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Characterization of segmented Silicon detectors for neutron beta decay experiments AMERICO SALAS, University of Virginia, PATRICK MCGAUGHEY, Los Alamos National Laboratory, NAB COLLABORATION, UCNB COLLABORATION — The "Nab", and "UCNB" collaborations will measure the correlation parameters "a", "b", and "B" that are found in the triple differential rate equation from neutron β-decay ($n \rightarrow p + e + \bar{\nu}_e$). These parameters that offer an atractive platform for searches of signals of new physics beyond standard model will be measured using unpolarized cold neutrons (Nab) at SNS, ORNL,and polarized ultracold neutrons (UCNB) at LANL. Following a neutron β-decay the electron and proton, will be accelerated in a 4π-field spectrometer, and detected by a novel detector design consisting of two opposite large area and thick silicon detectors segmented in 127 pixels per detector, and operated at $\sim$ 100 Kelvin. We have successfully completed the first phase of detector characterization, operating 0.5, 1.0, and 1.5 mm thick Silicon detectors of 11 cm in diameter for neutron β-decay experiments at Los Alamos National Laboratory, and detected $\sim$ 300 Hz protons from 15 to 35 keV at NCSU with a FWHM resolution of $\sim$ 3.2 keV with a potential of another factor of two improvement. Custom amplifiers based on FETs mounted directly on the detector reduced the noise and made possible the proton detection.

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