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Fundamental Symmetry Violations in Nuclear Systems

JARED VANASSE, Fitchburg State University

Parity violation in nuclear systems offers a unique probe of QCD, while time-reversal violation in nuclear systems is a potential path for discovering physics beyond the Standard Model due to the smallness of Standard Model time-reversal violation in nuclear systems. Parity (P) and parity and time-reversal (PT) violating interactions in nuclear systems can be systematically understood through the use of effective field theories, which are model independent and allow for theoretical error estimation. At low energies P and PT violating interactions are each described by a separate set of five low energy constants (LECs). These LECs must either be calculated from lattice QCD or extracted from experiment. To cleanly extract these LECs experiments should be performed on few-body nuclear systems for which P and PT violating processes can be calculated with minimal uncertainty. In this talk I will discuss the current theoretical and experimental landscape for determination of these P and PT violating LECs. In addition I will discuss recent developments in the use of the large-N_C expansion in QCD to estimate the relative size of these LECs and its guidance in further experimental efforts.