

# Discovery of four new particles at the Large Hadron Collider(LHC)

March 8, 2021

**In news :** Recently, the European Organization for Nuclear Research, CERN has announced the discovery of four brand new particles at the Large Hadron Collider in Geneva

## Key updates

- With the recent discover, LHC will have 59 new particles in addition to Higgs boson since it started colliding protons particles that make up the atomic nucleus along with neutrons – in 2009
- These include the tetraquarks most recently discovered, but also new mesons and baryons. All these new particles contain heavy quarks such as “charm” and “bottom”.
- These hadrons are interesting to study. They tell us what nature considers acceptable as a bound combination of quarks, even if only for very short times. They also tell us what nature does not like. For example, why do all tetra- and pentaquarks contain a charm-quark pair (with just one exception)? And why are there no corresponding particles with strange-quark pairs? There is currently no explanation.
- Each newly found hadron allows experiments to measure its mass and other properties, which tell us something about how the strong force behaves. This helps bridge the gap between experiment and theory
- These models are crucial to achieving the ultimate goal of the hadron collider: find physics beyond the standard model.

**What is the LHC?**

The LHC is a particle accelerator that pushes protons or ions to near the speed of light. It consists of a 27-kilometre ring of superconducting magnets with a number of accelerating structures that boost the energy of the particles along the way.

### Why is it called the “Large Hadron Collider”?

- “Large” refers to its size, approximately 27km in circumference.
- “Hadron” because it accelerates protons or ions, which belong to the group of particles called hadrons.
- “Collider” because the particles form two beams travelling in opposite directions, which are made to collide at four points around the machine.

### More about the Large Hadron Collider

- It is the world’s largest and most powerful particle accelerator.
- It was built by the European Organization for Nuclear Research (CERN) between 1998 and 2008 in collaboration with over 10,000 scientists and hundreds of universities and laboratories, as well as more than 100 countries
- **Location:** The accelerator sits in a tunnel 100 metres underground at CERN, on the Franco-Swiss border near Geneva, Switzerland.
- **Launch:** It first started up on 10 September 2008, and remains the latest addition to CERN’s accelerator complex.
- LHC is the world’s largest and highest-energy particle collider and the largest machine in the world.
- The LHC consists of a 27-kilometre ring of superconducting magnets with a number of accelerating structures to boost the energy of the particles along the way.
- The first collisions were achieved in 2010 at an energy of 3.5 teraelectronvolts (TeV) per beam, about four

times the previous world record.