Shattered Sun

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Prologue

4.6 billion years ago, primordial hydrogen and other elements synthesized by the first 20 minutes of the Big Bang formed a nebula, 65 light years in diameter. A fragment of this molecular cloud moved into the center, collapsing under its own gravity into the star that we now call the Sun. The rest of the mass collected into a disk, which then formed multiple balls of gas and rock, one of which is special; the Earth. This is how our Solar System was born.

The Sun is a massive ball of plasma, consisting mainly of hydrogen, helium, and some other heavier elements. Like all stars, it radiates away energy in the form of heat and light from the nuclear fusion that happens in its core, transforming hydrogen into helium. The Sun will become a red giant after it exhausts the hydrogen in its core, soon fusing the helium into carbon instead, expanding and being more unstable in the process. Finally, it will eject its outer layers, exposing the core inside. This core will stop shining after trillions of years, becoming a black dwarf; an iron shell of what the Sun had once been.

Stars much larger than the Sun however, do not fade into obscurity at the end of their lives. Instead, they explode into a supernova, an event even brighter than that of an entire galaxy; and then they collapse into a black hole, an object so dense that anything that falls into it is completely stretched thin in a process called spaghettification. Black holes are completely dark and unseeable; they absorb all light and emit nothing back. We can only detect them because of how they affect their surroundings.

When a star closely passes a supermassive black hole, like Sagittarius A*, the black hole in the center of our Milky Way galaxy, the gravity of the black hole is so strong that it pulls apart a spaghettified stream of matter from the star into its orbit; this is called a tidal disruption event. If the supermassive black hole eats up the star, by absorbing the matter in orbit after a tidal disruption event, or by simply swallowing the star whole, the black hole is given a new name: ‘quasar’

Astrophysicists have been extremely fascinated by quasars ever since their discovery in the 1950s. Quasars are beautiful, bright, and dangerous; they are one of the most luminous phenomena in our universe, with an energy output orders of magnitude higher than that of our Milky Way, which contains 400 billion stars. They radiate away this energy across all wavelengths, from radio waves to gamma rays; waves with frequencies even higher than that of X-rays.

In the present day, scientists like me have been trying to figure out how to

harness energy from space in order to counteract the dwindling resources here on Earth, while supporting all of humanities' energy-intensive infrastructure, which has ramped up in consumption in the previous century. The problem of energy has plagued the advancement of our technology, and caused humanity to adopt ineffective, inefficient and infeasible solutions, destroying the planet that we all live in, the planet that I love.

I believe that the key to this unpickable lock lies in the quasar. If we somehow manage to harness the power of a quasar, we would have 100 duodecillion joules of energy per second at the tip of our fingertips. We would rule the galaxy with Earth at its center, just like how the supermassive black holes that make quasars remain in complete gravitational control of entire galaxies. We would have enough energy to sustain the conquest of humanity until the heat death of the universe.

And I believe, that with my blood, sweat and tears, I have finally forged this key for humanity to use.

Chapter 1

Luminescence

The Earth is a polluted and disgusting mess. It's been scarred by centuries of misuse and abuse at the hands of humanity. All of its natural resources have been exhausted; rivers trashed, lakes dried up, forests shaven clean and mountains bored completely through. But there are still some places of relative paradise here in the desolate Terran wasteland; I, for one, live in a particularly peaceful prairie in the middle of what had once been the Chinese border together with my husband. While the lithosphere on Earth has been thoroughly ruined, the sky still remains clear, unscorched and uncaring of the events of the past millenia. Looking up, I am still bombarded by the blue tint stretching from horizon to horizon, I can still pretend like I could eat the clouds above that look like tasty white cotton candy, and I can still feel the rays of the Sun absorb on my cheeks as I wake up in my window-side bed in the morning. It's a wonder how the sky could live on as the beautiful thing that it was centuries ago; my great-grandparents, their children, and their children's children all remember the sky in the same way, because the sky looked the same to all of us.

Nothing compares to the beauty of the Earth; not the luminous white flowers that sprout out of the pitch black soil in Eclipta, nor the saturated mesa-like color bands of the mountains in Geraea. I've been to every single planet that humanity has colonized ever since we perfected faster-than-light galactic travel, and even though their features have remained unaffected by the destructive gaze of humans, I wouldn't look at them the same way as I look at the Earth; my home.

This patch of land that my family has been living in was gifted to us by the Galactic Council, the administration that governs over each and every planet that humanity has spread to. I was the proponent of capturing relativistic jets from far away quasars as a source of energy, the technology that we now call 'relative capture'. Relative capture has removed the barrier of limited energy in research and technology, which has allowed us to funnel gigantic amounts of power into our systems without wasting a single gram of a planet's natural resources. Without relative capture, humanity would not be colonizing and naming thousands of planets after plant genera; without relative capture, hu-

manity would not be able to terraform uninhabitable planets, or transmutate common materials into the rare elements that are only found in the dust clouds of supernovae.

I had retired from astrophysics 5 years ago since my job had been fully done at this point; relative capture has been reaching its practical limits, and there is pretty much nothing that can be done to optimize it further. The energy of a relativistic jet from a quasar billions of light-years away would have redshifted by a lot before it reaches the Earth; nothing can be done about that unless nearer quasars just somehow come into existence. The only thing that relative capture actually does is redirect the jet into a collector; it cannot amplify the jet or create energy from something that isn't already there.

I miss the life of a researcher, and I wish that there was more to do; but frankly, I enjoy resting in the countryside with my husband even more.

"The night sky is so gorgeous today." I said as I lie down in the recently-cut grass, looking up at the black-blue sky. I give a short glance to my husband Rufus, wondering if he's also admiring it.

"Indeed it is." he replies. "It's also gorgeous how it's been years and you still make it a thing to always point it out."

"Indeed I do. Well, the thing is that it always is beautiful."

"Yes. But I'm reminded more of how fucked we are when I look at it."

"Why is that?"

"We've been trying to darken the sky ever since the Industrial Revolution. We've made all the effort to deface it just because, yet the only thing that happened is that it became gray for like, a century. That's barely a blip in the whole scheme of things."

"If this is what you think about every single time that we've lied down here, then you'd be even more fucked than 'we' are." I retort, jokingly.

"But it's true, isn't it?"

"I'd rather the sky didn't become gray for a century. If we'd continued down that path, it would've been like that until the end of time instead."

"That's also true. Thank god, I guess."

"I guess?" I exclaim in feigned disgust.

"I'll get some more nachos." he said, giving me a sly smirk and gets up out of reach of my arms. "You ate them all and left me nothing, you monster."

"You know I love nachos. And karma. Do get me some more though."

The widespread usage of relative capture as the primary source of energy on most planets have made the night even prettier; in my opinion, at least. Bright yellow streaks litter the sky; those streaks are of the relativistic jets of different quasars being redirected into the planets governed by the Galactic Council. It's impossible to see, but those streaks are curved with the radii of thousands of light years, angled incredibly precisely, in order not to miss the collectors and wreak guaranteed havoc on what unprotected matter lies beneath. While yes, the energy would have dissipated from travelling in empty space for what used to be an unimaginable distance, the ionized matter would still be carrying joules of energy in the range of decillions. For context, humanity, even now with our massive energy usage, have only used 521 yottajoules of energy in total since

the dawn of time. Total relative capture would provide way more than that in a single second, and what it could generate in this singular second would last humanity even beyond the final minimum entropic years of the universe.

Of course, no one needs this much energy, so relative capture is toned down by a lot. But in theory, it would be possible to achieve total relative capture with the machines that we use today. But imagine, imagine if the relativistic jet somehow misses the target collector and absorbs into the ground; what damage would be done to the exposed planet below? I pray that this scenario would never play out in real life, the way that it replays in my head every time I notice the magnificent yellow lines in the sky.

"Sorry for the wait. I melted some cheese too. Leave some for me, okay? I made this cheese for me, not you. I'm merely letting you share."

He notices something on the corner of his eye, something that he'd never seen before. He froze just above my field of vision; I look at where his eyes were pointing at, and a spectacular sight cuts all of my focus on the view of the Milky Way galaxy around it.

A yellow beam of light.

This beam of light isn't anything that I've seen before. The ray becomes more intense and lengthier with each second that passes. It curves around Sagittarius A*, revealing the position of the black hole that normally isn't visible to the naked eye. The beam weaves through stars like a line in a dense scatter plot; it intersects with many of the relativistic jets that are being absorbed by relative capture machines on other faraway planets. These things; the beam, the stars and the jets create a system of lines and points in the sky; a constellation where the lines are drawn out for you. Space has become the drawing board for our civilization, and the sky is the projection of it into two-dimensional space.

"That is the most awesome thing that I've ever seen in my life." he says.

I remain pinned in place on the ground, centering the growing end of the beam in my vision. I start to realize the disaster that is happening. This is a relativistic jet.

"Helia, are you okay?"

I don't reply.

Chapter 2

Oblivia