RESONANCE ENERGY MEASUREMENTS ALONG THE RP-PROCESS PATH WITH GRETINA

W. Ong[1,2,3], C. Langer[1,2], F. Montes[1,2], A. Aprahamian[2,4], D.W. Bardayan[5], D. Bazin[1],B.A. Brown[1,3], J. Browne[1,2,3], H. Crawford[6], R. Cyburt[1,2], C. Domingo-Pardo[7], A. Gade[1,3], S. George[8], P. Hosmer[9], L. Keek[1,2], A. Kontos[1,2], I-Y. Lee[6], A. Lemasson[1], E. Lunderberg[1,3], Y. Maeda[10], M. Matos[11], Z. Meisel[1,2,3], S. Noji[1], A. Nystrom[2,4], G.Perdikakis[12,1], J.Pereira[1,2], S.Quinn[1,2,3], F. Recchia[1], H. Schatz[1,2,3], M. Scott[1,2,3], K. Siegl[2,4], A. Simon[1,2], M.K.Smith[2,4], A. Spyrou[1,2,3], J. Stevens[1,2,3], R. Stroberg[1,3], D. Weisshaar[1], J. Wheeler[1,2,3], K. Wimmer[12,1], R.G.T. Zegers[1,2,3]

1 National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing MI, USA
2 Joint Institute for Nuclear Astrophysics, Michigan State University, East Lansing MI, USA
3 Department of Physics and Astronomy, Michigan State University, East Lansing MI, USA
4 Department of Physics, University of Notre Dame, Notre Dame IN, USA
5 Physics Division, Oak Ridge National Laboratory, Oak Ridge TN, USA
6 Nuclear Science Division, Lawrence Berkeley National Laboratory, Berkeley CA, USA
7 IFIC, CSIC-University of Valencia, Valencia, Spain
8 Max-Planck-Institute for Nuclear Physics, Heidelberg, Germany
9 Department of Physics, Hillsdale College, Hillsdale MI, USA
10 Department of Applied Physics, University of Miyazaki, Miyazaki, Japan
11 Department of Physics and Astronomy, Louisiana State University, Baton Rouge LA, USA
12 Department of Physics, Central Michigan University, Mt. Pleasant MI, USA

Type I x-ray bursts observed from accreting neutron stars are caused by explosive nuclear burning of the H/He-rich accreted material via the rapid proton capture process (rp-process). ^{56}Ni is a potential rp-process waiting point and has a significant impact on x-ray burst observables and the amount of A~56 material incorporated into neutron star crusts. Proton captures on ^{55}Ni offer a possible pathway for the rp-process to bypass ^{56}Ni. However, the ^{55}Ni(p,γ)^{56}Cu reaction rate has so far only been determined by shell-model predictions. Such rate estimates can be uncertain by orders of magnitude. In order to reduce these uncertainties, we measured the excitation levels of ^{56}Cu produced by the ^{56}Ni(d,2n)^{56}Cu reaction as these levels directly determine the resonant ^{55}Ni(p,γ)^{56}Cu reaction rate. The measurement was part of a systematic study of proton capture reactions in the ^{56}Ni region [1]. The experiment was carried out at the National Superconducting Cyclotron Laboratory, utilizing the S800 spectrograph for particle identification and the γ –ray tracking detector GRETINA for measurement of γ-rays emitted in-flight following decays of excited states in ^{56}Cu. Preliminary results and the implications on the astrophysical rate will be discussed.

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