Contribution ID: **92** Type: **Poster**

Novel Detection System for Electron and Proton Momentum Spectroscopy with PERC

Tuesday 10 September 2013 18:00 (3 hours)

Experiments with neutrons address important questions in nuclear and particle physics, astrophysics and cosmology, as well as gravitation. These experiments include precision measurements of the parameters describing the beta decay of free neutrons. Here, the main emphasis is on the search for evidence of possible extensions of the Standard Model of elementary particles and fields. Such extensions require new symmetry concepts like leptoquarks, supersymmetry, or many more. In high energy physics with colliders, one directly searches for new particles, complementary to low energy physics with neutrons, where we indirectly probe their existence.

With the new instrument PERC, several symmetry tests based on neutron beta decay data become competitive. At its exit, PERC delivers neutron decay products under well-defined and precisely variable conditions. Depending on the parameters studied, the analysis of the extracted decay particles is performed with different and specialized detectors. For the measurement of the Fierz term b, we propose a novel detection system for electron and proton momentum spectroscopy based on the RxB drift effect. In the RxB spectrometer, the charged decay particles are dispersed in a uniformly curved magnetic field, and then measured with large phase space acceptance and high resolution.

The Fierz term b is measurable in decays of unpolarized neutrons, as a distortion of the beta spectrum. A non-zero value for b would be an indication of the existence of scalar or tensor interactions. Scalar or tensor couplings in turn would occur if yet unknown charged Higgs bosons or leptoquarks were exchanged instead of a W boson.

We present a design of the RxB spectrometer which can be used with PERC. Its momentum resolution can reach 14.4 keV/c, if the position sensitive detectors have a spatial resolution of 1 mm.

Primary author: Dr KONRAD, Gertrud (TU Wien, Atominstitut)

Co-authors: Prof. ABELE, Hartmut (TU Wien, Atominstitut); Ms ERHART, Jacqueline (TU Wien, Atominstitut); Dr WANG, Xiangzun (TU Wien, Atom Institute)

Presenter: Dr KONRAD, Gertrud (TU Wien, Atominstitut)

Session Classification: Poster, BBQ & Drinks