# IT IAS Toppers

## **Future Circular Collider**

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#### **Future Circular Collider**

Scientists at the European Organization for Nuclear Research (CERN) express confidence in the Future Circular Collider project.



[ref- wikimedia]

### About Future Circular Collider (FCC):

- The Future Circular Collider (FCC) is an international design study for a **new particle collider**.
- It is CERN's envisioned project to build a larger and more **powerful particle collider**, surpassing the capabilities of the existing Large Hadron Collider (LHC).
- FCC aims to start operating in a first phase by 2040.
- The FCC aims to **smash particles at higher energies**, which could lead to the discovery of new particles and forces.
- The FCC aims to achieve **particle collision energy levels** of 100 TeV, approximately eight times more powerful than the LHC's 13 TeV.
- This could help scientists understand some of the **universe's mysteries**, such as dark matter, dark energy, and the matter-antimatter asymmetry
- CERN leaders see the FCC as a **catalyst for innovation** in areas such as cryogenics, superconducting magnets, vacuum technologies, and detector-instrumentation technologies.

#### What is a particle collider?

- A particle collider is a type of particle accelerator that uses charged particles to **smash atoms into pieces.**
- The accelerator uses electricity to push the charged particles along a path, making them go faster and faster.
- Colliders can be ring accelerators or linear accelerators.
- They bring two **opposing particle beams together** so that the particles collide.
- They are powerful research tools in particle physics because they **reach a higher center of mass energy** than fixed target setups.
- The Large Hadron Collider is the most powerful accelerator in the world.
  - It boosts particles, such as protons, to a speed close to that of light, where they **collide with other protons**.
  - These collisions produce massive particles, such as the Higgs boson or the top quark.
- Particle accelerators are also used for **radioisotope production**, industrial radiography, radiation therapy, sterilization of biological materials, and a certain form of radiocarbon dating.