APR18-2018-020056

Abstract for an Invited Paper
for the APR18 Meeting of
the American Physical Society

Precision determination of the ratio of axial-vector and vector coupling constants from neutron beta decay

BASTIAN MAERKISCH, Technical University of Munich

Within the standard model of particle physics, only two free parameters determine the decay of the free neutron, where we profit from the precise determination of the Fermi coupling constant in muon decay. These parameters are the ratio of axial-vector and vector coupling constants $\lambda = g_A/g_V$ and the CKM mixing matrix element V_{ud}. With about a dozen experimental observables the problem of the determination of these parameters is largely over-constrained and hence enables the vivid search for non $V-A$ couplings in this process. We present the result of the neutron decay spectrometer PERKEO III on the ratio of coupling constants which was derived from a measurement of the beta asymmetry in polarized neutron beta decay with a precision of $\Delta\lambda = 6 \times 10^{-4}$. The instrument was installed and operated at the high flux neutron source of the Institut Laue-Langevin, Grenoble, France. A pulsed cold neutron beam was used to control or eliminate major sources of systematic error. The presentation will conclude with a status report on the follow-up instrument PERC, which is currently under construction at the MLZ, Garching, Germany. The aim of PERC is an improved measurement of several decay correlations in neutron beta decay by an order of magnitude.