

Finding the Joy of Science

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Do you like science? Or is there something you enjoy much more than studying? When I was in junior high school, I did not like studying. I loved basketball and video games much more. Now, however, I study the Sun in graduate school, and I work every day toward my goal of becoming a researcher (I still like basketball and video games, of course!) In this essay, I would like to explain how a student who did not like studying came to want to become a scientist. After reading this, you might also begin to imagine yourself choosing the path of science one day.

As I mentioned above, I did not like studying until I was in junior high school. I was good at mathematics, but I was not good at Japanese, social studies, or science. On school tests, I often scored below the average. However, when I started learning physics in high school, I found it very interesting. Compared with the science I had studied before, physics required less memorization, and I discovered the joy of describing natural phenomena using equations. After that, physics became my strongest subject.

Around that time, I had a meeting with my homeroom teacher. During the meeting, my

teacher told me about the Physics Olympiad and encouraged me to participate. Looking back, I think this was one of the events that changed my life.

The Physics Olympiad is a physics contest held once a year. In Japan, the domestic contest consists of a preliminary round and a national round. In the preliminary round, students solve theoretical problems based on basic high-school physics. Some of the problems look simple at first, but they are actually very deep. Students also submit a report on an experiment. Based on the results of the preliminary round, about 100 students can move on to the national round.

The national round also usually includes both theoretical and experimental problems, although when I participated, it was during the COVID-19 pandemic, so we only had online theoretical problems. In the national round, some problems are based on physics that students usually learn at university, such as relativity. Other problems are based on familiar things, such as snow crystals. These problems are designed so that high school students can solve them, and they also show that physics is much broader than what appears in school textbooks.

Through these problems, I realized that physics can explain an amazingly wide variety of phenomena. This made me want to study physics as a researcher in the future. I also joined an online meeting where participants in the Physics Olympiad could talk with one another. It was very exciting to talk about science with other students who were interested in physics. After the Physics Olympiad ended, the memories of these events motivated me. I studied hard for the university entrance exams, entered the University of Tokyo. When I was a third-year undergraduate student, I became fascinated by solar physics in a class. Now, I am a graduate student studying solar physics.

Like the Earth, the Sun also has an atmosphere. However, the Sun's atmosphere is extremely hot. Because of this, many of the particles in it are separated into atomic nuclei and electrons, and they become electrically charged. This state of matter is called plasma. The surface of the Sun has a temperature of about 6,000 degrees Celsius. However, a region high above the surface,

called the corona, has a temperature of about one million degrees Celsius. This is very strange. The Sun's energy is produced by nuclear fusion at its center, so we might expect the temperature to become lower as we move farther away from the center. In reality, the corona, which is farther from the center than the surface, is much hotter. Scientists still do not fully understand what physical mechanism keeps this temperature structure.

One possible answer involves turbulence. Turbulence means complicated and irregular motion, like swirling water in a river or unstable air during a bumpy airplane flight. In the Sun's atmosphere, plasma and magnetic fields move in a very complex way. This motion may help carry energy and heat the corona. My research focuses on this turbulence.

The corona is not found only around the Sun. Similar structures can also appear around other stars and even around objects such as black holes. Therefore, by studying the Sun's corona, we may also learn more about many different objects in the universe. Turbulence exists not only in the corona, but also many kinds of phenomena, so understanding turbulence is very important for understanding the universe.

The science we study at school is connected to a much wider range of phenomena than we might imagine. I did not realize this when I was in junior high school. For me, the Physics Olympiad showed me how exciting physics could be. It helped me see that science was not just a school subject, but a way to understand the world and even the universe.

I would be very happy if this essay helps you become more interested in science. Even if you do not like studying now, one experience may change the way you see the world. That kind of moment may become the beginning of your own path toward science.

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