Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Determining the astrophysical ^{20}Ne(α,p)^{23}Na reaction rate from measurements with the Notre Dame 5U accelerator[1] ALYSSA DAVIS, Swarthmore College, AUSTIN MITCHELL, University of Southern Indiana, DAN BARDAYAN, PATRICK O'MALLEY, University of Notre Dame — In binary star systems including at least one white dwarf, the companion star may accrete mass onto the white dwarf until electron degeneracy pressure can no longer support the additional mass. A threshold is surpassed at high accretion rates, causing a stellar explosion categorized as a type Ia supernova. The system undergoes nucleosynthesis throughout the mass transfer and supernova process, producing heavier elements. Uncertainties in the ^{20}Ne(α,p)^{23}Na reaction rate have been shown to significantly affect the final abundances of a number of nuclei produced in type Ia supernovae. Although previous inverse kinematic measurements have been conducted to model this reaction rate, the explored beam energies were not of astrophysical significance. Utilizing the 5U vertical pelletron accelerator and the Rhinoceros extended gas target at the University of Notre Dame, new direct kinematic cross section measurements were conducted using beam energies as low as 3.5 MeV. Theory, experimental methods, preliminary results, and future analysis plans will be discussed.

[1]This work is supported by the US National Science Foundation PHY-1713857.

Alyssa Davis
Swarthmore College

Date submitted: 03 Oct 2019 Electronic form version 1.4