

# BETWEEN PARTICLES AND PROTOSTARS

You're going to take a brief journey with me, and it begins with a spoon full of sugar. Each sugar granule is a star. This is how many stars you can see in the sky with your naked eye.

Up in that very same sky, there is an object that looks much like a star, but it's really a planet. Orbiting that planet is a large rock. This rock is actually a small moon only eight miles in diameter. If this moon were a container for our sugar granule stars, all of the stars existent in the universe could just barely fit inside it.

Each one of those sugar granules represents a huge sphere of burning matter that produces a vast amount of energy through nuclear reactions within its core. One such main-sequence star exists only eight light-minutes from where we're at right now. It's a short trip if you could travel at the speed of light, but that's a hundred and fifty million kilometers. If it wasn't for the issue of our health and our terribly short life spans, it would be an amazing, albeit extremely time-consuming, adventure. You would never again be up against something so massive.

If you took all of the other planets in our solar system and smashed them into a large ball, the sun would be seven hundred and fifty times bigger. That's over three hundred thousand times the size of our tiny planet.

The next closest star to us is called Alpha Centauri, and it's a short four light-years away. That's forty-trillion kilometers.

There are seventy-nine other star systems within twenty light-years of where we are, and there is a total of about one-hundred-billion stars within our galaxy. The Milky Way is a comparatively large galaxy, so immensely huge, so indescribably gigantic that at any given time, there is likely to be about nine-hundred intelligent, technologically-capable civilizations in existence in this galaxy alone. We are just one of them.

Even further out, there are wonders that can rival even that of your imagination. There are beautiful nebulas that are slowly collapsing into protostars and slowly reaching the main sequence. Some will fade, some will collapse and form another nebula, and others will explode in a massive supernova, creating neutron stars, pulsars, and if they're large enough, they will form a black hole so massive that not even light can escape its pull. Beyond the black hole's event horizon, time stops and matter collapses into infinite mass.

The universe may be finite without boundaries, and the only material that's keeping it together has not even been discovered yet.

It may not hold together for long, though, at least on a cosmological timescale. It's continually expanding and doing so faster and faster. All of the galaxies in the universe may eventually be ripped apart in a Big Rip, or it may boomerang back into a Big Crunch, back to the point of the big bang, or maybe the universe will burn out in a Big Chill. Existence may just go on existing, if not in our universe, then maybe in others.

Every day, you go about your life oblivious to all but three spatial dimensions, when three times that many actually exist. Curled, they are, into the tiniest space theorized to be possible, far tinier than our original granule of sugar.

A granule of sugar is comparatively quite large, because within a granule of sugar there are smaller bits of matter, molecules, each molecule made up of carbon, hydrogen, and oxygen atoms. Within each atom there are protons, electrons, and neutrons. Within those particles there are quarks, and within quarks there are other, smaller particles, and within those particles, there are other, even smaller particles.

Somewhere, deep down inside, beyond matter, beyond particles, beyond the limits of human knowledge, there rests the makeup of your soul—and that's all that matters.

The best way to stay grounded in the universe is to just forget about the big picture.

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