

Nuclei in the Cosmos (NIC XVII)



Contribution ID: 203

Type: Poster

Nuclear astrophysics study using SNACK at KoBRA

Tuesday, 19 September 2023 17:40 (5 minutes)

KoBRA (Korea Broad acceptance Recoil spectrometer and Apparatus) [1] is a low energy nuclear physics facility at RAON (Rare isotope Accelerator complex for ON-line experiments) [2]. In its early phase of operation, KoBRA will produce RI beams with energies of 5 to 10 MeV/u from stable ion beams (10 ~ 40 MeV/u) delivered from the superconducting linear accelerator SLC3 of RAON. Transfer reaction measurements with RI beam are a powerful tool to extract spectroscopic information such as spins, parities, and spectroscopic factors. With this information, the thermonuclear reaction rates in explosive stellar environments such as novae, X-ray bursts, and supernovae can be studied. Therefore, the silicon detector system SNACK (Silicon detector array for Nuclear Astrophysics study at KoBRA) [3] has been developed by IRIS (Institute for Rare Isotope Science) for (d,p) transfer reaction measurements at KoBRA. By measuring protons produced in the reactions with SNACK and the trajectories of RI beams with upstream PPAC (Parallel Plate Avalanche Counter) detectors, excited energy levels can be reconstructed to extract spectroscopic information. In order to investigate the feasibility of the (d,p) reaction measurement using SNACK at KoBRA, the $^{18}\text{Ne}(d,p)^{19}\text{Ne}$ reaction measurement was simulated for study of the $^{18}\text{F} + p$ system in nova explosions. In this presentation, details of the detector system development and results of the simulation will be presented.

[1] K. Tshoo et al., Nucl. Instrum. Methods Phys. Res. B 376 (2013) 188.

[2] D. Jeon et al., J. Korean Phys. Soc. 65 (2014) 1010.

[3] M.S. Kwag et al., Nucl. Instrum. Methods Phys. Res. B 541 (2023) 42.

Primary author: Dr KWAG, Minsik (IRIS, IBS)

Co-authors: Dr AKERS, Charles (IRIS, IBS); Dr LEE, Kwangbok (IRIS, IBS); Dr SHIN, Taeksu (IRIS, IBS); Dr TSHOO, Kyounggho (IRIS, IBS)

Presenter: Dr KWAG, Minsik (IRIS, IBS)

Session Classification: Poster session (Novae and X-ray bursts, Type IA supernova and the p-process)

Track Classification: Novae and X-ray bursts