Abstract Submitted
for the DNP17 Meeting of
The American Physical Society

**First Determination of the $^{27}$Al Neutron Distribution Radius from a Parity-Violating Electron Asymmetry Measurement**[1] KURTIS BARTLETT, William & Mary, $Q_{WEAK}$ COLLABORATION — The $Q_{weak}$ collaboration has made the first measurement of the parity-violating elastic electron-$^{27}$Al scattering asymmetry, an electroweak observable, using a spectrometer with an approximate energy acceptance of 150 MeV. This is a unique measurement as $^{27}$Al is a s-d shell nucleus with a $J^p = 5/2^+$ ground state, which is difficult to model compared to the doubly magic (closed shell) $J^p = 0^+$ ground state nuclei from similar experiments. The previous PREx and the upcoming PRExII and CREx experiments have used or plan to use these easier-to-model nuclei, $^{208}$Pb and $^{48}$Ca. The original intent of this measurement was as a background correction for the weak charge measurement of the proton. However, a 2014 paper outlined the possibility of extracting the $^{27}$Al neutron distribution radius from the elastic parity-violating asymmetry as a test of theoretical models. This elastic asymmetry can be extracted from this background measurement by correcting for known asymmetries that arise from non-elastic scattering processes. Presented here is a discussion of the analysis required to extract this asymmetry and the neutron distribution radius, along with its impact on theoretical models for lighter non-closed shell nuclei.

[1]This work was supported in part by the National Science Foundation under Grant No. PHY-1714792.

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Date submitted: 29 Jun 2017 Electronic form version 1.4