio is talking about a mugging downtown—the man on the radio is talking about a new restaurant opening—Aunt Jane flies through the sky with wings sprouting from her back—Ezra has a husband—Aunt Jane is coughing out the blood from her lungs—Ezra lives by herself and feels crushed by her own loneliness—Aunt Jane is singing her a lullaby in the rain—Aunt Jane is introducing her to rock and roll and heavy metal—Aunt Jane strums her vocal cords like a guitar—

The shadows look like forests of kelp, swaying in the breeze that comes off the water.

"It's been on fire for years now," says the woman next to her. She looks like Ezra's aunt if she turns her head just right. The ocean is burning.

The sky greets the ocean at the horizon line, reflecting the fire burning as far as Ezra can see. She feels small beneath the red of the sky, a red so deep that her strings almost blend in with it.

"I keep trying to find you," Ezra says. "And I keep failing."

The woman smiles in the same way that her aunt did. "Well, nobody said this was going to be easy."

The woman opens up her sequined bag and takes out a pair of golden sewing scissors.

The metal of the handle is warm against Ezra's skin. She pulls her threads taunt and slices through them.

The world tips sideways at the first cut, and tilts further with every new line she severs. It feels like she's amputating a limb but she keeps going, cuts until the only thing left of her threads is the remnants fluttering around her fingers.

When the world evens out again, she's home.

THE COLLAPSE

MEG SIPOS

Only trust yourself.

Sometimes, don't do that either.

Lea stared at her inked words until they became weathered lines staining the page. Then she stuffed the crumpled paper back into her pocket. Glancing at the clock, she lifted herself from her desk and moved toward the kitchen.

Knowing what to make for dinner had become difficult since The Rip. She never knew what version of her husband would come home. Twice now, her husband had been her wife.

A rip in the fibres of reality, news outlets had called it.

Cue the doomsdayers, Aaron had joked while knocking back whiskey and pacing in front of the television as a news anchor began discussing the story of a man's late husband coming home as if he had simply popped out for coffee and not been dead for two years.

Rather than prompting the end-times prophets, The Rip inspired arguments over the mere concept of reality. Scientists called this significant. Irreversible. A fascinating—*concerning*—shift in the universe.

Philosophers called it an existential disaster.

At first, Lea and Aaron relished the novelty. Discussed the appeal of meeting themselves. The allure of courting each other's doppelgangers.

A chance to experiment freely, Aaron told her. *Without the complications that come with cheating or forming emotional connections with other people.*

At first, they considered the other versions of themselves that began to manifest no different. The first few they met felt like clones. Copies.

The same.

At first, they only knew of *The* Rip. In Grandview Park.

Then, more rips appeared.

In other cities. Towns. Prairies.

Smaller ones too.

Harder to detect.

To navigate.

At first, they could find their way back to their own apartment in their own version of reality. When they did, they would tell each other everything—*the other you spent a semester abroad* or *you love snowboarding* or *you make an amazing beef wellington even though you, here, are vegetarian* or *have you ever thought about the peace corps, because the you there is*—and they would find themselves overwhelmed with passion for each other.

At first, the differences between themselves and themselves were miniscule. As if one small, seemingly insignificant choice set them all on a slightly different course.

When the rips began to multiply, though, the differences between their realities and their other selves mounted.

The you there lost her mother.

That you didn't get a doctorate. He started working right after high school.

Did you know you're an actor? Don't you have nightmares about being up on stage?

You went to prison. Five more years to go, but you're up for parole.

When the rips started to feel infinite, they began to have trouble finding their way home.

I couldn't find the right path back, Aaron told her after a two-week absence.

I stepped into another reality by accident yesterday. Didn't even notice until I found a vacant lot where our apartment building should be. Lea had gone out to buy groceries. Came back emptyhanded.

I think the world I visited last month is gone. Or… the rip moved?

Eventually, wanderlust snuffed out of her, Lea tried to halt their experiments. Tried to stop the world-walking. Began to work from home. Refused to venture out of the building.

She couldn't risk stepping out her door and into a post-apocalyptic version of their world. One she might not escape from.

Isn't this *world post-apocalyptic?* Aaron asked. *Aren't they all?*

So Aaron still left while Lea stayed.

And she never knew who might come home.

When she heard the key rattling against the door as she stirred more butter into the mushroom risotto she had settled on making, she lifted her spatula and waited for the click of the lock and the rustling of Aaron taking off his shoes before calling out. *Who are you?*

I'm me. The pause lingered. *But not to you, I guess.*

With a sigh, she stared down at the glistening rice in the pan and continued stirring. *Safe to say that reality is still collapsing around us then?*

Aaron entered the kitchen and she glanced up at him, assessing.

Unnaturally hunched. Pale face.

Disconcerting smirk.

Honey, you either act like it's the end of the universe or you just live your life.

Shadowed eyes. Sloppy scruff.

You have to admit: it's hard to live your life when there are other yous wandering around. Reality is falling apart.

He walked toward her and slipped an arm around her waist, fingers rougher than she was used to. Not like the other Aarons.

Off.

Always was. His shadow eclipsed her as he whispered in her ear. *Relax. Enjoy the ride.*

She set the spatula on the counter and tilted her head toward him. Tried to ignore her growing alarm.

Because he was *still* Aaron.

Just also… not.

But… Like, *I* kind of *know you. Intimately even. Because I've always known you. But I also* don't *know you at all*, *because I've* never *known you.*

Her chest tightened. Willed her to stop. But these incessant thoughts began to bubble over. *And even though you are you*, *you are also not you*, *because you're not* my *you. It's just become so complicated. It's hard to keep track of me and you and the other yous and the other mes and the you that I've known and loved for ten years.*

Aaron's hands gripped her hips, his breath now hot against her neck. She pushed past the rising unease and continued. *And*, *I'm just… I'm tired of knowing you and* not *knowing you at the same time. Of you being you and not being you at the same time. I just want things to be normal again. Simple.*

Yeah, *because things used to be so simple before.*

His scoff rang sharp.

Echoed.

Lea's hand went to the pocket she'd stuffed her crinkled note in.

Only trust yourself.

Aaron felt *wrong*.

Her hand hovered.

Sometimes, don't do that either.

Then reached for the spatula and stirred.

POWERS OF OBSERVATION

CHARMAINE SMITH

Observer wanted, the ad read. *Top pay plus eigenbonus for the right applicant with stamina and discretion*. I scratched my wiry head and chewed on the end of my stylus. I'd been out of work for four months since the university imploded, my benefits and housing allowance about to expire. The ad was cryptic but enticing. *Observe what?* I wondered. But how hard could it be?

I flipped a coin: three moons up. So I applied.

A reception mech led me down the corridor to a door with a small inset arc of crystal. Meant to resemble a moon in early phase, it glowed velvety black with a halo of silver at its edges. Nice effect, and expensive. I calculated the crystal import and artisan fees, running the numbers in my head like a devotion, and relaxed. This place could pay.

Inside, the Director sat me at a mahogany table. I could see my reflection and hers in the gloss. Jet-black hair pulled into a complicated knot at the base of her skull, a tailored ebony suit with lapels like pinned daggers, tiny diamonds in her ears, skin caramel and flawless. Her eyes glittered behind lavender contacts. "We don't get many applicants from botanical math," she said.

"My field is a little crowded, and I'm ready for something different."

"Well, your assessments are a match. Observers need a very specific temperament, organic yet precise. Let's audition you."

We stepped into an adjoining chamber of oddly indeterminate size, and my eyes blurred as she fitted me with goggles. "These interface with the chamber, powered by splendifying math. Field panels in each surface feed the math to your goggles, and your brain does the rest." She touched a zone on the goggles' rim and I was splendified, in a milky puddle swirling with stars. The puddle whirled around me, tightened. I fought down nausea. "The symptoms will fade, and if we hire you, we'll provide supplements to replenish your neurotransmitters." Glowing geometries flew up at me, and the Director showed me how to select the right group and melt into it until the target scene stabilised. "You can't be seen, but avoid collisions with objects or the targets. It's delicate work, like surgery."

I zoomed past triangular buildings, sculptures in a narrow park, a kid on a uniscooter. My pinprick of light settled in a spot the Director swore would be free of spatial conflicts, next to a dragonfly ticking its wings like a windup toy. The target approached, his shape fuzzy. I encompassed his satchel, his loose sleeves, the paperfilms he shuffled. There! An equation and a credit figure scribbled in a margin, the symbols rippling like water. Math flowed through me and the text settled, sharp and clear. I double-blinked, sending it back to be logged by the receiving field.

The Director removed my goggles and steadied me. "This was a recorded scenario; your real work would be live. There's a nondisclosure, of course, and a quarterly eigenbonus depending on our profits and your performance. We use four Observers, but to keep the collapses clean, they're not allowed to interact. We'll be in touch."

I got the job. By three weeks in, the nausea and dizziness had passed, and splendifying math was my new best friend. "It's all about nudging the wavefunction, collapsing it in a particular direction," the Director told me. "Observations, amplified. We're reality consultants. Small changes make big money." Zipping into a lemon jumpsuit before work, I admired my upgraded quarters. I even let myself think, briefly, about a permanent homestake.

In my dedicated chamber, behind a door with a ruby sun, I spun vectored solids into patterns like symphonies, coaxed magma between mantle shelves, lavished symmetries on the turbulence of stock exchanges, and stirred atmospheres into friendly gas blends. I made people walk toward each other, or away, at the right moments. In that room I was a goddess.

But the work changed my dreams: I chased irrational roots through my childhood warrens, singing them home but hearing only echoes. Once, brushing my teeth, my mouth multiplied into a hundred gaping mouths, and I couldn't remember what to do next. Cooking or writing a report, I was struck by déjà vu. I began to fear colliding with myself at every corner.

It got harder to make decisions. Salad, soup, or noodles for supper? I paced before my kitchen unit, staring at nothing. And was the

Director glowering at me when we passed in the halls? Even my first big bonus didn't shake the ominous feeling.

At my next review, I cradled one hand in my lap, nails bitten and rough. The Director gazed out at the blue mist settling on the hills where the first of three moons, just risen, hung like a ghost lamp. "By the numbers, your predecessor excelled beyond hope," she said. "His record still stands. But something went wrong, a cognitive decline. We've adjusted our screenings, but this field is so new." She glanced down at the table, where her reflection swam and sputtered next to mine. "I want you to get checked, next week. I've made the appointment."

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I lean my head back against the medical office wall, eyes closed. After batteries of tests, the docs recommend two months of therapy at a brain spa, at company expense. They're doing the paperwork now. "At the seashore, mountains, or deep forest?" they ask. "Your choice."

Images of the late university float through my mind: my office cubby, the quadrangle, lecture halls. Meetings with nodding heads and busy styluses. The financial shock wave that collapsed it all. Did an Observer's splendid math nudge, nudge all that away?

The docs are waiting. I sigh against the thud in my temples, and the math limps through my brain. Seashore, mountains, forest.

It's a lot to think about.

QUANTUM CAKE À LA SOLVAY

PIPPA STOREY

The history of physics contains 'til this day
A little-known secret surrounding Solvay:
Aside from the talks among Einstein's old pals,
Were parallel sessions arranged by the gals.
They beat God at dice and exchanged idle chat,
And nursed Erwin Schrödinger's traumatised cat.
They made snide remarks about Marie Curie,
And bad-mouthed the men over pastries and tea:
Their gripes over prizes and coveted chairs,
Romantic entanglements, steamy affairs,
Herr Pauli's exclusion from trivia night,
And Planck's constant rants about quanta of light;
That Erwin was dishy but Niels was a bore,
And Werner would sleep through his lectures and snore.
The girls' greatest secret undoubtedly, though,
Was Madame de Broglie's new quantum gâteau.
It's said those who tried it could not get enough;
It wasn't like Thomson's old plum-pudding stuff.
So here we explain the procedures to make
A version of Madame's original cake.
The optimal order is still in dispute,
But mixing and baking for sure don't commute.
First preheat the oven to one-eighty C
(Or four-fifty K, give or take a degree).
Beat butter and sugar with integer spin,
Then fold all the other ingredients in.
Don't measure them, though, or you'll alter their state;
Just guess the amounts and then leave it to fate.
You might get a cake that's too dry or too greasy,
But nobody said this was going to be easy!
Now transfer the mix to a suitable pan,
And bake thirty minutes (or less with the fan).
The pan must be deep and have sides that are stout
To prevent the raw batter from tunnelling out.
The cake should turn golden and rise as it cooks—
But don't take a peek to assess how it looks!
Just wait for the specified time to elapse,
Or you'll trigger the wavefunction's fatal collapse.
By quantum mechanics and these simple rules,
You can eat the cake hot and still wait 'til it cools.
This feat marks the theory's preeminent coup:
The proof you can have your cake *and* eat it too.

Physics references:

Line 2: A reference to the Solvay Conferences, the most famous of which were the conferences of 1911 and 1927, where the world's leading physicists met to discuss the emerging theory of quantum mechanics. Among them were Albert Einstein, Erwin Schrödinger, Marie Curie, Wolfgang Pauli, Max Planck, Niels Bohr, Werner Heisenberg and Louis de Broglie, all of whom are referenced in the story.

Line 5: A reference to Einstein's contention that God "does not play dice" with the universe.

Line 6: A reference to Schrödinger's famous thought experiment, in which a hypothetical cat may be considered simultaneously alive and dead because its fate is linked to a random subatomic event that may or may not occur.

Line 7: Marie Curie was the only woman invited to the Solvay Conferences of 1911 and 1927.

Line 10: A reference to quantum entanglement, in which the state of one object is correlated with the state of another (potentially distant) object, although each object exists in more than one state simultaneously. Measurement on one thus instantaneously affects the other, a phenomenon that Einstein described as "spooky action at a distance".

Line 10: A reference to Schrödinger's many love affairs. He formulated wave mechanics during a vacation in the Swiss Alps in the company of a Viennese girlfriend.

Line 11: "Pauli's exclusion from…": a reference to Pauli's Exclusion Principle, according to which no two electrons can occupy the same quantum state.

Line 12: "Planck's constant rants…": a reference to Planck's Constant. According to quantum mechanics, light exists in discrete units known as photons, whose energy equals their frequency multiplied by Planck's Constant.

Line 13: "Niels was a bore" : a reference to Niels Bohr, whose model of the atom underlies our modern understanding of atomic physics. Bohr proposed that electrons revolve in stable orbits around the atomic nucleus, but can jump from one orbit to another by absorption or emission of a photon.

Line 14: "Werner" is Werner Heisenberg, who developed the matrix formulation of quantum mechanics and the Heisenberg Uncertainty Principle.

Line 16: A reference to Louis de Broglie, who proposed that particles have wave properties. The concept of wave-particle duality was further developed by Schrödinger in his formulation of wave mechanics.

Line 18: A reference to Thomson's 1904 plum-pudding model of the atom, in which negatively charged electrons were hypothesised to be embedded like raisins within a positively charged "pudding". This model was refuted in 1911 by Rutherford's discovery of the atomic nucleus.

Line 22: A reference to non-commuting operators, which represent the mathematical basis of Heisenberg's Uncertainty Principle. In quantum mechanics, measurements are described by operators, which can change the state of the system. If two operators do not commute, it means their order matters and the quantities they represent cannot be measured simultaneously with arbitrary precision.

Line 24: "450 K" : The temperature in kelvin (the number of degrees above absolute zero).

Line 25: "integer spin": A reference to the intrinsic angular momentum or "spin" of a particle, which is quantised in integer or half-integer multiples of Planck's Constant.

Line 27: A reference to quantum measurement theory, according to which any measurement or observation on a system can potentially change the state of the system.

Line 30: The constraint phrase required by the competition.

Line 34: A reference to quantum tunnelling, a phenomenon in which an object such as an electron passes through a potential energy barrier that, according to classical mechanics, it has insufficient energy to surmount.

Line 36: "Don't take a peek…": another reference to quantum measurement theory.

Line 38: Wavefunction collapse describes the change in the state of a system induced by a measurement or observation on the system.

Line 40: "eat the cake hot and still wait 'til it cools": a reference to quantum superposition (a phenomenon in which a system exists in different states simultaneously).

Line 42: "have your cake *and* eat it too": another reference to quantum superposition.

ROOT CONSCIOUSNESS

TONY TSOI

He returned to the redwood forest in Big Sur to clear his mind. His oncologist had told him the only treatment left for his leukaemia was a bone marrow transplant from a close relative. But his only relative in the United States—his father—had died three years ago.

This forest was his sanctuary. He came here often when facing uncertainty and challenges. A biophysicist, he enjoyed cracking problems that his peers thought had no solution. While he considered the iterative process of conjectures and refutations too time-consuming, his proficiency in mathematics gave him the intuition to sort out competing hypotheses quickly. He taught his students, "Nature favours solutions that embody mathematical parsimony." He became a star at Stanford after he presented how biophoton emission in onion roots was mathematically related to equations of quantum mechanics. His recent paper theorised that the root systems of plants could communicate with other plants nearby and far away. While the reviewers of his paper admired the elegance of his theory, they wondered how he came up with his ideas.

He never revealed the source of his insights. It would sound too personal, too anecdotal. He had intuited the entire phenomenon on a solo camping trip in this same forest two years earlier. His own consciousness intercepted the chatter between plants. He didn't see or hear or smell the chatter. He just knew—like the way an animal intuitively knows that clouds stay in the sky, or that leaves rustle when the wind blows. He couldn't explain in words how he knew what the plants knew. However, with mathematical equations, he was able to reconstruct the phenomenon. He was convinced that plants—and perhaps all organisms—possessed waves of consciousness with quantum characteristics. However, the central idea of his theory would conflict with the dominant tenet of quantum physics. His equations implied a conscious observer is caused by wavefunction collapse, not vice versa.

He awakened deep in the night to the gurgling croak of ravens in the forest. He opened his campervan's sliding door and felt a breeze under the clear sky, where the moon shone like a street lamp. The sweet smell of damp earth vivified him. He removed his glasses to heighten the connection he felt with the trees, the soil, the ravens, the rats, the deer, the entire forest, and beyond. He let his mind drift. He could sense the presence of his parents—and their parents before them. He was startled when he sensed his descendants.

This means I could survive leukaemia. But how? He was married once, but he divorced, without children.

He felt an insect bite on his thigh two inches above his left kneecap, right on the pea-sized, diamond-shaped birthmark he and his father both shared. He thought of his father and remembered his words. "Find Wei-ling. Tell her I love her."

Wei-ling was his sister. His parents had given her away to a childless couple—childhood friends of his mother—shortly after she was born. "Xiao-ming, we can't keep your sister." He recalled his mother crying and mentioning China's one-child policy. "They live three blocks away. Honest people. They promised we can visit her." However, three years later, in 1989, his parents went to Tiananmen Square the night the soldiers intervened. His mother was shot dead on a side street. His father fled with him to Hong Kong and later to the United States. In a letter, the couple who adopted Wei-ling told his father, "She misses you all. She is too young to understand. The police say you are a fugitive. Please stop writing to us."

The moment he got out of the forest and found a cellular signal, he called a former MIT roommate, now a professor at Beijing University. He told him his sister would be the best donor to give him bone marrow. "Please help me find her."

"Beijing has twenty million inhabitants. I can't possibly find her," his former roommate said. "Besides, your father was a fugitive."

"Nobody said this was going to be easy. I'll come myself."

"That would be best. If you're willing to spend a few days with my colleagues and graduate students, I can help make arrangements."

A month later, after spending a week giving the series of talks he promised, he went to the address found in his father's letters. Upon arriving, he found only a municipal park with a jogging trail curved around a manicured lawn dotted with shrubs and flowers. A plaque in front of a giant banyan tree described that the park had been built ten years ago in this very location, where hundreds of homes nearby had been burned after a storm of lightning. Miraculously, the banyan tree survived the fire unscathed.

He recognised the tree. He had played hide-and-seek around it as a child. The tree's aerial roots had dropped from the branches into the soil, forming a labyrinth of root trunks. He placed his forehead on a root trunk and closed his eyes. *Where is my sister?*

He heard a cry from a little boy thirty feet away. Wearing a helmet, the boy sat on the ground whimpering, a toppled bicycle with a pair of training wheels lying next to him. He knelt to examine the boy. There was blood on his knee, and, above it, he saw a diamond-shaped birthmark. Then he heard a voice calling his name. "Xiao-ming." He thought he had misheard it—only his father would have called him by his Chinese name.

The voice was from a woman walking toward the boy.

The woman helped the boy get up. "Xiao-ming, I told you not to pedal so fast."

"Did you name your son after your brother?" he asked.

The woman pulled the boy closer to her. "How did you know that?"

He pulled up a pant leg to show his birthmark above his knee. "I lived here thirty years ago."

The woman covered her mouth and burst into tears.

ENTANGLEMENT

ANNIE TUPEK

Joel gripped the corner of the envelope like it was contaminated. For the last fifteen years, the birthday cards from his mother had contained cash. This year the card contained a certificate to Fortuna. After seeing the holographic logo, he'd shoved it back in the envelope.

"I made you an appointment," she said.

"You don't need me to move the mulch into the garden tomorrow, do you?"

"No."

"Thanks." Her pursuit of grandchildren was shameless. In Joel's mind, it would happen when it happened. From his mother's perspective, it wasn't happening quick enough.

The side project of a research trio at Quantum Computing Research Institute, Fortuna had caused a sensation when six months after its inauguration each of the thousands of couples it matched were still together. The one-year mark and millions of couples. Then two years. Five. It was a statistical impossibility.

That was what quantum computing had done, made the impossible possible. After they'd broken conventional encryption, QCRI turned to chemical modelling and weather forecasting. Their Knapsack project became the de facto SAT solver, providing optimal solutions to non-polynomial time problems. Then Fortuna arrived and changed the game of matchmaking.

Sandra had been with Fortuna since day one, a test engineer snatched away from QCRI by the offshoot corporation. Seven years ago, they'd needed to fill the database and created an employee incentive programme. Now, Fortuna retained her because she was The Anomaly.

Sandra's qubits had been in excited superposition for years without reaching the decoherence state. Technically, they only existed for a q-second. But quantum time had its own idiosyncrasies and exact durations could only be theorised. Who was to say her qubits weren't the expanding, shivering spheres of bright energy she imagined?

Maybe their intersecting wave forms had been cancelling and boosting each other for years on end. The result was the same, either way. No match.

Researchers at heart, Fortuna kept her around. Sandra suspected it was because her NDA expired a few short years after her employment ended and they didn't want word getting out that there was an anomaly. Eventually, they'd promoted her to managing the East Coast division. It paid well, and most days she enjoyed her job. Except when she had to scan someone.

Fortuna processed a client's digital personality simulacrum and didn't require an on-site scan. Occasionally someone's DPS was incomplete or poorly trained. Less frequent were the paranoids worried about identity theft, brainwashing, and cloned doppelgangers. Lazy or crazy. Sandra wondered which type would show up for the morning's appointment.

Fortuna occupied a skyrise with a view of the ocean. Joel's appointment was in room 304, not high enough to catch a glimpse of the water. The attractive young woman behind the desk smiled and offered him tea.

"How long is this going to take?" he asked and took the teacup.

"The scan? Minutes. The match?" Sandra shrugged. This was Kit's job, but he was on vacation and she was the only qualified person on site. "Possibly before you walk out the door. Most people are matched within a week." They always loved hearing that, but the man's posture and tight lips indicated something like reluctance.

"Fortuna will start with a synapse reading. You'll experience mild hallucinations as it stimulates different regions of your brain. Then, the analytics run," she said. Lazy or crazy, he seemed to be neither. She explained the process as she prepped the sensor halo.

Joel listened to words he didn't understand. They said no one really understood quantum systems, but she was convincing with her talk of uncertainty principles and probability matrices and nontrivial entangled states.

"It's not as clinical as it sounds," Sandra said. She placed the halo around his head. There was something spiritual in witnessing Fortuna perform its elegant calculations that exposed the organisation of the universe.

"What do you mean?"

"You'll see." She took the teacup from him.

"Should I close my eyes?" Joel asked.

"It doesn't matter."

The halo vibrated and then Joel was elsewhere.

Sandra wondered who he saw. She'd scanned herself plenty of times, searching for a fault in the scan that never emerged. He'd see flashes of potential matches proposed and rejected as Fortuna read his reactions to stimuli. He'd experience love with each. That love might last a night, a week, a year, during the quest for the one that would last a lifetime.

Among countless others, the young woman from Fortuna flashed though Joel's awareness. Images and emotions battered him into overstimulation. It was over almost as soon as it began. The experience faded and she removed the halo from his head.

Sandra received a priority notification from Fortuna as the man came out of the scan. She'd been matched to the man in the chair. Her hands fumbled the halo.

Joel caught the halo before it dropped into his lap. Feather-light and sleek, it looked expensive. A notification from Fortuna announced his match. She stood in front of him.

Joel needed to leave. He stood and pushed the halo into her hands. "The appointment was a gift," he said. "I'm sorry. I didn't think I'd meet you in person right away. I'm not ready."

Overwhelmed by pinging notifications and congratulations from colleagues, Sandra barely registered his words. She'd hoped no one

watched her file after all these years, but that was not the case. "I understand," she said and walked him to the door. "You can reach me through Fortuna if you change your mind."

Joel left.

Sandra stared at nothing. Things used to be so simple when she'd been The Anomaly. Her future at QCRI just got complicated. Would they let her go now that she had a match? And for nothing, since he wasn't ready.

On his way home, Joel passed through doubt to curiosity. He had vague recollections of her from the scan. Feelings, mostly, of comfort, strength, and joy. More tangible than what a brief meeting might produce.

The next day, Joel called Sandra.

EQUESTRIAN PHYSICIST NEEDED ASAP

LILY TURASKI

"Equestrian Physicist needed ASAP:

Equantum, Inc. is seeking a skilled horse rider and trained physicist to assist in testing an exciting new breakthrough. Detailed responsibilities will be shared at an onsite interview. Contact Dr Roan…"

Nearing the completion of my graduate degree in physics, I found myself browsing through job postings while waiting for my samples to process. I had already applied to a handful of positions, but I was still looking for my "dream job."

I re-read the ad. Could this be it? The elusive dream job? Horses and physics! Two of my favourite things to geek out on. Although I won a couple of equestrian championships in years past, I left those dreams behind when I entered grad school. But reading this ad… maybe there's a way for both dreams to come true.

I search "Equantum, Inc.", but nothing comes up online. I take a deep breath and call the provided number. "Here goes something!" Nobody answers, so I stumble through an awkward voicemail, wondering if the job is even real.

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It is. I'm invited to interview onsite at Equantum "as soon as possible," which apparently means "tomorrow."

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I arrive early and am greeted by Dr Roan. He takes me to a windowless room with a wall-to-wall photograph of lush meadows and a calm pond. Apparently, the lack of windows is due to security concerns, and Dr Roan informs me the photographs were taken on the institute's property at their partner location in France. "Maybe you'll get to visit our French campus later," he mentions. He starts the interview by focusing on my research background and emphasising the importance of safety. He asks me seemingly random and unrelated questions. "What is the most efficient path between two cities?" "What is the viscosity of a photonic fluid?" "Have you ever ridden a horse underwater?"

He ends with a brief presentation explaining the research and goals at Equantum. "We're trying to be the Pony Express of the Modern Age. We developed a programmable neutrino that is compatible with swarm robotics. They can be brought together and will behave in a coordinated manner, potentially enabling ultrafast transportation." When I try asking further questions, I receive only vague responses. At this point, I have generated more questions than answers, but Dr Roan continues blithely. "Well today is going along splendidly! Everything seems to be in order, and we have been cleared to begin the fun part—the lab tour, er, stable tour, if you will! And the riding test. That part's important."

He takes me down a long, white hallway decorated with research posters from the lab. I want to stop and read them to hopefully get some answers, but we walk too quickly for me to catch more than a few words and the outline of some graphs. At the end of the hallway, we pass through a set of keycard-gated double doors which lead directly into the stable. Entering a stable without having to go outside surprises me, as does the fact that there are still no windows. I must have looked quizzical as Dr Roan explains, "These horses have, ah, let's just say the lack of light doesn't bother them, and we have plenty of artificial light anyway."

As I am questioning whether these horses even exist or if I have been brought in for an elaborate scam to murder female physicists in windowless buildings, I see the silhouette of an Arabian horse in one of the stalls. Dr Roan stops outside of the stall and peers in, but he isn't looking directly at the horse. Hesitantly, I ask Dr Roan if this is my horse for the riding test.

"Oh, can you—you can see her, then? Excellent! Yes, you will be riding Chance in the test run, I mean, in the er—riding test for the interview." I notice the horse flickers in the odd artificial lighting in the stable. I ask Dr Roan about getting Chance tacked up, and he seems confused, "Can't you just ride her like this?" I wasn't expecting to ride bareback, but I lead Chance out of the stall and prepare to mount. Before I get on, Dr Roan urgently reminds me that safety is a priority at Equantum, and adds, "Make sure you don't fall off! I don't know what would happen…"

I get on, and immediately the lights go out. Nobody said this was going to be easy, but this inky blackness is absurd! I feel Chance quivering under me, but I can't read her. One thing I love about horses is developing a deep connection and learning to read my mount's emotions and desires. Typically, riding bareback makes this connection even stronger. But Chance seems to be switching between different possibilities at an impossibly fast frequency. Before I can get a stable read on her, we're moving. At least, I think we're moving? It's completely dark, except for the occasional flickering light from Chance. And then I feel her plunging violently. It's alarming, but I recognise the feeling—this is what horses feel like when they're swimming. Swimming? I tighten my grip.

After one particularly enormous lurch, I can feel Chance's hooves on solid ground again. Relieved, I pat her neck, and sense that her signals are approaching a constant. Her emotional state collapses to a single output, and simultaneously it is light again. Blinking, I am amazed to discover that we are standing in a rolling meadow beside a calm pond.

"Hello?" I call out, not seeing anyone nearby, and unsure what happens next—"Is the test over?" As I look around, a scientist in a white coat comes running over the hill. Dr Roan is brought in via video call: "You did it! The test was successful! Equine quantum teleportation…." He appears elated even as he trails off. "I mean… congratulations, you passed the interview! We'd love to offer you a position here at Equantum."

SPECIAL EXHIBITION

GRIFFIN AYAZ TYREE

Juliette Okoro
Jovian, 2078–2112
Dot (2094)
Egg Tempera, Canvas

The large brown circle framed here is a composite image: hundreds of depictions of Jupiter, each with a slightly different atmospheric pattern. From childhood, Titan-based artist Juliette Okoro experienced her environment in constant superposition—what she called "the unbearable pluripotency of photons." Modern historians speculate she suffered from a sensory-dominant form of Selective Decoherence Insufficiency, an unrecognised condition in her time. While she died in obscurity in the early 2110s, today much of her repertoire has been repurposed in the symbology of the Quantum Resistance Movement, prominently a stylised version of this piece known as the "Okoro Spot."

***

Quantum Resistance Oral History Project
Ahmed Eklund (b. 2125–)
Chief Medical Officer; Celadon Mining Cluster, Kuiper Belt
Date of Interview: 11/1/2081

>> We'd been misdiagnosing SeDI for so long it's impossible to pinpoint when the epidemic began. Accelerated dementia, brain tumours, spinal infections—they're all common among deep-space miners. It's the radiation. So when local workers came into MedBay with cognitive symptoms we just gave the usual treatments: handful of antibiotics, handful of neuroplastics—"the Celadon cocktail." If people didn't get better, we chalked it up to drug-resistance. That was the status quo for years. I… I'm not proud of it.

In '66 they brought in a Terran gunnery sergeant on leave. The man was raving: "I'm bleeding out on Neptune while I shave myself on Titan." He had it all—multilocation, situational instability, overstimulation. Got a billion-cred workup because the Central Planetary Authority said so, with nothing to show for it.

But there *was* something, damn it, and he had this creepy way of knowing things he shouldn't have about all these other places where he visualised himself. Turns out these were alternate posts where he

could have been stationed. So then—this guy was a particle, right? A single person, one body. But he sensed himself existing like a *wave*; uncollapsed, present across all places where he had the *probability* of being.

Soon enough we had a name for it: Selective Decoherence Insufficiency. SeDI.

…God, whatever happened to the good old days when you could trace disease to a fault with the human body and not the nature of reality itself? Things used to be so simple…

Anyway, I wrote up the case report and sent it to the Authority. In retrospect I should have just transmitted it into the sun, for all the good that did us.

***

"Beware the Tunneller!" Propaganda Poster
Ceres Station
Ca. 2167-2170
Ink, *Paper*, *Spraypaint*

The Central Planetary Authority responded to the emergence of SeDI in the Kuiper Belt with a swift campaign of containment and intersystem propaganda. At its best, CPA publications disseminated practical knowledge about SeDI and other quantum perceptual disorders. At its worst (as pictured here), they perpetuated misinformation and reinforced stigma. "The tunneller" is a hypothetical quantum-aberrant individual, caricatured as Belter, who could manifest physically at points along their probability waveform to bypass quarantine and other containment measures. This is widely refuted as a mischaracterisation of both quantum mechanics and quantum psychopathology, but the idea found fertile ground in CPA propaganda due to anxieties over loss of political control in the Belt and longstanding xenophobic sentiments.

The poster is extensively vandalised. The winged decal is a reference to the *Bashful Starling*, a Jovian relief ship destroyed while trying to transgress the Terran blockade of Celadon Cluster. Several Okoro's Spots have been painted, presumably in an act of defiance—or to

suggest that SeDI was not as limited to the mining clusters as once presumed.

***

Quantum Resistance Oral History Project
Sister Faustina Chen (2115–2182)
Marian Order of the Blessed Parabola; Celadon Mining Cluster, Kuiper Belt
Date of Interview: 24/3/2180

>> Why? Well that's an existential question: why have the laws of physics changed all of a sudden? Pure entropy, maybe. Perhaps it's part of a larger cycle built into the universe, one we're too small to see the shape of. Certainly the orthodox sentiment is *Deus vult*—God wills it.

I have a lot of problems with that last position (and this isn't just the spiritual anguish of the recently-diagnosed, mind you.) Late-stage SeDI is terrible. Ungodly. People just sit there, so overstimulated and anxious they're drenching their clothes with sweat and drool. And there's nothing we can do but keep them comfortable—get a room with padded chairs and curtains. They like fluttering curtains.

Though every now and then we get a case where someone's still cognitively intact. Who can talk to you, through all the multilocation and whatnot. Who'll relate conversations from halfway across the system, tell you the latest news from Mars, the full *range* of possibilities. It's the closest thing I've ever seen to prophecy.

And all the prophecies are bleak. War, rioting, disease. Babylon burning in the night across a thousand realities.

***

Schrödinger Independence Stele
Erected 17/9/2183

*** Since 2166 the citizens of Celadon Mining Cluster have faced the Unknown with fortitude and bravery, alone and abandoned by the Inner System. Now, on the eve of greater intersystem conflict, the

Independent Celadon Polity averts its eyes—not out of bitterness but in hope, for *Esse est percipi*. So long as the stele is unopened and the transmitter within not accessed the state of the System, and our distant Homeland therein, may yet be well. ***

***

Sister Faustina Chen, Interview 24/3/80 — continued

When it comes time to seal this place from the inside like the Terrans have done from the outside, I'll rest easy knowing I did my part. Turned the Abbey into a hydroponics farm, expanded the waterworks. Even made the chapter-house a museum—for history's sake. However far-gone I'll be, I just hope someone will be around to put me in front of some curtains.

…I understand it, now that I have it, you know. It's the little waveforms of fabric when they flutter. They overlap, coalesce. It's calming. Beautiful. I can see it now…

HELPING HANDS

CORA VALDERAS

CAUTION: Do Not Put Hand Into or Under Quantum Machinery.

You'd think it didn't need to be said. QLabs specifically requires people to use their brains to do their jobs, and it doesn't take a genius to consider basic lab safety. Unfortunately, if the rule exists, it's probably because it happened before. Maybe it's ignorance, bad luck, or maybe people just aren't paid enough to care.

For the record, I'm unpaid and happy to keep my limbs where they are.

Shoot, I'm getting ahead of myself.

Shoot. Shoit. She it.

So, explicit language is blocked on these monitors. Funk.

Anyways, my name's Miles Thatcher, I'm a junior researcher in QLabs' Quantum Development Department (QDD). Not that anyone will be reading this, but if I'm going to commit to this journalling thing I'll try to keep things organised. That's been the hardest thing to do this week. Nobody said this was going to be easy; anything with 'quantum' in the name is bound to cause some headaches. Still, no one could have anticipated the sheer madness of these past few days. Despite it all, Dr Angel has insisted that I remain her assistant in the following experiments, even offered me a promotion. I didn't sink myself into student debt to not pursue the impossibilities of quantum physics, or not get paid for it, but the reality of it all…

It's a lot to think about—too much honestly. That's why I need to get this written down before I lose my head or... other vital extremities.

Quantum machinery is what we call the tangle of wires, metal, and blinking lights that encompass the entire wing of the QDD. It was a lot more dazzling the first time I toured the facility, like waltzing through a techno Christmas party. I won't lie, the urge to touch literally everything was strong. Though after countless hours of tests and lacklustre results, you'd feel more inclined to kick the funky thing. But that's what happens when you try to construct a bridge to a parallel universe.

That's exactly what Dr Angel and her team were obsessed with achieving. Holed up in the observation booth, I'd copy down their ramblings as they performed test after test. That day, I'd taken enough coffee runs to count as a marathon, though caffeine didn't help anyone's frustration. Dr Angel was fuming about some calculations being incorrect; Dr Baker looked like he wanted to correct Dr Angel's face with his fist. Love that workplace camaraderie. At some point, Dr Baker decided it was not the fault of their impeccable minds, but the machine not working properly.

I'll make this clear, Dr Baker is brilliant, but not a technician.

The jewel of this isolated section of machinery was the huge funnel-like appendage meant to simulate a wormhole. It can adjust to any size we want, but at the centre it narrows and disappears into the inner workings of the machine. I swear I only looked away for a moment, sipping at the cold remains of my coffee. That's all it took.

Dr Baker, the remarkable physicist, stuck his right hand inside the funnel.

Apparently, IT upstairs heard his screams.

I bravely choked on my coffee, which saved me the grittier details. By the time I'd recovered the entire wing was in a panicked frenzy. Medics swarmed the wailing Dr Baker while Dr Angel kept worried onlookers at bay. I didn't quite grasp what happened until Dr Baker was dragged away with someone's coat wrapped around his right arm.

His hand was gone.

I don't mean that it was crushed or chopped up—it was literally gone. They couldn't find it. The funnel was opened to let the biohazard team investigate, but the scene was alarmingly spotless. Apparently, there was a distinct smell in the air, like burnt charcoal. That's as far as I'd like to know.

Fortunately, Dr Baker survived, even made a swift recovery. Unfortunately, our work had just begun. At some point Dr Angel had escorted me to her office where I sat, stunned silent, who knows for how long. When Dr Angel returned, she'd tell me something that I'm still grappling with.

She'd found the hand. It just… wasn't the right one.

In fact, it was the left hand.

A perfectly cauterised left hand was found in front of the funnel, Dr Angel explained. I said it was impossible, she called it a miracle. Apparently, Dr Baker was right. There was a mechanical error, and whatever he had done actually caused it to, well, work. He'd reached into the fabric of the multiverse and pulled out a fate worse than anything I could imagine, and it didn't stop there.

At this time we've received thirteen hands total, five left hands, eight right hands, and all belonging to Dr Baker.

With a piercing hum, the machine belches out another piece of Dr Baker from the multiverse, sometimes with a souvenir. So far, we've found a watch still clinging to a wrist that counted a thirteenth hour. Another had what appeared to be a university ring from a place called Texas, which definitely doesn't exist. The multiverse is literally spilling out at our feet, all we have to do is let the machine do its job.

I'm not sure how, but Dr Angel has managed to keep this entire thing under wraps while everyone else assumes the funnel was decommissioned. As she put it, they can't possibly stop now, and the higher ups agreed. This whole ordeal is straight out of a nightmare, yet I'm still here, typing away. This is real. Insane. Astounding. It's everything I expected from the quantum realm. I was reminded again today of the open position. Dr Angel told me to think about it, and I suppose that's what this rambling is about. Curiosity has a 50% chance of killing the cat, but you have to observe it to find out.

Well, at least it will look good on my resume.

QUANTUM LUCK

BRIAN WELLS

"This transformation you underwent, was it painful in any way?" Dr Fenton made notes on his clipboard as he spoke.

"There was no transformation," Brinks said. "Why can't you understand that?" Captain Brinks had expected a hero's welcome. Instead, all he got were stares and even a few screams. As the first person to cross interstellar space, the last thing he expected was to be treated like a zoo animal, caged in a quarantined hospital room, interrogated by a psychoanalyst through a glass wall.

"Then how do you explain your appearance?"

"I'm not the one who's different," Brinks said. "You are."

"But I don't feel any different. How do you explain that?"

Brinks took a step toward the thick pane of glass separating him from Dr Fenton, and Dr Fenton took a frightened step back. "Look," Brinks said, "something big has happened. Bigger than you can imagine. The universe—the universe I knew—is gone."

Dr Fenton shook his head in confusion. "I'm sorry, come again?"

"Are you familiar with how the Quantum Probability Wave Attenuator works?"

"Doesn't it use wormholes to propel your ship, the Astral Star?"

"Not wormholes," Brinks corrected. "It quantum-tunnels the ship from one location to another by attenuating every probability wave but the one that will get you where you want to go."

Dr Fenton looked up from his clipboard. "Okay, how is a tunnel different from a wormhole?"

Brinks was glad to finally have the opportunity to explain his predicament. "Wormholes bend space and require godlike amounts of energy. Quantum tunnelling, on the other hand, is where a particle simply disappears and instantly reappears somewhere else. It happens spontaneously all the time at the subatomic level. That clipboard you're holding? There is a non-zero probability that it could

suddenly disappear and reappear on the other side of the universe. But the probability is so low, it may as well be zero. That's where the Quantum Probability Wave Attenuator comes in. It's like rigging the quantum lottery so every subatomic particle in an object gets lucky and wins the tunnelling lottery at exactly the same time."

"And this is how your ship works?"

"Exactly. Only what wasn't known at the time is that quantum luck is conserved. For something the size of my ship to tunnel across the galaxy, you'd have to wait about ten-to-the-power-of-fifty years before it's likely to have happened spontaneously. So by rigging the quantum lottery so my ship could tunnel to Proxima Centauri, we robbed the universe of ten-to-the-power-of-fifty years' worth of quantum luck, diminishing the level of subatomic tunnelling going on in the universe."

"And how do you know this?" Dr Fenton put his pen to his clipboard as if expecting an especially delusional account.

"Four hours after I arrived at Proxima Centauri, the star went out. Like blowing out a candle. Know how far away I was? Four light-hours away. That star went out the instant I tunnelled. It couldn't have been a coincidence."

"Why would tunnelling to Proxima Centauri make the star go out?"

"Because stars depend on nuclear fusion, which requires a certain level of tunnelling activity."

"But wait…" Dr Fenton put down his clipboard. "So all tunnelling stopped throughout the universe because of your ship? Because of you? Throughout the universe?"

"Not completely. Probably just enough to make the stars go out. Solid-state electronics, even our brains require some level of tunnelling activity to function, so I knew tunnelling hadn't completely halted."

"But our sun didn't go out when you went to Proxima Centauri."

Brinks leaned forward and lowered his voice. "Oh, but it did. You just don't remember."

"Uh-huh," Dr Fenton picked up his clipboard. "What happened next?"

"I knew the star going out was only temporary," Brinks said. "Without the internal pressure of fusion to hold the star's outer shell at bay, the massive shell would collapse until there was sufficient pressure to restart nuclear fusion at the diminished tunnelling rate, causing the star to explode in a nova. When I figured out what was happening, I abandoned my data-gathering and set the attenuator to take me home. Back to Earth."

"And what did you find when you got here?"

"I found a dead, collapsing sun, about to blow and obliterate Earth."

Dr Fenton looked at Brinks over his glasses. "But you saved Earth, didn't you?"

"Damn straight I did." Brinks knew he was being baited, but he didn't care. "And not just Earth, but the whole universe."

"Right. Sorry. How, exactly?"

Brinks spoke clearly, knowing his next words would either vindicate or condemn him. "I decided to go for broke. I inverted the field so the attenuator, instead of tunnelling the ship, would tunnel everything outside the ship. I set the controls to the level required to stop all tunnelling, everywhere, throughout the universe. Then I pressed the button."

"And this accomplished what?"

"Don't you get it?" Brinks said. "I tunnelled the entire universe! This universe is only two days old!"

"Then why do I remember what happened last week, or last year? Why is there a compelling history that goes farther back than two days?"

"I know. It's a lot to think about. It's a new state of existence," Brinks said, "not a new Big Bang. A Boltzmann universe, if you will, with an established, causal progression of events."

Dr Fenton pushed his glasses up and gazed at Brinks as if he had reached a new understanding. "But something went wrong, didn't it?"

"You could say that," Brinks said. "Some things were different. Minor things."

"Ah. Like the horns on your head?"

"Yes. But like I said, I'm not the one who's changed. You're the ones who've changed. Before I pushed that button, everyone had horns on their head."

"Right." Dr Fenton picked up his clipboard and flipped to a new page. Without looking at Brinks, he clicked his pen. "Now, about your tail…"

INDEX BY QUANTUM CONCEPTS

Many Worlds Theory or Multiverse*

Math

Nonlocality

Planck's Constant

Probability

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* The Many Worlds theory and the concept of the Multiverse have scientifically distinct roots. The former is an interpretation of quantum mechanics while the latter is a cosmological idea. However, in popular culture, the terms and concepts are often used interchangeably and so we present these stories as one group.

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If you are interested to learn more about the scientific concepts after reading the stories inspired by them, our online resources provide a good starting point. Visit https://shorts.quantumlah.org/quantum-theories for more.

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Tony Tsoi worked in product design in the high-tech industry for twenty-five years. After retirement, he joined a book club and started reading fiction and nonfiction. Quantum physics made him rethink the (unnecessary) distinction between fiction and nonfiction. Truth is not about what is real but about what is possible.

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As a scientist and equestrian, **Lily Turaski** would have eagerly applied for the equestrian physicist position in her story. In real life, she has already found her dream job teaching materials science engineering at Georgia Tech. She is passionate about science education and strives to inspire her students to appreciate how materials impact our everyday lives.

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ABOUT THE COVER DESIGNER

Nur Azizah is a creative designer passionate about all things art and design. She infuses fun into her creations, crafting visuals that not only look good but also convey meaningful messages both literally and metaphorically. Beyond her professional work, she enjoys creating stylised portraits that reflect her personality. Azizah continually pushes the boundaries of design, always seeking new ways to innovate and inspire her creative process.

ABOUT THE LAYOUT DESIGNER

June Lin is a graphic designer and typographer based in Hong Kong. Having worked in different industries for branding, packaging, and other media, her persisting love for type led her into the world of editorial design, where she now puts her focus in. When out of office, she can often be found reading a mystery novel, on a long walk, photographing mundane objects, or trying out new arts & crafts. Her work can be found at june-lin.com

This second volume of "Quantum Shorts" blends quantum physics with more storytelling. Inspired by the quantum world, 38 writers have crafted 38 imaginative stories.

In one, two lovers' relationship hangs in the balance as a quantum computer calculates, in another, a quantum computer chats with its classical counterpart. There are tales of a demon-haunted world, a grumpy Observer handling the fate of a universe, a musician looking for his hit single, and many more. Prepare to be in a superposition of inspired, entangled, disturbed and amused by this quantum flash fiction.

"Every one of the authors in this book has experienced the magic of sheer creation. Quantum is better when minds play with it in all possible variations.

Please, enjoy in depth the quantum in art, and the art in quantum."

— José Ignacio Latorre,
Director of the Centre for Quantum Technologies
Professor and Provost's Chair in the
National University of Singapore's
Department of Physics

Quantum Shorts

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