

Cold Storage

by E.S. Strout

The Big Bang marked the beginning of the Universe - and that of its antimatter equivalent.

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1.

Pasadena, California. Unscheduled NASA-JPL meeting, Monday, December 11, 2006.
1020 hours:

“What’s so important, Rachel?” Astronomy Department Chairman Leon Benson asked.

Twenty-eight year old astronomer Rachel Leah Meyer shoved her hands in the pockets of her lab coat to conceal their tremor. “It has to do with the recovered material from the Stardust Wild-2 comet mission.”

“I’m sensing a problem,” he said with a puzzled single-eyelid squint.

“We have a mystery. Some of the polycyclic aromatic hydrocarbons and mineral particles have disappeared.”

An ominous silence spread like a thundercloud over the assembled group of astronomers. “Disappeared, you say,” Professor Benson remarked. “How?”

Rachel brushed dark tresses from her softly angular tanned Sabra features. “Unknown, sir. We’re working on it.”

“This is most unfortunate,” Professor Benson said. “Some personnel replacements may be in order.”

“Please wait. I’m looking for some outside help.”

“Do what you have to, Dr. Meyer. Keep me updated.”

2.

“I could be out of here if I don’t find an answer, Ed,” she complained later to fellow astronomer Edgar Fallon.

“Yeah, me too. Any ideas?”

“I have a friend who took a Fellowship with Professor Paula Jane Lynch at NASA in Cape Canaveral.”

“Lynch? Sounds familiar.”

“One of the top experts in subatomic particle physics. She discovered the antigraviton and won a Nobel Prize.”

“Oh, yeah. I remember now. Rumor is, she’s working on a graviton-antigraviton drive for spacecraft propulsion. Give her a call.”

Rachel exhaled a sigh. “I tried. It’s restricted access.”

“Have you talked to NASA?”

“Them and our liaison guy at D.O.D. No help.”

“Try your friend.”

3.

December 12. 0930 hours:

Rachel punched a saved number on her cell phone.

“Stanford Subatomic Physics Lab. Iverson here.”

“Sara? It’s me, Rachel.”

“Hi, pal. How’s Pasadena? How’s your love life?”

“Stagnant as usual. Listen, I need a gigantic favor.”

“I know a couple of single astronomers at UCLA. Want their phone numbers?”

“No. Professor Lynch’s.”

The silence was deafening.

“Sara?”

“This better be damn important, Rachel. That number is known to less than ten people.”

Rachel explained.

“Replaced? Oh wow. Give me a secure fax number.”

“I owe you, Sara. Big time.”

“It’ll cost you a trip to Maui.”

4.

1030 hours:

“You have a nanosecond to provide some identification. GPS tracking has triangulated your location and FBI agents will arrive within ten minutes to arrest you,” a soft contralto voice threatened.

“Rachel Leah Meyer, Professor Lynch. I . . .”

A pause. Clicking of computer keys. “You’re one of those JPL hotshots. My curiosity will gain you a full second. Please tell me how you came by this number.”

“I swapped Sara Iverson a vacation in Hawaii for it.”

“Sara’s one of mine. Wait one.” More keys clicking. “Okay, I have called off the cops. Please explain.”

Rachel did.

“And EM studies confirmed these findings?”

“Inconclusive at 60k magnification.”

“Do you have a disc recording?” Paula asked.

“Also inconclusive. I need an answer.”

“Very direct, you are. I like that. And please call me Paula.”

“What happened on the Stardust mission, Paula? I’m at a loss.”

A soft chuckle. “I would have done it faster.”

Silence.

“I know you’re there, Rachel. Wild-2 is one of the oldest comets we know. Am I right?”

“Four-point-six billion years. How could you have done it faster?”

“Tell me about that new one, C/2006 W23 Koslov.”

“How could you have done it faster?”

Another chuckle. “Persistence. An admirable quality, Rachel. Please bear with me.”

Impatient sigh. “Koslov is an intergalactic comet just entering our Sun’s gravitational field. Discovered by astronomer Andrei Koslov in St. Petersburg. Analysis of radioactive decay of isotopes in its tail tells us it’s at least fifteen billion years old.”

“How far away?”

Deep breath, slow exhale of frustration. “Hubble-II data says fifteen million miles, plus or minus a mil.”

“Remind me please, Rachel. How long did the Stardust mission take for its three million miles round trip?”

“Seven years. What’s that got to do with . . . ?”

“Wild-2’s been moving away, right? A second Stardust mission would take two or three times as long. Can you wait twenty years for an answer?”

Silence.

“I could have done Stardust-1 in less than a day.”

Rachel’s voice was a shriek, a half decibel above middle C. “Impossible!”

“Thank you for letting me finish,” Paula said gently.

“I’m sorry. I just can’t believe . . .?”

“May I continue?”

“Please.”

“You will need to get to a scrambler phone.”

5.

Twenty minutes later:

“My security people have checked your land lines. We can converse safely.”

“Please, Paula.”

“Antigravitons can cancel gravitational forces in amazing ways. They have overturned some of Einstein’s theorems.”

“And this helps me how?”

“I’ve been conducting some classified experiments up at the Delta Echo space station. You have shown up at an opportune time, Rachel.”

Her voice quivered with excitement. “You can help?”

“Perhaps. What’s your security clearance?”

“Omega-5.”

“You will need O-7.”

“Damn,” Rachel whispered.

“Do you still have the specimens?”

“Yes. I’ve put the surviving aerogel sheet in liquid nitrogen.”

“Good. Please bring them all to Cape Canaveral.”

6.

Subatomic Physics Laboratory, NASA complex, Cape Canaveral, Florida. Monday, 18 December. 1130 hours:

Rachel handed over her I.D. card. “Professor Lynch is expecting me.”

The Air Force MP checked the scanner printout with a dubious eye. “Omega-5? I don’t know. Let me check with the Prof.”

“She’s been upgraded to Omega-7, Sergeant.” Professor Lynch said over the intercom. “Please show her in.”

“Welcome, Rachel.” Paula extended a slender hand.

She stared. Dr. Lynch was a tall attractive woman with shoulder-length curly auburn hair, piercing gray-green eyes and clear polished nails. She wore a white lab coat over an

oversized blue NASA sweatshirt and Levi's. White Reebok running shoes and no socks.

"Do I pass inspection," Paula asked with a Mona Lisa smile.

An embarrassed blush. "Sorry."

"Don't be. Curiosity is good. Please come in."

Rachel gaped again. The small office held a government-issue gray metal desk. A G-5 PowerMac and disorderly piles of documents were arrayed on the desk top. There was a visitor's chair heaped with sheets of hardcopy. A framed classic *Blade Runner* movie poster adorned one wall and a *Stars of NASCAR* calendar another.

Paula dumped the hardcopy to the deck.

"Please sit, Rachel. Do you like Mozart?" She pressed a remote. Muted strains of his *Serenade in G* flowed from hidden stereo speakers. "Helps me concentrate. Want some coffee?"

Negative head shake.

"Good choice. NASA coffee is toxic."

Paula said, "Please show me the aerogel collections."

Rachel withdrew the preserved aerogel sheets, photos and paperwork from her briefcase and laid them on the desk. "The branching cone-shaped defects were particle impacts."

"Good tracks," Paula noted. "And the particles were disappearing?"

"Yes."

"Did it stop?"

"As soon as each individual particle was destroyed."

"Mm-hmm. Time frame?"

Rachel flipped pages. "Three hours to onset after exposure to room air. Complete in five hours, thirty-eight minutes. The sheet I saved had only been exposed for an hour."

Paula smiled. "Back in liquid nitrogen. Good thinking. Show me."

Rachel produced an insulated gray cylinder from her briefcase.

"Let's bring it to the lab."

7.

The windowless laboratory space was lit by banks of fluorescent fixtures and a single skylight. It was crowded with scientific equipment, computers and CRT monitors. A late model transmission electron microscope rested in its own cubicle.

“Tony, we’ve got a hot one,” Dr. Lynch said. “Let’s crank up the Hitachi.”

“Tony Nakamura,” the young Asian man introduced himself. “I’m Dr. Lynch’s postgraduate Fellow.” He flipped a series of switches on the EM control panel. “Ready.”

Paula said, “This is a frozen sample from JPL’s Wild-II excursion. Let it thaw slowly. Use the wide angle lens. Sixty thou mag first, then get a time track at 1.2 mil.”

“Won’t we lose resolution at such magnification?” Rachel asked.

“We’re looking for changes in atomic structure, not molecular.”

They peered through duplicate eyepieces. “Sixty thousand mag,” Tony said. “Here’s a nice magnesium olivine crystal.”

Paula nodded. “It’s missing something.”

“Partial molecular disruption,” Rachel said.

Tony tapped computer keys. “Burning a timed CD at 1.2 million mag.”

Paula said, “Well done. We’ve got some time. Let’s all go get some lunch. Rachel’s buying.”

8.

1430 hours:

“Watch the screen,” Paula said. She clicked a remote. “Tony programmed the playback to stop at any change in the atomic structure. Here’s one.”

“Yikes,” Rachel breathed. “The olivine atoms are breaking down.”

Paula nodded. “Yes. How?”

Rachel took a breath, cupped her chin in one hand. “Something on the subatomic level. Free radicals? Helium or hydrogen ions?”

“Those don’t destroy matter, Rachel. When was Wild II formed?”

“At least 4.6 billion years ago.”

“Okay. Lots of subatomic stuff was still circulating in our evolving universe. And some of it got caught in a newly formed comet. Something that should have gone elsewhere.”

“OmiGod. Antimatter.”

Dr. Lynch gave her a high five. “Yes. Equal amounts of matter and antimatter were formed at the Big Bang. Many physicists believe the antimatter created a separate universe. So do I.”

“Some of it was trapped in Wild-2,” Paula added. “It was still active enough to attack your particulates when thawed.”

“Antimatter is free positrons,” she continued. “They annihilate electrons, thus causing disruption of individual atoms, then the molecules they comprise. We can use antimatter. Positron emission tomography, PET scans. It’s a diagnostic tool to produce images of internal body organs.”

“PET scan. That’s homemade antimatter,” Rachel said. “It’s been tamed. The Wild-2 antimatter is feral.”

“It is, indeed.”

9.

“Why did you ask about comet Koslov, Paula,” Rachel asked.

“It’s much more intriguing than Wild-2. Five times older.”

A smile broke through Rachel’s dour countenance. “And you can reach Koslov just as easily as Wild-2.”

A barely perceptible smile. “You can’t blink an eyelid so fast.”

A shriek of incredulity. “Boggles the mind!”

Dr. Lynch covered her ears. “No need to shout, Rachel.”

A whisper. "Sorry."

"Much better. Want a crash course?"

Vigorous head nod.

Paula tore a sheet of blank note paper from a pad, laid it flat on a lab bench. She made two dots six inches apart with a black Sharpie marker pen. "Antigravitons can affect space in some unusual ways, Rachel. This first dot is us. The second dot is *Koslov*, okay?"

Another nod.

Dr. Lynch folded the sheet so that the two dots lay superimposed. She tapped on the conjunction with a clear polished fingernail for emphasis. "Antigravitons can produce folds in space, thus."

Stunned silence.

"Can you get current celestial navigation charts for comet *Koslov*?"

"Yes."

"I have a probe fueled by antigravitons."

A gasp. "At Delta Echo?"

"Yes." She clicked a remote and a 70-inch plasma screen came to life. "The tapered cylinder in the docking bay is *Infinity-1*. It completed a circuit around our local black hole, *Sagittarius-A*. Round trip of fifty light-years in 0.21 nanoseconds."

Blink of dark irises. "Incredible."

"Yes it is. A second *Infinity-1* mission might resolve your JPL situation. Proof from the earliest subatomic particles ever recovered. And they are only nanoseconds away."

An ecstatic yelp. "When can we start?"

Paula glanced at her watch. "1730 hours. Happy Hour at the Officers Club. Let's go get a drink."

Flush of agitation. "But we must . . ."

"Don't go anal-retentive on me, Rachel. Relax. There is another consideration we must ponder."

10.

The Officers Club. 1800 hours:

Dr. Lynch chose Stoli rocks with a twist. Rachel opted for Diet Pepsi. “What other consideration?” Rachel asked.

Paula stirred ice cubes with a fingertip, took a swallow. “A possibility we haven’t discussed.”

“What?”

Dr. Lynch pressed her fingertips together, elbows on the table. “Antimatter we recover from Koslov will be from much earlier in the Universe’s history than Wild-2’s. Its reactivity will be unpredictable.”

“I’ve proven that cold stops antimatter,” Rachel argued.

Paula nodded. “True for Wild-2’s. But for Koslov . . . ?”

Rachel made a fist. “I’m a scientist, Paula. So are you.”

“It’s *terra incognita*, Rachel.”

“It was for the Apollo Eleven astronauts in 1969.”

Paula smiled, motioned for a refill. “Your enthusiasm is refreshing, Rachel. Show me the design of the aerogel collection device.”

Rachel sketched on a cocktail napkin, added dimensions. “It unfolds to about the size of a tennis racquet.”

Paula took the pen and scribbled some equations. “Hmm. This could be another problem.”

“Oh no. What?”

“The probe can’t return to Delta Echo with this size and configuration of payload . . .”

Rachel exhaled a sigh of abject frustration. “Damn. So close.” She signaled the waiter. “Bring me what Dr. Lynch is having.”

“Good choice,” Paula said. “As I was about to say, a modification of the delivery system may be possible.”

Silence.

“A detachable module could carry the aerogel samplers.”

Rachel took a large swallow of her Stoli rocks. She made a gagging sound and blinked several times. “Wow.”

“Don’t guzzle,” Paula said. “Vodka is an acquired taste.”

Rachel took a small sip. “Can you design one?”

“I can.”

Dr. Lynch sketched on a second cocktail napkin. “It can be released when the probe returns to normal space. The aerogel modules will parachute to earth after they re-enter the atmosphere.”

“All right! I’ll get the collection units.”

“Good. We might be able to surprise your JPL honchos.”

“And keep me employed.”

Paula smiled, rattled the ice in her empty glass. “Your turn to buy a round.”

11.

U.S. Army Proving Ground, Dugway, Utah. Tuesday, February 6, 2007. Projected desert landing site. 1043 hours:

“Separation occurred seventeen minutes ago. We should see the parachutes any second now,” General Rinker said.

Rachel peered into the cloudless blue glare of the desert sky. “There.” An unbelieving squint. “Just one cluster of parachutes, General.”

Rinker grabbed a field scrambler phone. “General Rinker here. Where’s the other module? You’re sure? Confirmed by two Air Force satellites? Damn.”

Raised eyebrow from Paula. “Problem, General Rinker?”

“One module detached early. Parachutes failed to deploy. Satellite tracking has it buried under a mile of ice in Antarctica.”

Rachel gnawed a fingernail. "Oh no."

"Easy, Rachel. We have an intact module," Paula said.

12.

Wednesday, 7 February. Subatomic Particle Research Laboratory, NASA Complex, Cape Canaveral, Florida. 0730 hours:

Overhead fluorescents glinted off the tiled walls and glassware of the research lab as Rachel, Paula and Tony gulped noxious NASA coffee.

"You ready with those extra liquid nitrogen canisters I requested, Tony?" Paula asked.

He rubbed his eyes, yawned, nodded. "Got the EM receptacle packed with dry ice, too."

Paula swallowed two Extra Strength Tylenols with another gulp of the lethal coffee. "Good. You're up, Mr. Nakamura."

Tony removed one of the unfolded aerogel sheets from liquid nitrogen with a tempered glass forceps, placed it in the EM scope enclosure.

They viewed the samples at 300,000x magnification. "Different than the Wild-II specimens," Rachel noted.

"I'm not surprised," Dr. Lynch said. "Carbon, boron, magnesium atoms. Very few complex molecules. Let's see 1.2 million mag, Tony."

"They're thawing."

"We'd better be quick, then," Paula said.

"Something different here, Prof's," Tony said as he peered through the binocular eyepieces. "Carbon atoms losing electrons. Much faster antimatter reaction."

Paula said, "Hmm. Where will it go next?"

"Oh God," Rachel whispered. "The aerogel silicates are decomposing."

"Paleontologic antimatter," Paula said. "Step away from the scope, Tony. Quickly. Stand by with those liquid nitrogen canisters." She grabbed the aerogel sheet from the scope enclosure with an insulated glove. "Assure me this is all on disc, Tony?"

"Every second, Prof."

Rachel's eyes widened in shock. "Your glove, Paula. Decomposing. Oh no. The glass forceps too."

"Everything into liquid nitrogen. Now, please, Tony," Paula said in a soft but compelling voice. "Try not to let anything drip."

Rachel gasped. "Did any get on you, Paula?"

She inspected both hands. "Whew. My nail polish is intact."

13.

1022 hours:

"We were lucky," Dr. Lynch said. "It's asleep. My team on Delta Echo will load it on *Infinity-1*, dump it a trillion miles in deep space."

"Do I get a raise?" Tony asked.

Paula tapped his fist with hers. "Perhaps."

Rachel hugged herself to quell the tremors. "Close call."

"Back in cold storage," Paula said. "Enough data for another Nobel Prize." She handed Rachel two CD copies in a double plastic sleeve. "Your JPL folks will enjoy these."

14.

Vostok, Antarctica. Combined Russian-American research station near the South Pole. Coldest spot on Earth.

"What's this, Gennady?" technician Robert Emerson asked as he eyed the deep ice core artifact from Lake Vostok.

"Beats the heck outta me, Bob," Professor Andreyev said. "Looks like a piece of silicon mesh. Like that aerogel stuff the Wild-2 NASA mission used. Wonder what it's doing here. We'd better call somebody."

"Let's thaw it out. Maybe there's a reward."

The End