Inflation as a Particle Collider

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The conventional way to study high energy particle physics is to build particle colliders. In fact, the nature has already built a "collider" running at unprecedentedly high energy (up to 10^13 GeV): During cosmic inflation, high energy particles (up to the Hubble scale of inflation) are produced and interacts with each other. The relics of the interaction are imprinted in the density fluctuations of our current universe in a unique and model-independent way. By measuring the correlations of these density fluctuations, the particle spectrum and interactions at the energy scale of inflation can be reconstructed. This is known as the cosmological collider physics. In this talk, the cosmological collider physics, and the corresponding signature for the Standard Model are reviewed. We also discuss how the expansion history of the primordial universe can be measured by the same process.

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