

## Measurements of Neutron Decay Correlation Coefficients with PERKEO and PERC

*Tuesday, 10 September 2013 11:40 (20 minutes)*

Precision measurements of angular correlation coefficients in neutron beta decay 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  $A$  in polarized neutron decay is the most precise way to determine the ratio of axialvector and vector coupling constants. Measurements of  $A$  and the neutron lifetime are used to determine the element  $V_{ud}$  of the CKM-matrix from neutron decay data alone.

The neutron decay spectrometer PERKEO III was installed at the PF1B cold neutron beam site at the Institut Laue-Langevin to measure the beta asymmetry  $A$ . A pulsed neutron beam was used to effectively eliminate major sources of systematic uncertainties, such as neutron beam related background and edge effects. All systematic uncertainties of this measurement are smaller than  $10^{-3}$  on  $A$  and the error on the axial vector coupling constant is thus reduced to a level of  $5 \times 10^{-4}$ .

The next generation instrument PERC (Proton Electron Radiation Channel), which is currently under construction at the FRM-II, Garching, realizes a novel concept in this field: as a beam station it delivers not neutrons, but neutron decay products. Electrons and protons are extracted from a long neutron guide by a strong magnetic field. Specialized spectrometers will use PERC as source to measure spectra and correlation coefficients with an improved accuracy by more than one order of magnitude.

In this talk I will present results on the beta asymmetry by the PERKEO instruments, and the design of PERC and its current status.

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**Session Classification:** Tu - 2