

Abstract

All matter around us is made of a handful of elementary particles, and the standard model of Cosmology tells us that everything in the universe evolved from a very hot soup of quark-gluon plasma (and components of dark matter). Dynamics of the elementary particles thus played a key role in the evolution of the universe to its present stage. Particle Physics endeavors to understand these dynamics. The less-than-a-century old story presents us with a consistent mathematical model, known as the Standard Model of particle physics, describing almost all aspects of the particle dynamics at the energy scales we have probed. However, there are questions that are left unanswered. Primary concerns include: understanding the dominance of matter over antimatter in the visible universe, the constitution of dark matter, stability of vacuum, and questions related to the neutrinos.

In the colloquium, after a detailed introduction to the Standard Model including the spontaneous symmetry breaking and the Higgs mechanism, we shall discuss possible solutions to some of the concerns posed above, and how they may be connected to each other.