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Precision Measurements of the Neutron Decay Asymmetry A

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Neutron beta decay is the simplest semi-leptonic weak process, and precision measurements of angular correlations coefficients provide unique information about the weak interaction and contribute significantly to precision tests of the Standard Model of particle physics. In particular, measuring the beta asymmetry correlation coefficient A in polarized neutron decay is the most precise way to directly determine the ratio of axialvector and vector coupling constants $\lambda = G_{\mathrm{A}}/G_{\mathrm{V}}$. This ratio is for example required for predicting the abundance of light elements from primordial nucleosynthesis, the solar neutrino flux and the spin content of nucleons. Measurements of λ and the neutron lifetime τ_{n} are used to determine the element V_{ud} of the CKM-matrix from neutron decay data only. Recent experiments by PERKEO II, UCNA and PERKEO III have successfully reduced total corrections to the raw data to the percent level. The PERKEO III instrument used a pulsed polarized cold neutron beam to effectively eliminate major sources of systematic error, such as beam related background and edge effects. All systematic uncertainties of this measurement are smaller than 10^{-3} on A and the total error is thus reduced to a level of $\Delta\lambda/\lambda \approx 5 \cdot 10^{-4}$. In the talk I will give an overview of recent precision measurements of the beta asymmetry A correlation coefficient and present the recent results of PERKEO II and PERKEO III.