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Measurement and R-matrix Analysis of ^{14}N(p,γ)^{15}O for the CNO Cycle[1] Q. LI, J. GOERRES, R.J. DEBOER, A. BEST, A. KONTOS[2], E. UBERSEDER, M. WIESCHER, JINA; Department of Physics, Univ. of Notre Dame, IN 46556, G. IMBRIANI, Department of Physics, Univ. of Notre Dame, IN, 46556 USA; Università degli Studi di Napoli "Federico II" and INFN, Napoli, Italy, P.J. LEBLANC, Department of Physics, Univ. of Notre Dame, IN 46556 — The CNO cycle is the primary energy source for stars more massive than the Sun during hydrogen burning. The energy producing cycle uses heavy nuclei as catalysts in order to convert four protons into an alpha particle. ^{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 in the determination of the age of globular clusters. Previous measurements and analysis of this reaction lead to different astrophysical S-factors due to the uncertainties in the R-matrix fit to the cross section data at higher energies. To better constrain the extrapolation, measurements were made of the excitation functions and angular distribution cross sections over a proton beam energy range from 0.5 MeV to 3.6 MeV. A multichannel R-matrix analysis including both the elastic scattering and the ^{14}N(p, γ)^{15}O data has been performed using the code AZURE. The new analysis provides better constraints for the extrapolation of the astrophysical S-factor towards stellar energies.

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[2]Present address: NSCL, Michigan State Univ., East Lansing, MI 48824

Qian Li
JINA; Department of Physics, Univ. of Notre Dame, IN 46556

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