Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Investigation of a Gas Photo-multiplier as a next generation neutron detector[1] MAYA WATTS, THOMAS BAUMANN, MARCO CORTESI, ALDER FULTON, PAUL GUEYE, PHAM PHUONGANH, THOMAS REDPATH, Michigan State Univ, National Superconducting Cyclotron — Particles lose energy while interacting with scintillating material, which subsequently emits light. These detectors are usually coupled with photo-multiplier tubes (PMTs) placed on both sides to convert the light generated into an electrical signal. The difference between the PMTs' signal timing allows reconstructing the location of the interaction as well as the time at which it occurs. For the MoNA-LISA detector at NSCL the resolution is within a few cm for position and within a few ns for timing. The limited position resolution and granularity of the current design induce some uncertainties that could be significant, thus reducing the resolution of reconstructed invariant mass and missing mass spectra. The technological advances of gas detector technologies, especially in the areas of micromegas and gas electron multipliers (GEMs), have enabled sub-millimeter position accuracy and pico-second timing resolution that have impacted greatly the fields of low and high energy nuclear physics research. Coupled with their relatively low material budget, these devices are increasingly becoming the standard for tracking energetic particles (charged and neutrons). The novel concept of a gas photo-multiplier (GPM) neutron detector was developed as a collaboration between the NSCL detector group, the MoNA Collaboration and JLab. It couples GEMs to plastic scintillator detectors thus possibly enabling the capability to allow for visible light detection, sub-mm position reconstruction of the emitted light and picosecond timing resolution. Preliminary studies will be presented and discussed.

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Date submitted: 11 Jan 2020 Electronic form version 1.4