

Parity violation in proton-proton scattering in chiral effective field theory

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The observation of parity violation in the weak interaction is one of the pillars on which the Standard Model of particle physics was built. Despite the solid theoretical foundation, the manifestation of parity violation in hadronic and nuclear systems is not fully understood. This problem mainly arises due to the nonperturbative nature of QCD at low energies. In the last decades tremendous progress has been made in understanding low-energy strong interactions by use of effective field theories. This understanding has made it possible to calculate hadronic and nuclear observables in a controlled fashion.

In this talk, I will present a recent calculation of the parity-violating longitudinal asymmetry in proton-proton scattering. The calculation is performed in the framework of chiral effective field theory which is applied systematically to both the parity-conserving and parity-violating interactions. By careful comparison to the existing low- and medium-energy data, it is possible to model-independently pin down an allowed range for the not-well-known, but important, parity-odd pion-nucleon coupling constant h_π . I will discuss how this range compares to theoretical limits and limits obtained from different experiments.

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