Contribution ID: **208** Type: **Invited Presentation**

Direct Measurements of (α,p) Reactions with ANASEN

Thursday, 1 June 2017 17:20 (15 minutes)

The LSU-FSU Array for Nuclear Astrophysics and Structure with Exotic Nuclei (ANASEN) has been developed, in part, for the direct measurement of (α,p) reactions with radioactive beams. It is currently installed at the John D. Fox Superconducting Accelerator Laboratory at FSU. The ANASEN detector consists of position-sensitive proportional counter aligned with the beam axis surrounded by a barrel-shaped array of double-sided silicon strip detectors. Utilizing an active gas target, ANASEN is able to measure the excitation function of reactions through a range of energies relevant to astrophysics.

Recently, two measurements on neutron-deficient N=8 nuclei were made with ANASEN. Both measured reactions are important to the understanding of Type-I X-ray bursts. Sensitivity studies of reaction network calculations indicate that the rate of the 18Ne(α,p)21Na reaction plays an important role in breakout into the rp-process from the hot CNO cycles in Type-I X-ray bursts [1,2]. The rate of the 17F(α,p)20Ne reaction has significant influence on both the output light curve and the composition of ashes in multi-zone X-ray burst model calculations [3]. The results of these measurements will be presented.

This work was supported by the National Science Foundation through awards PHY-0820941 and PHY-1401574 and by the Department of Energy, Office of Science, under grants No. DE-FG02-96ER40978.

References:

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[3] Cyburt et al. ApJ 830 55 (2016).

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Session Classification: Breakout 2