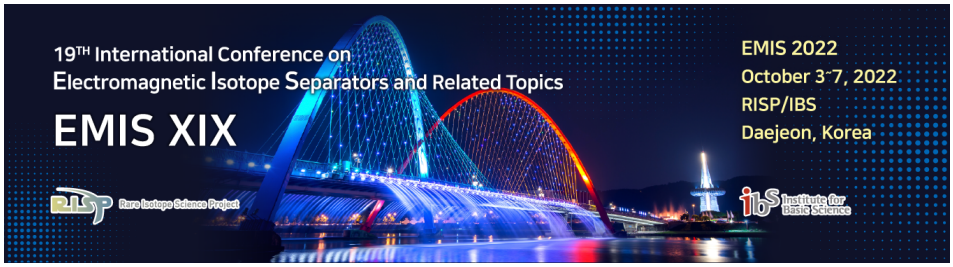

Contribution ID: **118** Type: **Poster Session**

Texas Active Target Detector Upgrade for 14O(α,p)17F Cross Section Measurement

Tuesday, 4 October 2022 21:04 (8 minutes)

The 14O(α,p)17F is nominated to be an important reaction that strongly affects the light curves of the Type I X-ray burst model [1]. In addition, the reaction rate is known to determine the break-out path from the hot CNO cycle to the rp-process at sufficiently high temperatures (T9 > 0.5) [2]. While the reaction rate plays an important role, its large uncertainty due to lack of experimental measurement causes difficulties on the precise demonstration of astrophysical observables.

In order to constrain the reaction rate, the first direct measurement of the 14O(α,p)17F cross section will be performed at CRIB, RIKEN, with the Texas Active Target Time Projection Chamber (TexAT) which was developed at Texas A&M University [3]. The energy and position resolution of the detected charged particles from the reaction can be enhanced thanks to the three-dimensional tracking of the particles. Along with segmented silicon and CsI detectors around the field cage, the TexAT detector enables more precise cross section measurement as a function of center-of-mass energy. It has been used for many important nuclear research topics including proton/alpha elastic resonance scattering, direct fusion cross section, transfer reaction and neutron-induced reactions.

The TexAT detector upgrade has been progressed to optimize the detector geometry for (α,p) cross section measurements at the Center for Exotic Nuclear Studies (CENS), Institute for Basic Science (IBS). The detector upgrade commissioning will be performed this summer to confirm its improvement of silicon detector position resolution and CsI detector energy resolution as well as compatibility of new parts. On the other hand, a high beam rate (3*105 pps) test of the TexAT detector using 14N+α elastic scattering was performed and its data is under analysis.

Detailed information of the TexAT upgrade and preliminary results of the commissioning experiments will be presented.

[1] R. H. Cyburt et al., Astrophys. J. 830, 55 (2016).
[2] R. K. Wallace and S. E. Woosley, Astro. J. Suppl. Ser. 45, 389 (1981).
[3] E. Koshchiy et al., Nucl. Inst. and Meth. A 957, 163398 (2020).

Primary authors: SAASTAMOINEN, Antti (Cyclotron Institute, Texas A&M University, College Station, TX 77843, USA); PARK, Chaeyeon (EWHA Womans University / CENS(IBS)); Mr KIM, Chanhee (Department of Physics, Sungkyunkwan University, Republic of Korea); Dr PARKER, Cody E (Cyclotron Institute, Texas A&M University, College Station, TX 77843, USA); KIM, Dahee (Center for exotic nuclear studies, Institute Basic Science); Prof. ROGACHEV, Grigory V (Cyclotron Institute, Texas A&M University, College Station, TX 77843, USA); Dr BISHOP, Jack (Cyclotron Institute, Texas A&M University, College Station, TX 77843, USA); HAHN, Kevin Insik (Institute for Basic Science); Mr KIM, Minju (Sungkyunkwan university); Ms KIM, Sohyun (Department of Physics, Sungkyunkwan University, Republic of Korea); CHA, Soomi (Center for Exotic Nuclear Studies); BAE, Sunghan (Center for Exotic Nuclear Studies, Institue of Basic Science); AHN, Sunghoon(Tony) (Institute for Basic Science); Dr KOSHCHIY, Yevgen (Cyclotron Institute, Texas A&M University, College Station, TX 77843, USA)

Presenter: PARK, Chaeyeon (EWHA Womans University / CENS(IBS))

Session Classification: Poster Session