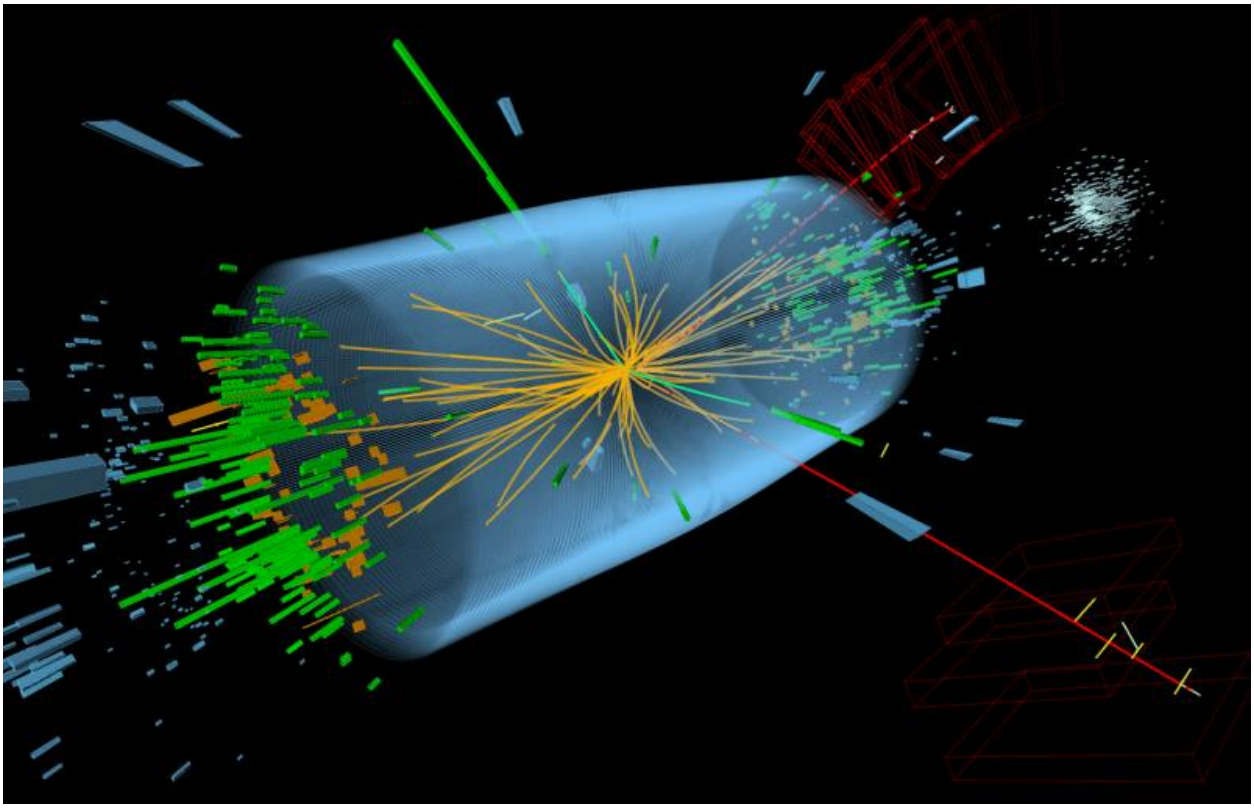
High Energy Physics/ Particle Physics

- Particle physics Physics is the branch of physics that studies the nature of the particles and deals with matter, energy, space, and time. The primary aim of research in high-energy physics is to produce a better understanding of fundamental physical law by following a reductionist strategy. That is, scientists attempt to understand the behavior of matter in general by working up from profound understanding of the properties and interactions of its elementary constituents.

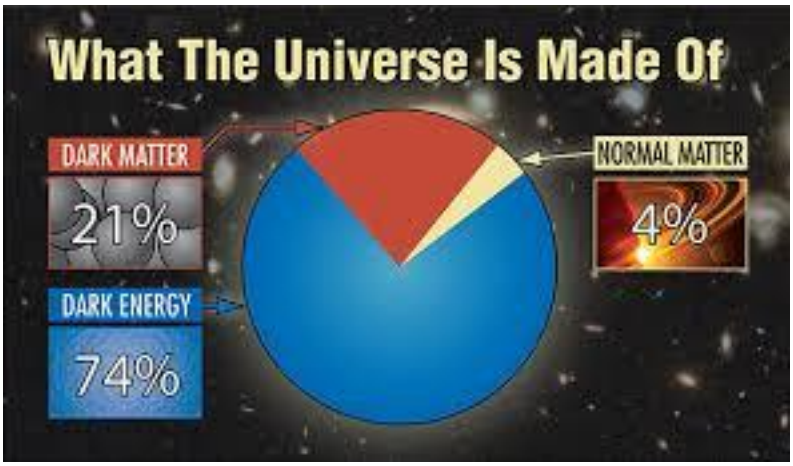


Theoretical particle physics attempts to develop the models, theoretical framework, and mathematical tools to understand current experiments and make predictions for future experiments.

- attempts to better understand the Standard Model and its tests through phenomenology, quantum field theory, effective field theory and lattice field theory .
- modeling develop ideas for what physics may lie beyond the Standard Model
- attempts to construct a unified description of quantum mechanics and general relativity by building a theory called String Theory.

Experimental High Energy Physics

The research in experimental High Energy physics mainly involves particle accelerators and detectors. Beams of particles such as electrons or protons are hurled at high speeds in the accelerators and then collided. The plethora of information contained in the data of these apparently chaotic collisions carries the hints about the underlying physics. It is the job of experimental high energy physicists to uncover the mysteries of fundamental laws from the huge sets of raw data .



Particle Physics Experiments

Several gigantic particle accelerators are currently being used to smash together small particles, such as electrons and protons, with higher and higher speeds. Amongst these are LHC in Switzerland, DESY in Germany, and Fermilab in the Unites States, BES in China. The experiments are so difficult to carry out that it is not unusual to have between 200 and 1000 people from many nations collaborate on a single experiment. The aim of these experiments is to try to find new particles that are predicted to exist, and other particles predicted by the supersymmetric extensions of the Standard Model