Contribution ID: **186** Type: **Poster**

Detection of low-energy protons within the neutron β-decay spectrometer aSPECT

Tuesday 18 October 2016 18:10 (1 minute)

The antineutrino-electron angular correlation coefficient a is related to the proton recoil spectrum by kinematics. aSPECT measures the integral proton spectrum using magnetic adiabatic collimation and electrostatic retardation. Data acquisition for a 1% measurement of coefficient a was performed during a beam-time in 2013 at the Institut Laue-Langevin in Grenoble.
As protons are emitted at low-energy (E_{p,max} = 751.4 eV), the detection occurs after a post-acceleration of the particles (-15 kV) onto a Silicon Drift Detector. The signal is then treated by dedicated electronics. In the 2013 measurements a shaper with non-linear amplification was used in order to avoid saturation effects.
In order to quantify the systematic effects related to the proton detection, the electronics chain and the event signals were investigated in details. Correlations between subsequent events were also investigated. Methods to improve the pulse-height resolution of the events, to identify and to correct pile-up were developed and tested.
Preliminary results are presented on this poster.

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Session Classification: Poster Session