



**NAMESAKE**

To acknowledge Lise Meitner's work, chemical element 109 was named meitnerium in 1997.

Meitner was Jewish and had to escape from Germany in 1938.

# LISE MEITNER

This Austrian physicist had the spark to discover the secret power inside the atom.

**NEW ELEMENTS**

As well as their famous discovery, Meitner and Hahn also isolated the chemical element protactinium.

**A**long with chemist Otto Hahn, Lise Meitner made one of the most astounding discoveries ever – nuclear fission, the process by which atoms are split by force to produce energy. Despite her incredible achievement, Meitner was ignored for the top award in science, the Nobel prize.

Meitner was born in Austria on 7 November 1878. The third of eight children in a Jewish family, she began studying science and maths when she was eight years old and kept a notebook of her findings under her pillow. Although she enjoyed learning, girls weren't supposed to continue going to school after the age of 14.

Meitner asked her father if she could go to college, and was privately tutored to pass the entrance exam for the University of Vienna. She had to ask permission to attend lectures, but in 1905, Meitner became only the second woman to receive a doctorate degree from the university.

By the 1930s, Meitner was working with chemist Otto Hahn at the University of Berlin in Germany.

However, under the Nazi leader Adolf Hitler the country was becoming increasingly dangerous for Jewish people. It was not safe for Meitner to stay and she was forced to flee to Sweden in 1938. She continued her scientific research, writing letters to Hahn back in Berlin.

In 1938, the two scientists met secretly in Copenhagen and Hahn told Meitner about some confusing results that he had found during experiments. Hahn and a junior scientist, Fritz Strassmann, had been bombarding a radioactive metal called uranium with subatomic particles called neutrons (see box below). Instead of making heavier metals, as they had expected, by adding extra neutrons to their uranium atoms, Hahn and Strassmann produced a lighter metal called barium.



**FISSION**

This is another word for splitting. Nuclear fission is named after the term that biologists use to describe a cell dividing.

None of the atomic theories of the time could explain this startling result.

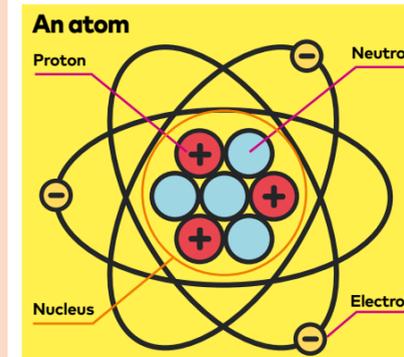
Meitner got to work with her nephew Otto Frisch. They realised that, instead of getting heavier, the neutrons were splitting Hahn's uranium atoms. Within a month, they devised the theory that the atomic nucleus could break like a droplet of water; it would stretch out, pinch in the middle and then split in two. This splitting of many billions of uranium atoms would create a great deal of energy.

Strangely – and unfairly – Hahn never credited Meitner for her part in his success. Despite her brilliance and hard work, Meitner's vital contribution to the discovery of nuclear fission was not recognised until much later. When deciding who to honour for the discovery, the Nobel committee awarded Hahn the prize for chemistry in 1944.

**How does nuclear fission work?**

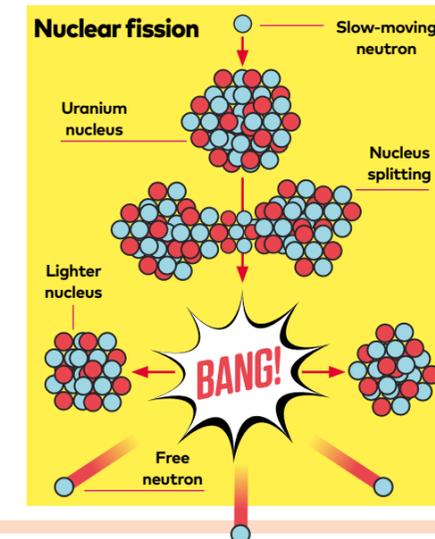
**What is an atom?**

Ordinary matter is made up of tiny particles called atoms, which are far too small to see with the naked eye. These atoms in turn are made up of even smaller subatomic particles. An atom is made by negatively charged particles called electrons orbiting a central core, called the atomic nucleus. The nucleus contains positively charged protons and electrically neutral neutrons. The number of protons in the nucleus determines what type, or element, the atom is.



**What is a nuclear chain reaction?**

Nuclear fission is when the nucleus of an atom splits, usually when it is hit by a slow-moving neutron. Two new, lighter nuclei are created, along with some free neutrons. If these neutrons hit other nuclei, a nuclear chain reaction can occur.



**Where does the energy come from?**

Lise Meitner realised that splitting the atomic nucleus would release a small amount of energy. If this process could be multiplied across a billion billion atoms, then the energy released would be colossal. Her discovery of nuclear fission led to the harnessing of nuclear energy and the destructive power of the atomic bomb. Meitner, however, refused an invitation to work on such a terrible project, saying, "I will have nothing to do with a bomb!"

