

Effective theories for particle and astroparticle physics

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Abstract

Effective theories provide a reliable formalism for discussing virtual effects of physics that is not directly observed. The approach has proved its usefulness in a variety of cases such as superconductivity, low-energy hadronic physics, and finite-temperature quantum field theory. In this course self-contained course I will discuss the basics of the formalism and its limitations and then discuss applications to a variety of cases including lepton-number and flavor violation at the LHC, low-energy pion physics and dark matter physics. Lectures will be complemented with exercises for the participants. Familiarity with quantum field theory will be assumed.

Plan of lectures

1. Introduction and basic formalism
2. Description of the formalism
3. Applications to LHC
4. Applications to dark matter

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