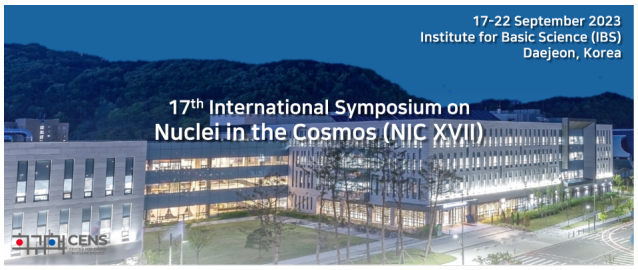

Contribution ID: **52** Type: **Oral**

Experimentally determined 56Ni(n.p) cross section and its impacts on nu-p process

Monday, 18 September 2023 17:30 (15 minutes)

To constrain the nu-p process, we studied the ^{56}Ni(n,p) reaction by directly measuring the cross section on the radioactive ^{56}Ni (a half-life of 6 days) at Los Alamos Neutron Science Center. This reaction has been identified as one of critical reactions for understanding the heavy element production in core-collapse supernovae. The radioactive ^{56}Ni was produced by irradiating protons on a ^{59}Co foil via the (p,4n) reaction at the Isotope Production Facility and the ^{56}Ni target was chemically separated, fabricated, and characterized at the Hot Cell facility. Using the LENZ (Low Energy NZ) instrument, the first directly measured cross sections of ^{56,59}Ni(n,p), ^{56}Co(n,p), and ^{59}Ni(n,α) will be reported along with experimentally deduced reaction rates of ^{56}Ni(n,p) and ^{56}Co(n,p). The impacts of these newly obtained reaction rates and potential further constrains on the nu-p process will be discussed. Ongoing LENZ efforts on (n,p) and (n,α) reaction studies with radionuclides such as ^{40}K, ^{44}Ti, and ^{26}Al, and the optimized solenoidal spectrometer development at LANSCE will be presented.

This work benefits from the LANSCE accelerator facility and is supported by the U.S. Department of Energy under contracts DE-AC52-06NA25396, the Laboratory Directed Research and Development program of Los Alamos National Laboratory under project number 20180228ER, and the U.S. Department of Energy Office of Science-Nuclear Physics.

LA-UR-23-25925

Primary author: LEE, Hye Young (Los Alamos National Laboratory)

Co-authors: FROHLICH, Carla (North Carolina State University); VERMEULEN, Christian (Los Alamos National Laboratory); PERDIKAKIS, Georgios (Central Michigan University); SASAKI, Hirokazu (Los Alamos National Laboratory); GASTIS, Panagiotis (Los Alamos National Laboratory); TSINTARI, Pelagia (Central Michigan University); KUVIN, Sean (Los Alamos National Laboratory); MOSBY, Shea (Los Alamos National Laboratory); KAWANO, Toshihiko (Los Alamos National Laboratory); MOCKO, Veronika (Los Alamos National Laboratory)

Presenter: LEE, Hye Young (Los Alamos National Laboratory)

Session Classification: Nuclear reaction rates and stellar abundances

Track Classification: Nuclear reaction rates and stellar abundances