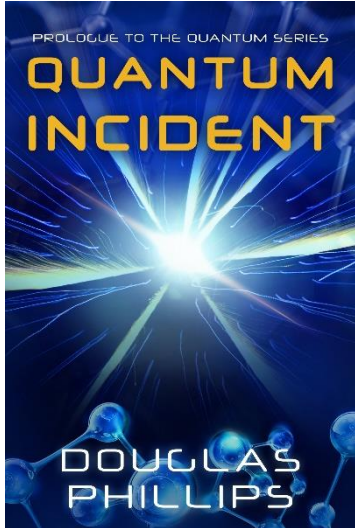


Quantum Incident



Prologue to the
Quantum Series

By Douglas Phillips

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1 Hadrons

July 4, 2012

**Conseil Européen pour la Recherche Nucléaire
(CERN)**

Geneva, Switzerland

In the warmth of a summer evening, the gala had spilled out of the ballroom and onto the outdoor patio. Cecily Johansson lifted a glass of wine from a waiter's tray and strolled through an open French door. She scanned the crowd, like a wolf looking for prey.

A lead physicist from the press conference was surrounded by adoring fans, in true rock-star fashion. *He won't do.* She'd never get him alone.

Her initial report had already been filed, but the editors in London wanted more. Of course they did; she did as well. The announcement at the press conference had been groundbreaking: the Higgs boson had been found. It was more than physics, beyond mere science—it was a discovery with consequences to the man on the street. At least, that's how she'd explained it in her article.

But there was more—beyond this newest of elementary particles, there was something unexplained, and unannounced. After the official press conference had

ended, her conversations with the CERN scientists had been... odd. They were holding back, every one of them. She hadn't become the leading science correspondent in Britain by ignoring telltale signs.

Cecily searched the faces, filtering those with knowledge from everyone else. On the other side of the patio, Peter Higgs was in an animated discussion with several of the American reporters. *Too high up*. An administrator talked with one of the French reporters. *Maybe*.

Her gaze landed on the back of a young man with long blond hair and a reddish beard sitting alone at a table. *Got you*.

"Mathieu," she announced as she approached him. "Enjoying the celebration?"

He looked up. "Cecily. Nice to see you again."

She pulled out a chair and sat down. Mathieu was the perfect liaison, not high in rank but clearly at the center of the discovery. Their conversation at lunch had been like all the others—satisfaction in their accomplishment, yet leaving something unsaid. But unlike the others, Mathieu had shown a tendency to run at the mouth. She could work with that.

"Cheers," she said and lifted her glass.

“*A votre santé,*” he replied, holding up his aperitif. There were two more glasses just like it on the table, both empty.

“You’ve completed your studies at precisely the right time, Mathieu. A postdoc at CERN, with all the secrets of the universe waiting to be discovered.”

Mathieu leaned in closer. “You understand, then. Most journalists don’t.”

“I understand? What, exactly?” Her position put her in contact with all of the major programs across Europe, but that didn’t mean she grasped the details of every scientific announcement.

He smiled broadly. “You understand that discovering the Higgs boson is not the end. It’s just the beginning.”

She watched him carefully, lest she miss some nuance in his expression. “You must be excited to continue, then.”

His eyes lit up. “The plus-fourteen TeV test on Monday will be...” He stopped and lowered his head. “Yeah... um, I’m very excited.”

Strike while the iron is hot. She lowered her gaze, forcing him to make eye contact. “There’s something else, isn’t there, Mathieu?”

He remained still for a minute and then took a long drink from his glass. "Fucking bureaucrats." He shook his head and waved his hands as if erasing what he had just said. "Sorry... sorry. Ignore me. I cannot speak about this."

"I'm a good listener." She was careful to be sympathetic.

"I can't. Not here."

"Then let's get out of here." She studied the deep concern on his face. She felt bad for him, but not enough to back away from a story. "Maybe I can help?"

He downed the rest of his drink in one gulp. "Do you have a jacket?"

A jacket? In July? She could think of only one reason. She'd heard the tunnel was cold.

"Never mind," he said. "I have a spare you can borrow."

They left through a patio gate, avoiding the main ballroom. If anyone noticed their departure they might assume the two were hooking up for the night. *Not a bad cover, actually. Less damaging for both of us.*

He headed straight for the parking lot and opened a tiny Citroen. "Hop in," he said.

He revved the engine and the car sped off down a tree-lined street. “Where are we going?” she yelled over the high-pitched drone of the three-cylinder engine.

“ATLAS. There is something I need to show you.”

“The ATLAS detector? For the collider?”

“Yes, the largest of several detectors on the ring. It’s where we discovered Higgs.”

“So, I heard. Today, in fact.” He wasn’t disclosing anything they hadn’t already said at the press conference. But she was thankful someone was finally ready to speak up about whatever they *hadn’t* disclosed. “I’ve never been in the tunnels.”

His eyes sparkled with boyish excitement. “Cecily, a collider virgin? Lucky girl, you’re in for a treat.”

She ignored the sexist remark. She’d probably ignore a lot more if it led to a good story. She was no physicist, but she had paid attention ever since CERN had begun digging in 2002. Deep underground, spanning provinces in both Switzerland and France, a large ring-shaped tunnel housed the world’s largest particle accelerator—the Large Hadron Collider. It was a place where high-speed protons crashed into each other, resulting in chaotic explosions of matter that revealed the

very nature of the universe. If there was a cathedral for fundamental science, this was it.

I get to see the LHC? In person? Her body tensed with anticipation.

The car hurtled through a roundabout. The comparison to protons moving at light speed around the collider ring was not lost on her. At this speed, she wouldn't need to wait long for whatever he was going to show her.

They passed through a security station and parked in front of a white building with four huge ventilation stacks on its roof. Mathieu pulled two jackets from the trunk and they walked across the empty lot. He tapped his badge at a glass door marked *ATLAS* and it slid open.

They walked alone through a quiet, dimly lit control room. Oversized computer displays covered one wall, mostly dark, except for one that revealed a closed-circuit camera view of the tunnel far below. A series of crescent-shaped workstations were crammed with dozens of smaller displays, keyboards, and other unidentifiable electronics. A large red warning light, thankfully not flashing, hung from the ceiling.

"No one working tonight?" she asked.

“Usually there’s at least one operator, around the clock. But tonight—the party. It’s probably only us.”

Alone with a man she barely knew. She pushed the ridiculous thoughts out of her mind. He was upset about something, but at the same time anxious to show her. It was, no doubt, related to the Higgs discovery. But she might be expecting too much. It might be a technical detail, or a higher statistical certainty than had been announced—nothing more than a footnote in her article.

At least she was getting a personal tour, an offer no other reporter had received.

With another tap of Mathieu’s badge, they passed through a second door and entered a small lift lobby, no different than any hotel or office building. There was only one button on the wall, marked with a down arrow. Someone had taped a small sign next to it.

Bottom quarks only, all others take the stairs.

“Very funny,” she said, even though she didn’t quite follow the humor. Physicists were sometimes too obscure for their own good.

Mathieu pressed the button. “Yeah, the sign changes regularly. An ongoing battle of wit between system operators and physicists.” He raised his brow comically. “I think the physicists are winning.”

The lift arrived and they entered an oversized compartment. As they descended, he narrated. "One hundred twenty meters down. Thirty floors. You'll notice it's getting colder." He handed her one of the jackets and she put it on. "The liquid helium remains inside the magnets, but even when we're not running, they're effective heat sinks." Finally, the lift came to rest and the doors opened.

"Welcome to Wonderland," he said.

She peered out to a view she'd only seen in photographs. To the right, a gently curving concrete tunnel stretched indefinitely into the distance. An enormous blue pipe filled most of the space, leaving only a narrow walkway alongside it. The ceiling and walls were covered with smaller pipes and wiring conduits. The repeating nature of the pipe segments receded into the distant curve and gave an odd feeling of the infinite, like standing between two mirrors.

On the opposite wall, several international warning signs graphically depicted what *not* to do. The arms and legs of a stick figure were splayed in four directions as a thunderbolt struck him squarely in the chest. Another stick figure, sans hardhat, hit his head on an overhang.

"Don't worry," Mathieu said as he took two hardhats from a shelf and handed one to her. "It's not as

bad as they make it out to be. Still..." He gestured to the tangle of electrical wiring. "Try not to touch anything."

"I'll keep that in mind," she said as she secured the hat.

They turned down the tunnel into a slight breeze. Compared to the warm summer evening above ground, it felt like someone had set the air conditioning on *frosty*. The confines of the tunnel soon opened into an enormous room filled with a confusing mesh of metal beams, scaffolding and machinery. The concrete path changed to a metal walkway at the room's midlevel. She looked up at the ceiling, several stories above her head, and down to the floor, equally far below.

Almost filling the cavernous space was a supporting structure that housed the colossal ATLAS detector. The pictures she'd seen didn't do it justice. Its gigantic cylindrical shape was apparent, though some of it was hidden by numerous metal beams. In one section, she could glimpse its interior, with copper-colored blades fanning out from the center like oversized petals on a giant sunflower.

The machine was magnificent, and impossibly large, as if viewing a cruise ship parked inside an auditorium more than a hundred meters underground.

“As massive as the Eiffel Tower,” he said with obvious pride.

They had come for a different purpose, but she couldn't help but stop and stare—the virgin witnessing the grand collider. Mathieu didn't disappoint. “The ATLAS detector, the largest on the ring.” He pointed back toward the tunnel. “Protons exit the tunnel at light speed. Every second, they make eleven thousand trips around the twenty-seven-kilometer loop. A second beam travels in the opposite direction and they collide here. Each proton collision is a microexplosion, creating quarks and muons that shower the detector. It generates an enormous amount of data, which takes months to analyze. We're looking for specific types of collisions—only those that produce two bottom quarks.”

Cecily touched her forehead. “Ah, bottom quarks only. The joke on the lift? Now I get it.”

He nodded. “Finding two bottom quarks is good, but not enough. We plot every pair on a graph, sorted by energy level. It gives us a smooth curve, with one exception. There's a bump on the curve in one spot—at one hundred twenty-six giga electron volts. That bump is predicted by theory, and finding it in our data is how we found Higgs.”

“We heard much of this explanation yesterday. You didn’t bring me down here to reiterate the press conference.”

“The graph is important,” Mathieu exclaimed, displaying an intensity she hadn’t yet seen in him. “You must understand it, or nothing else will make sense.” He paused in thought. “There’s more.”

“More about Higgs?”

“No.” He fidgeted with the zipper on his jacket.

“Mathieu, why the secrecy? What are you worried about?”

“There are EU government people here, from Brussels.” His voice was tinged with distaste. “They tell us what we can explain to the public. And what we *cannot*.”

“About the Higgs boson?”

“No... another discovery. Made simultaneously, from the same data.” He looked nervous. “I need to show you.”

The pain on his face was real and she became concerned. “Will you get into trouble?”

“I don’t know. I hope not.” It was clear he hadn’t thought this through. She felt a touch of guilt and wished there had been no alcohol involved. After a shaky start, his

voice solidified. "I don't believe that governments should decide what is shared and what is not. These are scientific discoveries, not military secrets."

Cecily put a hand on his shoulder. "Mathieu, I absolutely want to hear about it... but don't do something you'll regret." He was young and might be in over his head. She *did* have a code of ethics, even if it was entirely guilt-based.

He nodded diagonally as if not sure if he was agreeing or disagreeing. "Let me show you and you can decide what happens next. Just don't mention my name."

"My editors make publication decisions, not me. But I can withhold your name."

He shrugged. "Come." He turned and led her down the metal walkway to a small office, empty and dark. His badge opened the locked door and they entered what looked like a storage room. There were a few file cabinets along one wall. He opened one and pulled out a large folded sheet of paper.

He held the paper in his hands as if it were a treasure map. "What do you know about string theory?"

She was taken aback by the question. It didn't sound related to the Higgs boson. "Well, a little. I've seen summaries online. And I read a lot of science fiction."

“Fiction,” he repeated. “An unproven theory of the ultra-small.”

He laid the document on the table, still folded in half. “The theory says that quarks and bosons are built from even smaller particles. Strings. In particle physics, that’s the basement level; nothing is more fundamental than a string. But it’s a theory based only in mathematics—and someone’s active imagination.”

He unfolded the paper and turned on a lamp. It was a graph of thousands of data points with a smooth curve drawn through them. It looked a lot like the diagram she’d seen at the press conference, including the bump about midway down the curve.

“It’s the same graph from this morning, isn’t it?” she asked.

“Not quite. This is the original drawing. What you saw was cleaned up for the public.”

She looked back at the diagram. It was certainly much larger and more detailed than they had presented in the slides. But otherwise she didn’t notice anything obvious. “Show me.”

Mathieu pointed to the trailing edge of the smooth curve out at the highest energy levels. There were many

dots in this area and another small bump in the curve itself.

He tapped a finger on the bump. “This was not predicted. But once we noticed it, we went back to the theorists to see if they could match it to their equations. The confidence level is not as high as Higgs—three sigma certainty instead of five, but high enough to merit further work.”

“What is it?”

“A string. A one-dimensional particle that vibrates in different ways to masquerade as every other type of particle. Every quark, every lepton, every bit of mass, every force, even the Higgs field itself. This bump... this data... is proof of string theory and, perhaps, everything that goes along with it.”

She shivered involuntarily. If this strangest of theories was confirmed, an entire world of science fiction had become real.

“Quantum gravity and the Theory of Everything?” she asked.

“Almost certainly.”

“Extra dimensions of space and time?”

“Highly likely.”

“Parallel universes?”

“Very possible. And with wormholes between them.”

Her mind was a jumble of thoughts with a million questions forming. But one thing was certain.

This is way beyond Higgs. This is the biggest story of the century.

2 Sorcery

Fermi National Accelerator Laboratory

Batavia, Illinois

Near future

Nala Pasquier pushed the keyboard away. “Shit,” she said under her breath. Her companion in the lab looked up briefly and then returned to his work.

She leaned forward and studied the image on her computer. The sinusoidal waves weren’t aligned and she was at a loss as to how to fix it. She’d tried everything.

She pushed back from the workbench and allowed her chair to roll to the center of the room. She took a deep breath. She needed a break, a change of pace to shake the cobwebs loose. Her chair slowly spun in a circle and her mind wandered.

Her eyes focused on the clear plexiglass box, not much larger than a microwave, mounted on the wall. Within the box was an ordinary Canon camera. For about two hundred dollars, anyone could pick one up at a discount store. But the lemon-colored pipe leading into the box—the one marked *Primary Neutrino Beam*—routinely made it the most extraordinary camera on Earth.

A slight vibration in the air and a noticeable background hum were the only clues to the power she

controlled. A multibillion-dollar machine was only steps away, the second-most-powerful particle accelerator in the world. With a touch of the keyboard, she could unleash a high-energy beam of intensely focused neutrinos that would explode into the box and send the camera literally out of this world. The results were better than any magician's trick. If only she could control it.

The door to the lab opened. "Morning, everyone." Jan Spiegel was a physical opposite to Nala, man to woman, light-skinned to her dark, tall to her petite. But they shared an intellect that soared beyond even the most educated of their colleagues.

Nala glared at the new arrival and said nothing. Thomas, the system operator responded instead. "Donuts on the shelf, Jan."

"Why else would I be here?" he answered. He plucked a donut from the box and took a bite. "It's certainly not to check up on your work, which I'm sure is going swimmingly well."

Nala turned to her colleague, her frustration unchecked. "Don't fuck with me, Jan. We're not there, and you know it. We're close, but unless the phase alignment is perfect, the coherence falls apart and the neutrinos go back to random."

Jan pulled another chair up next to her. Even sitting, their height difference was significant. “How long can you hold it before it de-coheres? Any better than last week?”

“Same. Maybe ten seconds.”

“Something’s wrong with your software.” He produced an impish grin. “You might want to bring in a real programmer to check it.”

His dig at her skills was a regular part of their back-and-forth. “It couldn’t be your equations, could it, genius?”

Both were physicists, but opposites even in their specialization. He focused on theory, she worked in the lab, turning his thoughts into reality. His ideas had defined their work for more than eight years. Jan was quite possibly the most brilliant person she’d ever met.

He took the insult as he always did—like a friend. “You’re having another bad day, Nala. Don’t worry, it’ll come.” He turned to Thomas. “Has she been cursing again?”

Thomas looked over his shoulder. “No more than usual. I kind of like it—she’s inventive sometimes.” He looked up at Nala. “What did you call that manager who was in here last week?”

She couldn't help but soften. These guys were fun to work with. "A syphilitic cum dumpster."

"See?" Thomas said. "I don't even know what that means, but I like it."

Jan didn't appear to be too upset; he never was. He wasn't the boss, but he was the de facto lead. "Colorful words don't matter, at least not this week. But, Nala, we have a VIP arriving on Monday, so you might practice being polite."

The president's science advisor, Spencer Bradley. She was acutely aware of the schedule. "We're not ready for him. I can send an object *ana* or *kata*, but I can't hold it there, so there's no proof of its displacement. Sure, it disappears, but who's to say where it went?"

"We talked about this," Jan answered. "Gravity or electromagnetism. Take your pick. Demonstrate that bosons travel interdimensionally, any boson, and we've validated the 2012 CERN discovery."

"Even if we had a boson for gravity—which we don't—the demonstration isn't that useful. The target falls back to *Kata Zero*. So what?"

"Agreed, gravity is tricky," he said. "So, focus on electromagnetism. Show that photons propagate across dimensions."

He made everything sound easy. “Jan, I don’t have beam stability. I can send the camera, but the pictures it returns are too random. Ten seconds later, it pops back into existence.”

Jan put a hand on her shoulder. “Keep working on it, you’ll get it. Turn the problem on its head. That’s what you’re good at, right?”

“Apparently not today,” she griped. But as the words left her mouth, an idea followed.

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Nala wedged herself between shelves in the small storeroom, each shelf piled high with a tangle of electronic equipment, metal brackets and wires.

*You’d think we’d have a simple shop light somewhere in this pigsty,* she thought. She lifted a pile of computer cables and pulled on the end of a black extension cord.

“Sweet!” she said. The cord had a wire-caged lightbulb on one end. Better still, the bulb was one of those old-style incandescents that indiscriminately sent light in every direction.

The mind worked in strange ways. Hers, at least. *Turn the problem on its head.* It was a technique she used frequently. She had been trying to gather photons, using

the camera as a sensor. Why not broadcast them instead? Her own eyes would be the sensor. It solved the directional problem, and in multidimensional quantum space, direction was critical.

She rushed back to the lab, pushed open the door and dropped the cord on the workbench. "Screw the camera, this is what we need."

"What?" Thomas asked.

"An omnidirectional light. With this, we don't care where it points."

He seemed confused. "Tell me in 2-D language. That's usually when it makes more sense."

She pulled a piece of paper from a stack on the shelf and placed it on the workbench. "Okay, say you have a 2-D light embedded on this page. It shines in all directions, but only within the plane of the page. Right?" He nodded. "Now you pick that light up, off the page. It still shines in all directions. The photons are no longer restricted to the two-dimensional page. They're bosons, and all bosons are interdimensional, right? And even though the light is now shining in 3-D, some of the light still hits the 2-D page."

A smile crept across his face. "Ah, I see," he said. "So, if you put the light in the test box..."



“You got it.” She picked up the cord. “Let’s try it.”

She opened the lid to the box on the wall and placed the light inside. She stretched the cord to a nearby outlet and plugged it in. The bulb lit, shining brightly through the clear plastic.

“For the full effect, we need to make this room dark.” She looked around for the light switch.

“I got it.” Thomas reached over and flipped the lights off. Only the single bare bulb at the end of the extension cord provided illumination for the room.

“The accelerator’s still at full power, right?” she asked. Thomas checked the computer display and nodded.

She stepped directly in front of the plexiglass box, the front of her body lit by the light coming from the bulb. “Let’s just move it a little. Half a meter will do.”

Thomas nodded again and typed at the operator’s keyboard. “Got it. Ready when you are.”

“Make it so.”

Thomas hit a key. They both stared at the light inside the box. The background humming sound quickly ramped up to a loud buzz, filling the room. There was a pop, like a balloon bursting, and in a bright flash, the bulb disappeared.

They both stepped closer, their faces just inches from the clear box. The electrical cord passed through the open top of the box and ended abruptly. There was nothing inside.

Almost nothing. A soft glow gently lit their faces. It seemed to come from nowhere.

“Jan was right,” she breathed, her excitement building. “Behold, the world’s first interdimensional light.”

You've finished this short prologue, but there's much more—the Quantum Series awaits. Each book is a full-length novel grounded in science, with a few twists along the way. The series begins with...

## **Quantum Space**

**A mind-bending journey from the ultra-small to the vast stage of the Milky Way.**

High above the windswept plains of Kazakhstan, three astronauts on board a Russian Soyuz capsule begin their reentry. A strange shimmer in the atmosphere, a blinding flash of light, and the capsule vanishes in a blink as though it never existed.

On the ground, evidence points to a catastrophic failure, but a communications facility halfway around the world picks up a transmission that could be one of the astronauts. Tragedy averted, or merely delayed? A classified government project on the cutting edge of particle physics holds the clues, and with lives on the line, there is little time to waste.

Daniel Rice is a government science investigator. Marie Kendrick is a NASA operations analyst. Together, they must track down the cause of the most bizarre event in the history of human spaceflight. They draw on scientific

strengths as they plunge into the strange world of quantum physics, with impacts not only to the missing astronauts, but to the entire human race.

To get you started, here's the first chapter of Quantum Space:

## 1 Space

Sergei Koslov floated a few centimeters above his seat, enjoying the last few minutes of weightlessness. Soon enough, he would be back in the crushing gravity of Earth. Wobbly legs would be a small price to pay for the innumerable pleasures of returning home.

He glanced out the window. The gentle curve of Earth's blue-and-white horizon stood in sharp contrast to the blackness of space. Sunlight magnified the natural beauty of oceans and clouds, but it was the night side that revealed the lights of civilization. More than anything, Sergei missed the energy of a city at night—any city. He'd passed over most of them in the last three months.

*Home. Almost there.* The only thing separating him was a fiery ride down through the atmosphere.

Sergei and his two companions were wedged shoulder to shoulder in a space no larger than the backseat of a small car; cramped, but bearable for the

short ride down from the International Space Station. A pencil gently tumbled in the air. Anton Golovkin grabbed it and secured it with a clip. In the center seat, Jeremy Taylor confirmed the computer trajectory, his reach to the control panel extended by means of a small stick.

A voice in their headsets interrupted the soundless cabin. “Soyuz, ISS. *Kak pashyevayesh?*”

Sergei keyed his microphone and replied in English, “Doing well, ISS. We’re enjoying every minute. The view is much better down here. How are things with you, Nate?”

There was a slight delay in Nate’s response. “Sergei, my friend. In your haste to get home it appears you’ve left something behind. A music CD? On the cover, there’s a photograph of a beautiful young woman wearing a red scarf and... well, not much else.”

Sergei laughed. “You found it quickly, Nate. A gift, to help you Puritans in America better understand the finer things in life. I hope you will enjoy.”

“*Spasibo*, Sergei, very generous... I think. When I get home, I’ll send you some of my favorite decadence from the West. Your view of me might improve.”

The Russian glanced over at his two companions and lifted his hands in the air. “Nate Erasco? Decadence? Not possible.”

“Tell it straight, Sergei,” Jeremy said. “But you’ll miss that Puritan. You know you will.”

Three months aboard the International Space Station had been a life-changing experience that was now coming to an end. Jeremy was right. Sergei would miss waking up each day to the incredible view from orbit. He’d miss the comradery of the ISS team, especially the Americans, even Nate. Back on the ground, Russia and America were worlds apart.

Sergei shifted to his role as Soyuz Mission 74 commander. “ISS, six minutes until descent burn. Changing to frequency 922.763.”

The voice on the other end also changed tone. “Copy Soyuz, 922.763. *Bezopasnoye puteshestviye*—safe trip, guys.”

Anton pressed a key and a checklist appeared on his display. Each man flipped their helmet visor down, pulled on gloves and locked them in place.

Sergei peered once more through the small Soyuz window. Their orbital height had decreased substantially, and their speed of eight kilometers per second was now obvious. The clouds, ocean and land below raced by at high speed as if predicting the drama of atmospheric contact that would come soon.

Sergei reached out and pressed a button to engage the reentry sequence. From ports on Soyuz, tiny jets of nitrogen shot out into the silent vacuum of space, nudging them into perfect retrograde position for the final burn. A countdown clock appeared on the computer display, and as the clock reached zero, the big descent rocket behind their backs ignited and shook the spacecraft with a deep rumble. Sergei and Jeremy bumped fists. The deceleration was immediate, and they were pressed into their padded seats. A few minutes later, the burn stopped as quickly as it had started.

“Descent velocity within target envelope,” Anton called out. “Six minutes to atmospheric contact.”

The computer displayed a large yellow light, and two loud bangs reverberated from behind their seats, followed by two more ahead. Jeremy visibly twitched at the sound of the explosive bolts.

Sergei looked out the window to confirm their separation from the forward docking module and the aft rocket. The discarded parts would never make it to the ground, destined to become globs of melted metal, disintegrating in the intense heat of reentry. Their capsule would take the same path, but thermal shielding would make all the difference.

Sergei shifted in his seat, anticipating the final, but most dangerous leg of their journey. *Home. Nearly there.*

Five heart-pounding minutes passed until the first shudder rattled the spacecraft. The top of the atmosphere.

The bumps increased, and a minute later, their seats were shaking violently. The three men briefly held gloved hands and smiled through their helmet visors. The bounces were frequent and strong. Larger jolts caused the entire cabin to rattle like an old pickup truck on a washboard road. But their smiles didn't fade. They had been through worse, and home was within reach.

Sergei keyed his microphone, his voice jittery from the bumps. "Moscow, Soyuz. Atmospheric contact, descent normal. We're picking up light chop."

In his headset, a Russian voice replied. "Soyuz, Moscow, confirmed atmospheric contact, altitude one-seven-four kilometers, up range seven-two-zero kilometers. Status is green. See you in a few minutes."

Sergei's fingers dug into the armrests on his seat as the jolts increased in ferocity.

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Far below, on the flat, dusty plains of western Kazakhstan, a lonely Russian soldier stood outside his truck. He lifted his sunglasses and gazed upward. A

beautiful day, and warm by Kazakh standards, with only a light coat needed to protect from the chill of the wind. The soldier picked up his binoculars and scanned the sky, looking for the object he expected to appear at any minute.

His job was simple: visually confirm reentry and contact the operations commander at Korolyov Mission Control. Radar and GPS would do the rest, providing descent vectors and computing the exact landing site, where recovery teams would be waiting. Soyuz landings were good, but with somewhat older technology, Russia still employed ground observers just to be sure.

The soldier's patience paid off as he noticed a thin contrail high in the atmosphere, streaking west to east at high speed. He grabbed his radio from the truck's seat and spoke with pride and excitement. "Moscow! Moscow! Soyuz reentry visual confirmation at Caspian Station."

The response was loud and clear. "Caspian, Moscow. Confirmed sighting. Maintain contact."

He lifted his binoculars and located the tip of the contrail once more. But now, something was different. The air at the tip began to shimmer, as if looking through the heat above a fire. The shimmer intensified, making the air opaque and partly obscuring the view. He squinted.

An intense flash of blue-white light, blindingly bright, exploded across the sky. Reflexively, the soldier dropped his binoculars and covered his eyes. Seconds passed as the brightness faded. A massive sonic boom shook the air and the ground.

His hands shaking, he lifted his binoculars and searched again. The long white contrail lingered in the high, thin air, marking the reentry track. But the contrail ended abruptly, and beyond it there was no spacecraft. No movement. No parachute. Nothing but empty sky.

The spacecraft was gone, as if it had never been there.

Confusion overwhelmed the soldier. *The blue flash... what? The boom... an explosion?*

He dropped his binoculars and for a full minute scanned the sky with his own eyes. He could pick out the remains of the contrail, wisps of white but nothing more. A minute later, a demanding voice burst from his radio.

“Caspian, Moscow. We have lost radar contact. Report!”

The soldier picked up the radio, collecting his thoughts before keying the microphone. He shook his head and kicked the tire of his truck.

“Blyad!”



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