

Title: Tiny Particles, Big Questions: My Journey into the Universe's Deepest Secrets

Dear 12-year-old me,

This is a letter from your future self. Right now, I'm 24 years old and a graduate student at the University of Tokyo. Surprised? Yes, you really do get into the University of Tokyo! But more importantly, I want to tell you about the amazing journey you'll take and the science that will capture your heart.

Do you remember the time you watched that movie with black holes and time travel? You couldn't stop thinking: "Could any of that be real?" That question stuck with you, even when others thought it was just science fiction.

Well, here's the exciting part: some of those things might not be fiction after all. That's where my journey began—not with textbooks, but with wonder.

(1) What I'm Studying Now

I study something called particle physics, or more specifically, elementary particle physics. That might sound complicated, but let me explain.

You already know that everything around you is made of atoms. Atoms are incredibly tiny—but guess what? Even atoms are made of smaller parts. The center of an atom, called the nucleus, contains protons and neutrons, which are made of even smaller particles called quarks. The electrons orbiting the nucleus are also fundamental.

These tiny things—quarks, electrons, and others—are called elementary particles. So far, they seem to be the smallest building blocks of everything in the universe.

You might think there are hundreds of these particles, just like the 118 elements in the periodic table. But surprisingly, our best theory—called the Standard Model of particle physics—needs only 17 of them:

- 6 quarks

- 6 leptons (like electrons and neutrinos)
- 4 force-carrying particles (like the photon for light)

and the Higgs boson, which gives particles mass.

With these 17 particles, we can explain almost everything around us—from how the Sun shines to how magnets work. But here's the twist: this model, amazing as it is, doesn't explain everything.

It can't tell us what dark matter is, or why the universe exists at all. That's why I study theories beyond the Standard Model—to explore the deep questions that still don't have answers.

(2) Why I Find It Fascinating

I love this field because it connects the smallest particles with the largest mysteries in the universe.

Imagine this: scientists think the universe began with a huge explosion called the Big Bang. But right before that, there was something even weirder—an instant, super-fast expansion called inflation. In just a tiny fraction of a second, the universe grew from smaller than an atom to the size of a basketball! At that time, it was made entirely of elementary particles.

So by studying these tiny particles, we're really trying to understand the origin of everything.

Also, this science lets us explore wild ideas: black holes, wormholes, and even extra dimensions. You've seen these in movies, right? A wormhole, for example, is like a tunnel through space that could take you to another galaxy in seconds.

We don't know yet if they exist—but some real theories say they might. That's what's so exciting. Science can take you from questions in your imagination to real possibilities in the universe.

(3) Advice to My 12-Year-Old Self

Now, a few things I wish I had known when I was your age:

1. Make real friends.

You don't have to do everything alone. In science—and in life—working with others makes things more fun and more powerful. You'll meet people who think differently from you. That's a good thing. You'll learn from each other.

2. Take care of your body.

Studying is important, but so is moving your body. Run, play sports, ride your bike—whatever makes you sweat. It'll help you think better, feel better, and stay balanced.

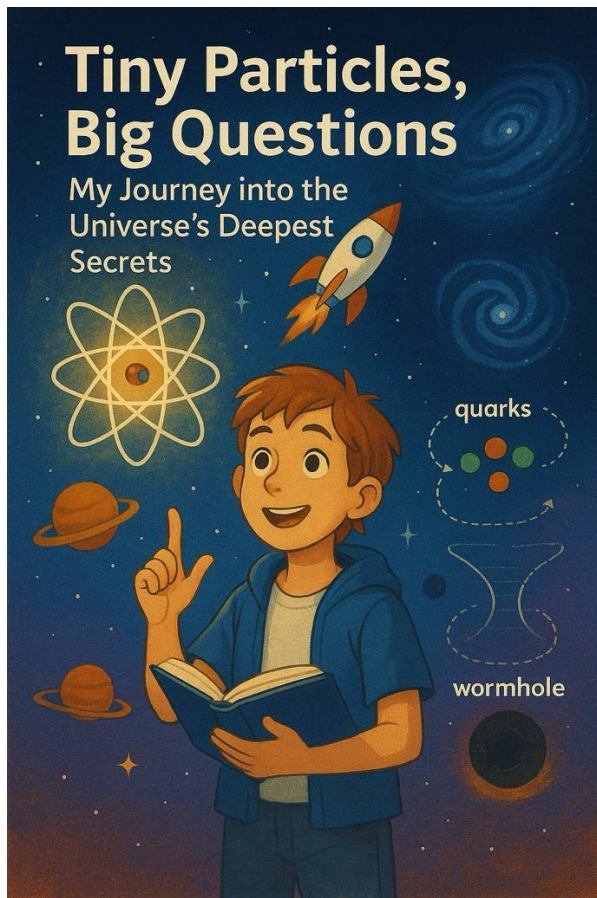
3. Trust your curiosity.

Sometimes adults might say, "That's just the way it is," or "You're asking too many questions." But your questions are important. If something doesn't make sense, keep asking. That curiosity will be your greatest strength.

You don't need to know everything. I still don't. But if you keep following what excites you, you'll go far. You might even help solve some of the biggest mysteries in the universe.

So stay curious, keep playing, and never stop wondering.

From your future self



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