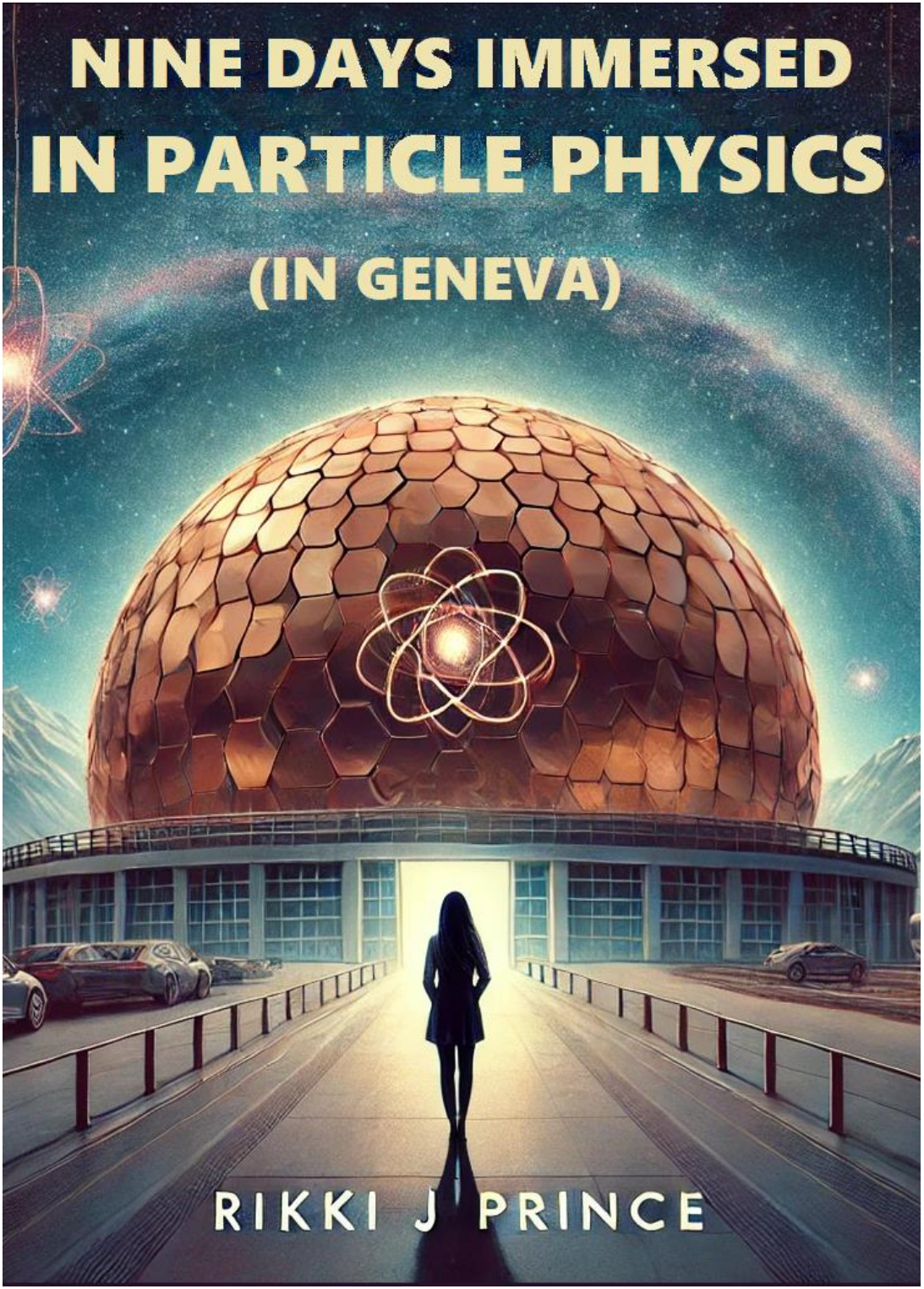
NINE DAYS IMMERSED IN PARTICLE PHYSICS

(IN GENEVA)



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Preface

Episode number 0 of the "Nine Days" series.

The universe is vast, spanning billions of light-years, filled with galaxies, stars, and planets. Yet, the deepest mysteries of the cosmos are often hidden in the smallest of things – the fundamental particles that make up all matter. Among these particles are quarks, the tiny constituents of protons and neutrons, held together by forces so strong that they can never be separated. While much of physics is concerned with the grand scale of the universe, the study of quarks takes us in the opposite direction, down to the smallest scales, where the rules of reality are strange and often counterintuitive.

"Nine Days Immersed in Particle Physics" invites you into the world of quarks, the smallest-known components of our universe, where Sarah Mackay, a first-year undergraduate at St Andrews University in Scotland visits CERN in Geneva, the home of the Large Hadron Collider. Over the course of nine days, a group of physicists, students, and curious minds come together to explore the latest theories and discoveries about what makes up a quark. But as they delve deeper into the intricacies of particle physics, something curious begins to happen: the attendees start to develop fixations on the smallest things around them. What begins as an innocent interest quickly spirals into humorous and absurd obsessions, turning their scientific journey into an unexpected comedy of quirks.

This story blends the serious pursuit of scientific knowledge with the lighter side of human nature, exploring how even the most rational minds can be led down surprising paths.

But it turns into a murder mystery when something unexpected happens.

Day 1: The Box

It arrived the day she turned nineteen.

No sender. No note. Just a box on the doorstep of her parents' house in Edinburgh, squat and ordinary, sealed with brown tape. Her mother was still inside preparing a cake. Her father was in the shed, building something he would never finish.

Sarah Mackay crouched and ran a finger along the edge of the box. It was heavy. Unmarked. The tape had a fresh chemical smell, like something out of a cleanroom. She didn't call to her parents. She didn't hesitate. She took it inside.

The living room smelled like pine cleaner, old books, and distant toast. She set the box on the coffee table, pulled a kitchen knife from the drawer, and sliced the tape. Folded the flaps open.

A cat.

Dead. Still warm. Fur neat. A tabby. No blood. No sign of injury. No smell, except for a faint metallic tang – like antiseptic and ozone.

Her first thought: Mario.

– Impossible.

Her second: quantum mechanics.

– Crazy.

She stared for a long time, heart drumming somewhere in her neck. Then she replaced the flaps, wiped the knife, and walked the box two streets over to the vet.

“No chip,” the receptionist said, after the scan. “No wounds. No marks. It could've suffocated. Or natural causes. If you want us to run tests, there'll be a cost.”

“I can’t afford any tests,” Sarah said. “But could you just cut a few hairs? And put them in a sterile bag for me?”

The vet tilted his head, then shrugged. “Sure.” He cut some hairs from its fur and a few whiskers.

Back home, her mother lit candles. Her father poured Prosecco.

“Happy birthday, darling! How was Switzerland?”

Sarah looked at them both, older than she remembered, softer, blurrier. A cat. In a box. Dead and unlabeled.

“Well,” she said. “I don't know where to start.”

—

Nine days earlier: August 22nd, 2019. Geneva

Sarah Mackay arrived in Geneva with a suitcase full of physics books and exactly one pair of non-practical shoes. The sky was blue, too blue, like

someone had boosted the saturation just to make the mountains look whiter.

Geneva's sunlight fell differently than Scotland's – it wasn't just brighter, it was sharper, carving the edges of buildings, mountains, and lake into crisp relief. The Alps hovered like ghost teeth beyond the rooftops, and the sky looked engineered.

The tram from the airport to Meyrin clacked through orderly streets. She counted stop names in French, tried not to look too obviously out of place. Everyone else wore the city like tailored clothing – sleek, minimal, expensive. Sarah wore wrinkled jeans and supermarket trainers.

Meyrin Station. She stepped off the tram with her suitcase in one hand and her course packet in the other. The air smelled of diesel, lavender, and hot metal. Every surface gleamed. The street signs were legible. Even the shadows obeyed geometry.

Her hotel sat three blocks from the CERN visitor entrance, tucked behind a bakery and a newsagent that sold international newspapers she'd never seen in print. The elevator smelled of lemon polish and fatigue. Her room was spare: white sheets, white desk, a view of the dome – CERN's Globe of Science and Innovation – glowing like a bronze sun as the late afternoon cast it into shadow.

She found the hotel easily enough. Not fancy, but clean. Sparse white sheets, a balcony with a view of the dome. The dome.

CERN.

Her course – "Contemporary Particle Physics: Theory and Frontiers" – was set to start the next day. Nine days. Lectures. Labs. Discussions with people whose names she had read in footnotes and bibliographies.

She barely ate dinner. Just cheese and bread and a single apricot from the fruit bowl downstairs. Then she sat on the edge of her bed and opened her battered copy of Griffiths, running her fingers across the highlighted lines like scripture.

Tomorrow, it would begin.

She didn't sleep well. But she didn't mind.

August 23rd – Day 1 of the course

Sarah Mackay stood in the atrium of CERN and tried not to look too eager. Eighteen, barely five feet tall, and the youngest on the course by at least two years, she clutched her visitor's badge like a passport to another universe.

The copper-colored dome outside shimmered in the morning heat. Inside, the building buzzed with the low hum of high-energy experiments, coffee machines, and

conversations in at least five languages. The air smelled of ozone and sanitizer.

She'd paid for this trip with two months of supermarket shifts. One night stacking frozen peas, she'd told herself she'd stand here. Now she was.

Her phone buzzed. Message from Mum: *"Have fun, sweetheart! Wear sunscreen! :)"*

She shoved it into her bag.

The first lecture was in a smaller auditorium just off the main atrium. Forty students filled the chairs, notebooks open, laptops glowing. Most were older – PhDs, postgrads, the type who read Feynman for breakfast. Sarah sat near the back, in case she needed to disappear.

Prof. Kip Thorne – yes, the physicist of Interstellar fame – entered without ceremony and started speaking as if he were finishing a conversation they'd all been having in their heads.

"Quarks aren't like billiard balls. They're excitations in a quantum field. Stop thinking of them as objects. They're relationships."

Sarah leaned forward. Her pen moved without thinking.

Thorne scribbled on the touchscreen board, diagrams blooming in blue and red: quark triplets, gluon exchanges, spin states. He spoke fast. Clear. Not dumbed down, but not exclusionary either.

Every so often, he paused. Looked at the room. Waited.

Sarah met his gaze once and held it. Just for a beat.

After the lecture, she drifted out into the hallway where coffee was being served in paper cups. She wasn't sure what to do with herself. She stood by a poster of neutrino oscillations until a voice beside her said, "You look like you understood all of that."

She turned. Tall, Italian, disheveled in a deliberate way. His badge read: Mario De Angelis, Università di Roma.

"Not all," she said. "Just most."

Mario laughed. "Honesty. Rare in physics."

"I'm Sarah. From St Andrews."

They shook hands.

He pointed at the poster behind her. "You know neutrinos have mass, right? But we don't know why. It's like we're watching shadows and pretending we understand the people casting them."

"That's everything in quantum theory," she said. "We describe what happens. The why belongs to the realm of metaphysics. Where there is only speculation."

Mario's smile faltered. He looked at her again, more carefully this time.

In the afternoon, they toured the control room. Screens blinked with real-time data from the LHC, where

particles were being smashed together at near light speed to recreate the universe's earliest moments.

Sarah stood behind the safety glass, awed. This was what she'd dreamed of – not the machine, but the idea: that understanding could be forced out of chaos, that even the smallest particle had a story.

That night, in the cafeteria, students clustered in groups. Sarah picked a table by the wall. Mario sat beside her.

"You ever think," he said, "that studying the smallest things changes how we see everything else?"

Sarah didn't answer right away. She was watching a sugar cube dissolve in her tea. The grain structure collapsing into liquid entropy.

"Yeah," she said. "Sometimes I think it makes everything else feel too big."

"Too big?"

"Like people. Emotions. Mess. Atoms make sense. Humans don't."

He nodded, slowly. "That's why I like this stuff. It obeys rules. Even if the rules are counterintuitive to us."

Sarah raised an eyebrow. "It gets interesting when they *don't* follow the rules. That's when we have to draw up new rules to discover what tune they are really dancing to."

That night, she wrote in her notebook:

Quarks don’t exist alone. You only see them through what they *do* to others. You look, and the act of looking changes what’s there.

She underlined it twice.

Day 2: Held Together by Attraction

August 24th, 2019

The second day began with heat. Not just outside – where the rising sun baked the pavement early – but in Sarah's head. A sleep too light, a dream half-remembered, the taste of something left unfinished.

The sun pressed down on the streets of Meyrin like a heavy blanket of heat. The air was thick with moisture, laced with the scent of wet concrete, roasting coffee from a nearby kiosk, and the faint electrical tang that always lingered around CERN's fence.

Sarah's hair clung damply to her forehead as she crossed the plaza. Her notebook was tucked under one arm, her badge clipped too tightly to the collar of her fleece. She got to the auditorium early again.

Mario was already there.

He wore the same red scarf, slightly skewed this time, and held a steaming paper cup with a CERN logo fading along its rim. The smell of espresso curled around him.

"The early bird…" she said.

"…catches the worm," he replied, his eyes glinting, as he eyed Sarah.

The auditorium slowly filled with the shuffling of coats and the clack of laptop keys. Dr. Elena Kovalenko took the stage precisely at nine. She was small, stern, with a dark pixie cut and boots that echoed crisply against the tiled floor.

The lecture today was on the strong force – the invisible rope holding quarks inside protons and neutrons.

"The strong interaction," she said, "is the most powerful force in nature. It holds the nucleus together despite the repulsion between protons. And yet you never see it directly. It's only evident by what doesn't happen."

She clicked to a slide showing a visual simulation: the strong force illustrated as a bright orange color operating at very short distances, increasing its intensity with distance from the nucleus before fading away rapidly, while the electromagnetic force was a pale green that faded gradually over large distances.

"If the electromagnetic force is like conversation, the strong force is silence that keeps things from falling apart."

Sarah copied the formula describing how the strong force varied with distance. Mario leaned in and whispered, "Sounds like my parents."

They laughed quietly.

Later, the practical lab divided the group into threes. Sarah, Mario, and Claire – the sharp-eyed, meticulous Frenchwoman from Marseille – were assigned a gluon interaction calibration task. The lab smelled faintly of solder, metal filings, and static-charged carpet. The keyboard keys felt tacky with overuse.

Sarah focused on the code. Mario adjusted sliders and variables on the interface. Claire checked their results with laser focus, barely speaking. The computer screen glowed with spinning colored diagrams. A few times, Sarah felt Mario's fingers brush hers. Not by accident.

They broke for lunch late.

Outside on the upper terrace, the heat shimmere above the tiles The mountains hovered in the background, hazy through the summer glare. Mario pulled a sandwich from his backpack and offered her half.

"Gluons are like unacknowledged connections," he said, unwrapping a sandwich. "You only notice they were there when they're gone."

Sarah sipped her coffee. "Are you insinuating that we have some kind of connection?"

"Do we?"

Mario took her hand. “Look, the lines of your hand are like the traces of subatomic particles in a bubble chamber.”

“That’s the most romantic thing anyone has ever said to me,“answered Sarah, and they both laughed.

Back in the lab, they saw a real bubble chamber. Sarah watched the trace of tiny bubbles following curves produced by magnetic fields, collisions that produced new particles, each with a particular trajectory that gave away its identity.

Later that evening, Mario invited her for a walk around the dome.

She said yes.

They didn’t talk much. Just walked.

Near the west entrance, he stopped. “Can I ask you something?”

“Sure.”

“Why did you really come here? CERN, I mean.”

She didn’t answer right away. Then: “To understand the world. Because things don’t make sense unless you go very, very small.”

He nodded. Then he stepped closer. “You’re not like the others.”

“I’m not sure that’s good or bad.”

"It's real."

She looked at him. "What are we doing here?"

"When particles come together, special things happen. And when some people come together, too."

Then he kissed her.

It was soft. Testing. Not rushed. It tasted faintly of coffee and cool night air.

And Sarah let it happen. It felt good. It felt right. The hum of the collider far beneath them was inaudible, but she imagined she could feel it in her bones.

Day 3: Flavors of Desire

August 25th, 2019

Sarah woke with color bleeding through her thoughts – streaks of red, green, and blue seeping in like sunlight through stained glass. She blinked at the ceiling. The air in her hotel room was warm, still carrying a trace of last night's storm that never came. Somewhere nearby, someone was frying onions. Her senses were wide open.

She dressed carefully. Same jeans, but a cleaner shirt. Subtle perfume dabbed behind her ears. Mario had shaved. His collar sat slightly lopsided, like he'd gotten distracted halfway through dressing.

Outside, the day felt brighter. Edges sharper. Light poured down the sidewalks in flat white sheets, bouncing off the pale facades of Meyrin's buildings. The Globe shimmered bronze in the distance.

Dr. Gavin Salam stood in front of a spectrum-hued backdrop of decay diagrams. He had the posture of someone who understood elegance – both in mathematics and in presence.

"There are six quark flavors," he began. "Up, down, charm, strange, top, and bottom. The universe is not only constructed but... seasoned."

Murmurs of amusement rolled through the room. Sarah caught Mario's eye. He gave a small shrug and a grin that said, *told you this would be fun.*

Dr. Sala, moved smoothly from flavor identity to flavor mixing. "In quantum chromodynamics, flavor isn't taste. But it *is* character. Change the flavor, change the particle. Appearance can deceive. Essence does not."

Sarah jotted that down. Her pen moved as if tracing the contours of her thoughts.

Dr. Salam clicked through slides showing decay paths, generations, flavor mixing. He paused now and then to ask questions no one could answer completely. Sarah liked that. It made the subject feel alive.

"In quantum chromodynamics," Salam said, "flavor isn't taste. But it *is* identity. Change the flavor, and you change the particle. It might look the same. It's not."

Sarah scribbled that down. Flavors identify particles.

Afterward, the cafeteria buzzed with forks and theories. Claire found them briefly, then peeled off

toward a noisy French discussion on symmetry breaking.

Mario leaned across the table. “So what flavor are you?”

Sarah tilted her head. “You first.”

“Strange,” he said. “Obviously.”

“Obvious,” she agreed. “I’m charm.”

“You are.” He didn’t blink.

They didn’t return to the hotel immediately after the afternoon session. Instead, they found a shady patch of grass behind the dome where no one else went. She lay on her back. He traced spiral paths in the air with his finger, explaining how top quarks decay.

She watched him. Listened to the hum of a particle accelerator somewhere deep beneath them.

They didn’t return to the hotel. Instead, they wandered behind the dome, where the grass still held the dampness of the night. They lay side by side, looking up at a sky the color of powdered cobalt. A single airplane scratched a white line overhead.

Mario drew spirals in the air with his finger. “Top quarks decay fast. So fast they barely even form.”

Sarah rolled her head toward him. “Have you ever been in love?”

He paused. “No. I don’t think so. You?”

“I think love is a lens that we can use to describe what we observe. Biochemistry is another lens. Evolutionary behavior is another one. Our reality is made up of all the lenses we have access to, and that we choose to use.”

He smiled. “Then when we part, I’ll send you a heart-shaped telescope.”

Sarah leaned in and kissed him. “The skin is a lens too. Right now I’m seeing you through mine.”

Arah took a step toward him and kissed him gently. “The skin is also a lens that records all our sensations. I’m seeing you through my skin now.”

That night, she stared into the mirror. She didn’t look transformed. But something had shifted – an interference pattern where before there’d been just clean light.

She wrote in her notebook:

Day 3: Flavor = identity. Transitions happen. But everything decays eventually.

She drew a spiral. At its center, she wrote one word: *charm*.

Day 4: The Weight of Connection

August 26th, 2019

The air felt heavier that morning, thick with sun and faint exhaust drifting up from the street. The mountains to the south looked washed in honey, their peaks softening under a golden haze. Sarah lingered on her balcony for a few extra seconds, watching the way the sunlight struck the dome like a slow-breathing heart.

She skipped breakfast. Her body felt full – not with food, but questions, leftover feelings from the night before, unspoken things that buzzed faintly under her skin.

The lecture room smelled faintly of warm plastic and citrus cleaner. The windows were cracked open to let in the breeze, but it barely stirred.

Dr. Mikhail Shaposhnikov, square-jawed and silver-bearded, began the day's topic without preamble. "Mass," he said, "is not a thing. It's an interaction."

He tapped on a sleek touchpad and brought up an animation: particles floating through a dense, invisible grid – the Higgs field – gradually gaining mass like boots picking up mud.

"Without the Higgs field, everything would move at light speed. No resistance. No weight. No reality."

Sarah leaned forward, her mind spinning. She jotted in her notebook:

Mass = resistance. Presence through interaction.

The idea sat heavily in her chest.

She glanced sideways. Mario was three seats away today. His face was unreadable. She wasn't sure what she'd expected – closeness? Distance? The not-knowing felt like floating through molasses.

In the lab, they calculated simulated particle masses. The task was straightforward, but Sarah found herself rereading numbers, typing commands twice. The room buzzed with fluorescent light and hushed voices.

She worked beside a Dutch student named Elise who whistled softly while solving equations. It was comforting and strange.

Mario worked across the room, alone.

At lunch, she ate by the reflecting pool behind the research wing. The water shimmered green under a line of cypress trees. Bees wobbled between wildflowers. Her sandwich was dry.

Mario found her near the edge.

"You're quiet today," he said.

"I'm thinking."

"About?"

Sarah looked at him, then at the water. "Whether things only become real because we press against them."

He sat down beside her, not too close. "That's not just physics."

"No," she said. "It's not."

That evening, she walked the perimeter of the campus. The gravel crunched beneath her boots. Heat still radiated from the concrete. Insects clicked in the tall grass.

She paused by a set of stainless steel panels etched with the names of past contributors. She ran her fingers across the engraved letters, cool and sharp.

Back in her room, the light was dim and warm. She cracked open her notebook.

Day 4: Mass = contact. We gain substance by how we resist. Maybe identity is a kind of friction.

She drew a grid, particles drifting, then sinking as they passed through it. A slow descent into selfhood.

Day 5: Substructure

August 27th, 2019

The sky was a hazy blue dome over Geneva, the light thick with midsummer heat. Sarah woke to the clang of the tram outside her window and the faint clink of cutlery in the hotel breakfast room below. She dressed without hurry, moving with the slow precision of someone keeping a fragile balance.

The cafeteria was half-empty. The sharp scent of hot coffee and sweat mixed in the still summer air as she poured herself a cup. No sign of Mario. Just the hum of low conversation and the occasional clatter of trays.

The lecture hall buzzed with a different energy that morning. Sharper. The room felt denser somehow.

Dr. Matteo Ricci took the stage in a flurry of gestures and enthusiasm. He was shorter than most lecturers, but his energy filled the space.

"Preons," he said. "Hypothetical particles smaller than quarks. Controversial. Inconvenient. But maybe necessary."

A chuckle rolled through the students. Ricci clicked through slides of speculative models – spaghetti-diagram chaos, dizzying in their implications.

"The Standard Model works beautifully," he said. "But it doesn't explain *why* it works. What if quarks aren't fundamental? What if they're just... packaging?"

Sarah's spine tingled. She scribbled:

Always something smaller. Essence beyond visibility.

Ricci moved between theories like a magician flipping cards. She followed closely, but couldn't shake the sense that something was happening beneath the words. Not in the lecture – inside herself.

During the lab, students were handed a box of broken items and told to dissect them – an exercise in discovering complexity beneath assumed simplicity. Sarah got a battered stopwatch. Cold to the touch, dense in the palm.

She unscrewed it, layer by layer. Inside: tiny gears, metallic dust, a smear of old lubricant. It was beautifully complicated and utterly without elegance.

Across the room, Mario and Claire worked over a lens assembly, heads nearly touching.

Sarah tightened her grip on the screwdriver. One slip and a spring jumped free. She found it, eventually, in the crease of her scarf.

At the bottom of the watch: a hollow chamber. No mystery. Just absence.

She stood up and walked out into the sun.

The air smelled of sun-warmed stone and distant diesel fumes. Behind the dome, the patch of grass where she and Mario had once talked was empty. A discarded lanyard fluttered on the bench. She sat down anyway.

No one joined her.

Back at the hotel, a note was waiting under her door. Plain, typed, folded once.

Not everything with structure has meaning.

Her fingers gripped the page longer than they needed to.

She opened her notebook.

Day 5: Preons. Smaller than small. But maybe what matters isn't the layer – it's the linkage. Not the unit, but the interaction.

She drew a diagram of interlocked gears, then erased the housing. Just motion, moving itself.

Day 6: The Heat of Creation

August 28th, 2019

The sky above Geneva trembled with heat. By midmorning, the sun had turned the metal of streetcar rails into hot ribbons, and the air over the asphalt shimmered like a lens slowly warping the view. The Alps in the distance looked ghostlike, washed out by haze and glare.

Sarah stepped out of the hotel and into a world that felt stretched thin by temperature. Her skin prickled with sweat before she even reached the tram stop. In her hand, her notebook felt heavier. She wasn't sure if it was the heat – or something else.

The lecture hall was dimmed, the blinds drawn to keep the heat at bay. Fans hummed at the back of the room. The scent of yesterday's air lingered: dry carpet, body heat, and ozone.

Dr. Yoshiko Tanaka stepped onto the stage with a calm that sliced through the haze.

"Quark–gluon plasma," she said, her voice soft but crisp. "The state of matter that existed microseconds after the Big Bang."

She tapped her clicker. The screen lit up with swirls of iridescent color – simulations of collisions inside the LHC.

"No protons. No neutrons. Just pure energy. Fundamental particles in a liquid chaos, unbound, unrestricted."

Sarah leaned forward. The screen seemed to breathe. The colors flickered like living paint.

"Heat," Tanaka said, "is disorder. Energy before form. This state is short-lived, but it tells us everything. Creation doesn't begin with order. It begins with rupture."

Sarah felt something shift. Her pen hovered over the page. She wrote:

Chaos precedes structure. Freedom before form.

In the lab, the simulations were louder than usual – more aggressive. The machines hissed. The fluorescent lights buzzed like hornets. Sarah worked with two students from Madrid. Their Spanish murmured at her periphery as they adjusted inputs and analyzed the cascade of virtual particles.

Each collision was a firework. Trails burst across the screen in colors calibrated to represent momentum and mass. Patterns formed and dissolved in seconds.

Sarah's group got a perfect symmetry on one run. Her lab partners cheered. She stared at the result,

her pulse strangely slow. Her thoughts were drifting.

When she left, the air outside was thick. Heat radiated off the pavement in waves. She walked the path toward the lake. Her throat was dry.

Near a vending machine, she saw Mario.

He looked up as if he'd expected her.

"Hey," he said.

"Skipped the lab?"

"Too much noise," he said. "Wanted to think."

His hair clung to his forehead. His shirt stuck to his back. He didn't move toward her.

"You looked happy with the others," he said.

"I wasn't," she replied. "You looked happy with Claire."

He paused, then said, "You want to go somewhere?"

They walked in silence, past a dry fountain and into a park shaded by crooked birches. The sky above pulsed a burnt blue.

They found a bench.

"I was avoiding you," Mario said. "I got... overwhelmed."

Sarah nodded slowly. “I thought maybe I imagined all of it.”

“You didn’t.”

She looked at the heat lines rising off the pavement. “You know what plasma is?”

He looked over. “A state where nothing is bound.”

“It’s unstable. It cools. Always. Even if it’s beautiful.”

They sat in silence.

Back at the hotel, she opened the windows to let the heat escape. The air inside was flat. Her notebook sat on the desk, slightly warped from humidity.

She picked up her pen.

Day 6: Quark–gluon plasma. Chaos with potential. Energy without shape. Maybe the beginning of anything is like this – too hot, too wild, to last. But essential.

She drew arcs, loops, rising like smoke. Then a descending curve – a cooling line, tapering toward silence.

Day 7: Perfect Symmetry

August 29th, 2019

The next morning dawned slightly cooler, though still heavy with summer warmth. Geneva felt scrubbed. The lake, visible from the tram, shimmered under the bright summer sun. The mountains regained their contours. Even the air smelled different – less dust, more stone and leaf.

Sarah walked with her jacket draped over one arm, trailing her fingers along the iron railing outside the Globe. The metal had cooled overnight. The city felt like it had exhaled.

Inside the auditorium, the tone had changed too. A quietness had settled – focused, not tense. The seats filled more slowly. Conversations stayed low.

Today's speaker was Dr. Isabelle Moreau, known for her work on supersymmetry. She entered precisely on time, her charcoal blazer immaculate, her hair pulled back like a theorem resolved.

"Symmetry," she said, "is not about perfection. It is about conservation – of energy, of identity, of law."

She clicked to a series of diagrams: elegant loops, mirrored graphs, clean equations. "We believe the universe began in perfect symmetry. But that symmetry had to break – for mass to form, for

matter to differentiate. If symmetry had held, we would not exist."

Sarah's pen traced the images on her page slowly.

Symmetry = balance. But balance prevents motion.

Mario arrived late, sliding into the seat beside her without speaking. He smelled faintly of rain and citrus soap. His knee touched hers once, then moved.

Moreau paced slowly, methodically.

"We find symmetry beautiful because it hints at truth. But it is in broken symmetry that the narrative of the universe unfolds. Not in what is, but in what is lost."

Sarah sat upright. That landed differently.

Later in the workshop, she and Mario were paired for a decay chain problem. It was clinical, focused. They moved in tandem – no tension, just function. Their voices stayed low. The clicking of keys was the only rhythm.

At one point, he said, without looking up, "You okay?"

She nodded. "You?"

He didn't answer. But their decay diagram was flawless.

That evening, they walked the perimeter of the collider tunnel. Just far enough from the main paths to feel alone. The gravel shifted underfoot. Geneva glowed in the distance – soft amber reflections in shuttered glass.

"I still think about the first night," Mario said. "How light you looked under that dome."

"I wasn't light. I was just new."

He kicked at a stone. "I think I wanted to believe in symmetry. That we were the same in what we felt."

Sarah didn't stop walking. "Maybe we are. But even if we are – it doesn't mean it stays that way."

They stopped near the service entrance, under a buzzing lamp. The light cast long, stretched shadows.

"I'm not sorry," he said.

"I'm not either," she replied. "But that doesn't mean it fits."

The night air was clear. Cool. The symmetry was broken, but the world still turned.

Back in her room, she opened her notebook:

Day 7: Symmetry is truth only until it's tested. What holds until it moves. What stays until it stretches. Beauty is balance – but life happens in the fracture.

She drew two mirrored shapes. Then scored a diagonal line between them.

Day 8: Colorful Connections

August 30th, 2019

The sky was cloudless, a washed-out blue that made everything below seem more vibrant. Geneva buzzed faintly with a Friday rhythm – trams louder, cafés fuller, street corners blooming with the perfume of late summer.

Sarah sipped a coffee in the courtyard outside the main research wing. The bitterness clung to the back of her throat, anchored her. She could hear the wind in the leaves above her, quick like whispering. Her pen tapped against her notebook absently.

Inside, Dr. Anwar Malik began the lecture with a surprising question: "What is color?"

A few students muttered. He smiled.

"In quantum chromodynamics, color is not visual. It is charge – an abstract property of quarks and gluons. Red, green, and blue are labels, not hues."

The screen behind him lit up with spirals of particle trails, chromodynamic interactions rendered in crisp neon lines.

"Quarks bind through color. Each one must carry a different color. Gluons act as messengers, constantly exchanging charge to maintain neutrality."

He walked slowly, hands clasped behind his back. "Together, these colors cancel to white – a stable, balanced whole. Nature abhors imbalance. And yet... she thrives on contrast."

Sarah wrote:

Color = compatibility. Balance through tension.

Mario sat across the room. She hadn't spoken to him since the symmetry walk. He looked tired, but he wasn't looking her way.

During the lab, Sarah was paired with Claire and Lukas from Munich. Their project: model color confinement through three-quark interactions. The code was messy, full of variables that didn't always behave. Lukas kept humming under his breath. Claire adjusted parameters like a surgeon.

Sarah found herself staring at the screen – not the output, but the colors. Always red, green, blue. Always different. Only meaningful together.

Halfway through, she excused herself.

Outside, the light was softening. Long shadows stretched across the pavement. She walked without direction, ending up at the reflecting pool near the visitors' centre. The water surface was undisturbed, an artificial stillness that somehow calmed her.

On the bench: a note.

Folded. Typed. Weighted down with a pebble.

We're not white light. We're interference.

Mario's voice in text.

She didn't pick it up. Just stood there. Breathing.

Later, back in her room, the lights buzzed faintly. She turned on her desk lamp and stared at her notebook.

Day 8: Color force = difference held in balance. Harmony not through sameness, but through tension. Maybe people too. Maybe we're only stable when we accept dissonance.

She drew a triangle. At each point: red, green, blue. In the center: white.

She closed the book softly.

Day 9: Embracing Uncertainty

August 31st to September 1st, 2019

Sarah stood at the edge of the LHC tunnel access point on the final day, staring down into engineered silence. The steel grate beneath her feet buzzed faintly with vibration, and cool air rose from the vents like breath from a slumbering machine. Beyond the fence, Geneva shimmered – clean lines of glass and steel cutting the horizon. A tram hissed past behind her, trailing electric murmur and dust.

She had eight days of notes, three unanswered texts from Mario, and the faintest smell of machine oil on her jacket.

Dr. Samuel Chen, young and sharp-edged, opened the last lecture with a pause. No slides. Just light filtering through the slats.

“Uncertainty,” he said, “isn’t a limitation. It’s a boundary condition. Heisenberg didn’t say we were blind. He said the universe hides on purpose.”

He stepped to the board and drew a wide ellipse, then a point hovering somewhere inside.

“All particles exist in haze until observed. But the observation doesn’t clarify – it collapses. You don’t learn what’s real. You choose which possibility becomes real.”

Sarah didn’t take notes. She stared at the board. At the light. At the faint flicker in the corner of the data feed – an anomaly again, just for a second. A spike. And then, quickly minimized. Someone whispered behind her: “X17 again?”

She caught the words. The voice. Not a student. A postdoc from Hungary? Maybe.

She scribbled it: X17? Unknown mediator. Again?

The rest of the lecture passed in a blur of diagrams and half-completed thoughts. She couldn't shake it. The cat, the note, the flicker in the data – none of it felt random anymore.

There were no more labs. Just a group photo in front of the Globe, awkward hugs and email exchanges no one would ever use. A farewell buffet with dry crackers and lukewarm wine.

Mario found her by the fountain as the sun dipped behind the dome. The shadows stretched across the gravel.

“I’m sorry,” he said.

“I know.”

“I don’t want this to collapse.”

She looked at him. The curve of his brow, the soft pinch of regret near his mouth. “It already has,” she said. “That’s what observation does.”

No kiss. No dramatic goodbye. Just the hum of the city returning to itself.

September 1st – Edinburgh

The airport smelled like reheated croissants and jet fuel. Outside, the air was cooler, edged with sea salt and chimney smoke. Her suitcase bumped along the familiar cracks in the pavement.

Her parents greeted her with wide smiles and clumsy embraces. The house smelled of lemon soap and coffee and the faint dampness of books.

On the doorstep: a box.

Plain. Sealed in brown tape. No label. No postmark.

She opened it in the living room. Quietly.

Inside: a tabby cat. Still. Eyes closed. Fur faintly warm. The smell – chemical, almost antiseptic, something like ethylene.

The vet found no chip. No wounds. No answers.

She asked for hairs to be taken. Bagged. Logged.

At home, her mother lit candles on the cake. Her father opened a bottle of fizzy wine that hissed and sputtered.

“Happy birthday, darling! How was Switzerland?”

Sarah looked at the table. The box. Her parents’ kind, open faces.

“Well,” she said. “I don’t know where to start.”

That night, in her room, she turned on the lamp and opened her notebook. Her hands trembled slightly.

Day 9: Uncertainty is not a flaw. It’s the architecture. Observation doesn’t reveal – it disrupts. The cat was always both. The spike was always there. I was always changing.

She drew a rectangle. Then a cat. Then a data spike, barely visible on a scrolling graph. Beneath it:

System Unstable. Observation Pending.

And just below:

X17 = signal = question = anchor?

She closed the book.

The night outside was quiet. But inside her mind, everything had begun moving again.

Sarah Mackay was just beginning her second year of undergraduate studies in physics. But something had shifted. A trajectory had been set.

It would lead her across continents, into shadows and superpositions, from Istanbul to Prague, from Paris to Florence, from Beijing to South Korea…

This was not the end.

This was her origin point.

End of Nine More Days Immersed in Particle Physics (in Geneva)

Next in the 'Nine Days' series: Nine Days Immersed in Quantum Gravity (in Istanbul)

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