Abstract Submitted
for the DNP16 Meeting of
The American Physical Society

A new 55Ni(p,g) rate and its implications on the rp-process[1]
WEI JIA ONG, Michigan State University / National Superconducting Cyclotron Laboratory, CHRISTOPH LANGER, Goethe University Frankfurt, FERNANDO MONTES, National Superconducting Cyclotron Laboratory, NSCL E11024 COLLABORATION[2] — The low-lying energy levels of proton-rich ^{56}Cu have been extracted using in-beam γ-ray spectroscopy with the state-of-the-art γ-ray tracking array GRETINA in conjunction with the S800 spectrograph at the National Superconducting Cyclotron Laboratory at Michigan State University. Excited states in ^{56}Cu are resonances in the ^{55}Ni(p,γ)^{56}Cu reaction, which is a part of the rp-process in type I x-ray bursts. To resolve existing ambiguities in the reaction Q-value, a more localized IMME mass fit is used resulting in $Q = 639 \pm 82$ keV. We derive the first experimentally-constrained thermonuclear reaction rate for ^{55}Ni(p,γ)^{56}Cu. We find that, with this new rate, the rp-process may bypass the ^{56}Ni waiting point via the ^{55}Ni(p,γ) reaction for typical x-ray burst conditions with a branching of up to $\sim$40%. We also identify additional nuclear physics uncertainties that need to be addressed before drawing final conclusions about the rp-process reaction flow in the ^{56}Ni region.

[1]This work was supported by NSF grants PHY11-02511, PHY10-68217, PHY14-04442, PHY08-22648 and PHY14-30152
[2]The experiment E11024 GRETINA collaboration.

Wei Jia Ong
Michigan State University / National Superconducting Cyclotron Laboratory

Date submitted: 01 Jul 2016 Electronic form version 1.4