Abstract Submitted
for the DNP13 Meeting of
The American Physical Society

Proton detection at aCORN[1] ED STEPHENSON, MELANIE NOVAK, Indiana University, ACORN COLLABORATION — The aCORN experiment will measure the electron-antineutrino angular correlation parameter in neutron beta-decay. Our method relies on proton time-of-flight information and electron spectroscopy. This presentation will focus on proton transport and detection. When neutrons decay inside our fiducial volume, emitted protons are directed to the top of the apparatus by an electrostatic mirror, which also pre-accelerates them. A uniform axial magnetic field then guides protons with low transverse momentum through a set of circular apertures. The protons are then accelerated towards a cooled silicon surface barrier detector by a high voltage focusing system, which boosts their energy to a detectable level, ensures they hit the active region of the detector, and deflects incoming electrons. The silicon detector is located off-axis to further minimize electron scattering. Our current design ensures high voltage stability; corona and sparking are reduced with better geometry and a locally lower magnetic field. A new dovetail support structure and separate reference jig allows easy installation with reproducible electrode positioning. Our silicon detector preamp was redesigned from the ground up to minimize noise, improve gain, and operate reliably in the aCORN environment.

[1]Special thanks for support from the NSF and NIST

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Date submitted: 28 Jun 2013 Electronic form version 1.4