Abstract Submitted
for the DNP11 Meeting of
The American Physical Society

The Cross Section Measurement of the ^{14}N(p, γ)^{15}O Reaction in the CNO Cycle[1] QIAN LI, JOACHIM GOERRES, RICHARD AZUMA, RICHARD DEBOER, GIANLUCA IMBRIANI, P.J. LEBLANC, ETHAN UBERSEDER, MICHAEL WIESCHER — In stars more massive than the Sun at the hydrogen burning stage, energy is primarily generated through the CNO cycle converting four protons into one helium nucleus. ^{14}N(p,γ)^{15}O is the slowest reaction in this cycle, thus it governs the time scale and the energy generation rate of the whole cycle. It also plays an important role for the determination of the age of globular clusters. Many groups have studied this reaction before yet their measurements and calculations lead to different astrophysical S-factors for the different primary transitions due to the uncertainties in the R-matrix fit of the reaction cross section. To get more precise results, we performed measurements of the reaction cross section over an energy range from 0.28MeV to 3.6MeV. The cross sections for the strongest transitions as well as the angular distribution of the ground state were measured using the JN/KN Van de Graaff accelerators in the Nuclear Science Lab at University of Notre Dame. R-matrix calculations have been performed using the code AZURE. The new data provide better constraints for the extrapolation of the astrophysical S-factor towards stellar energies.

[1]This work was funded in part by National Science Foundation Grant No. 0758100 and Joint Institute for Nuclear Astrophysics Grant No. 0822648.

Qian Li

Date submitted: 27 Jun 2011 Electronic form version 1.4