HK 50: Poster - Fundamentale Symmetrien

Zeit: Mittwoch 16:45–16:45 Raum: HSZ 1.OG

HK 50.1 Mi 16:45 HSZ 1.OG

aSPECT: Improvement of the high voltage electrodes — •Michael Klopf[1], Jacqueline Erhart[1], Gertrud Konrad[1], and Torsten Soldner[2] for the aSPECT-Collaboration — [1]Atominstitut, TU Wien, Austria — [2]Institut Laue-Langevin, Grenoble, France

The purpose of the retardation spectrometer aSPECT is to determine the anti-neutrino electron angular correlation coefficient a with high precision, by measuring the integral proton spectrum in free neutron decay. The precise measurement of the correlation coefficient a serves as a test of the validity of the Standard Model.
The analysis of the decay protons is based on a precise energy measurement, by means of an electrostatic filter. Hereby the independence of the background from the filter potential is a basic prerequisite for the determination of a. However, in previous measurements with aSPECT some dependencies have been found. The background, first mainly caused by strong discharge phenomena, has already been significantly reduced by the re-design of several electrodes. In order to reach our design accuracy in a, we have to further suppress this dependency. We therefore improved the shape of our high voltage electrodes to further reduce the electric field and thereby the probability for field emission. The theoretical background of such discharge phenomena as well as the optimization of the high voltage electrodes will be presented.

HK 50.2 Mi 16:45 HSZ 1.OG

$\mathbf{R}\times\mathbf{B}$ drift momentum spectrometer for PERC — •Xiangzun Wang, Gertrud Konrad, and Hartmut Abele — Atominstitut, TU Wien, Austria

We propose a new type of momentum spectrometer, which uses the $\mathbf{R}\times\mathbf{B}$ drift effect to disperse the charged particles in a uniformly curved magnetic field, and measures the particles with large phase space acceptance and high resolution. This kind of $\mathbf{R}\times\mathbf{B}$ spectrometer is designed for the momentum analyses of the decay electrons and protons in the PERC (Proton and Electron Radiation Channel) beam station, which provides a strong magnetic field to guide the charged particles in the instrument. Instead of eliminating the guiding field, the $\mathbf{R}\times\mathbf{B}$ spectrometer evolves the field gradually to the analysing field, and the charged particles can be adiabatically transported during the dispersion and detection. The drifts of the particles have similar properties as their dispersion in the normal magnetic spectrometer. Besides, the $\mathbf{R}\times\mathbf{B}$ spectrometer is especially ideal for the measurements of particles with low momenta and large incident angles. We present a design of the $\mathbf{R}\times\mathbf{B}$ spectrometer, which can be used in PERC. For the particles with solid angle smaller than 88 msr, the maximum aberration is below 10^{-4}. The resolution of the momentum spectra can reach 14.4 keV/c, if the particle position measurements have a resolution of 1 mm.