

So, You Want to Be a Physicist?

If you're very curious and creative, physics might be the field for you. Physics is the science that studies energy and matter and how they interact. These scientists try to answer big and small questions about the universe. What are stars made of? What makes the tides go in and out? Most physicists do research to try to answer these questions. They teach and write about their experiments.

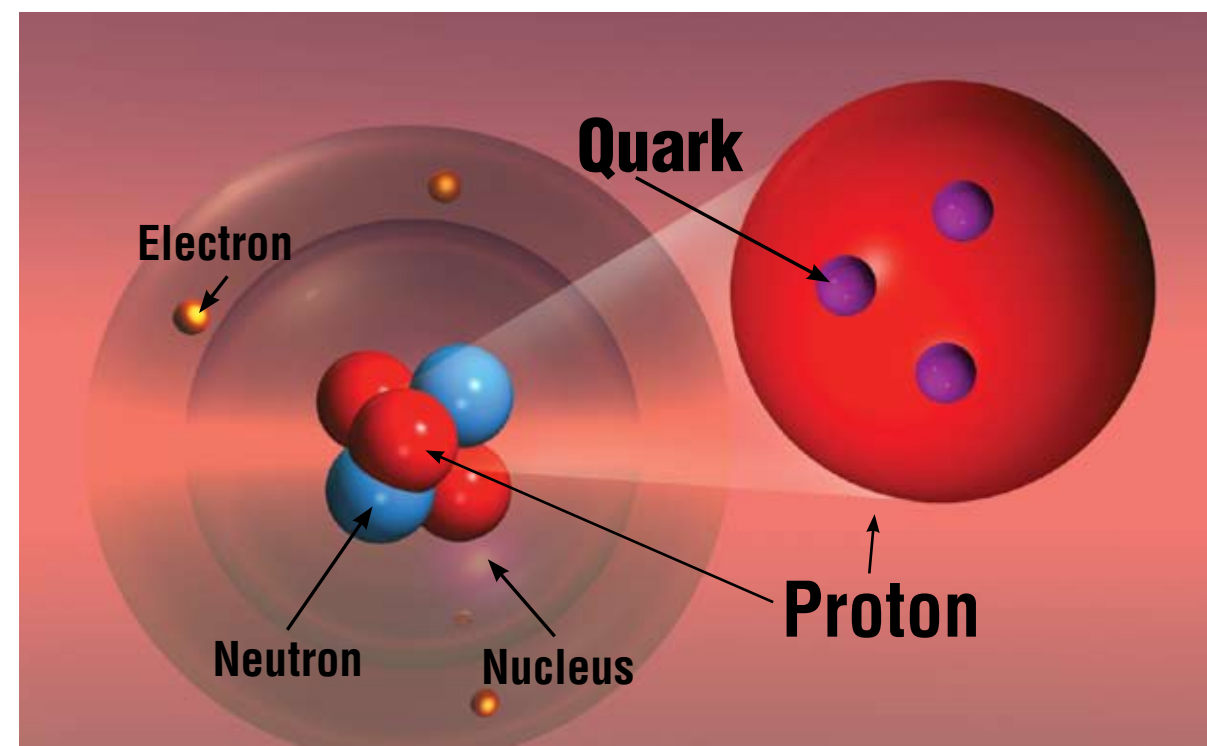
Margaret Burbidge is one such scientist. She studies the stars.

Her research has shown how heavier elements can be built from lighter ones inside of stars. Her work is definitely out of this world!



For a long time, scientists thought they knew all the parts of an atom. Then they learned that there is more. Protons and neutrons are made of something even smaller. They are tiny particles called **quarks** (kwarks). Quarks are the smallest parts of an atom.

Scientists have worked for more than 2,000 years to learn what we know about atoms. Everything they have learned is part of the **Atomic Theory**. The story begins in Ancient Greece. It continues even today.

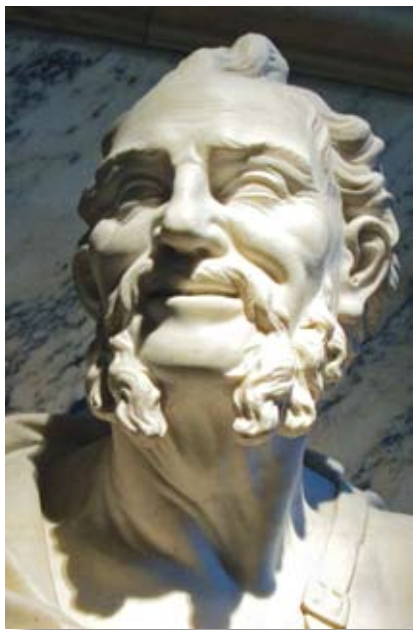


↑ This diagram shows that while protons and neutrons are tiny parts of an atom, quarks are even smaller.

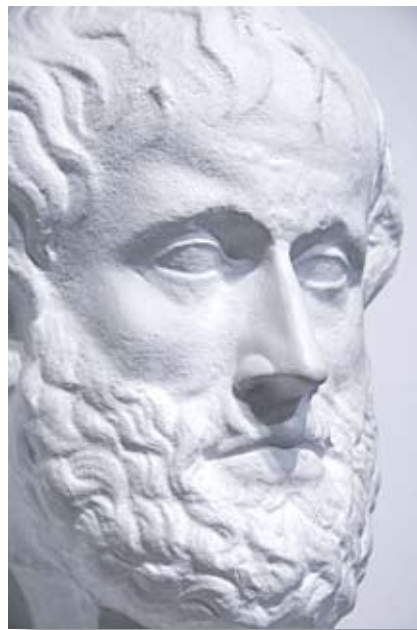
Old and New

Ancient Greek philosophers like Democritus and Aristotle watched the world around them. Many thought that all matter was made of four **elements**. They were air, fire, water, and earth.

Democritus wondered something. Is it possible to break matter into smaller pieces? And can you keep breaking the pieces forever? He decided the answer is no. At some point, there would be a pile of tiny bits that could no longer be broken. He named the bits *atomos*. It means “unbreakable.”



↑ Statue of Democritus



↑ Statue of Aristotle

Air

Earth

Water

Fire

Aristotle also thought that matter was made of the four elements. He added a fifth element called ether, which he believed filled up outer space. He thought that one element could be changed into another.

Scientists started to try out this idea. They began a branch of science called **alchemy** (AL-kuh-mee). They tried to change metals, such as lead, into gold and silver. For hundreds of years, people believed the ideas of Aristotle and the alchemists.

Strange But True

Although the alchemists never figured out how to turn lead into gold, they did discover a new element. One person thought he could turn urine into gold because they were the same color. His work led to the discovery of the element phosphorous. Phosphorous is used on the tips of matches.

