Important $^{18}F(p,\alpha)^{15}O$ Resonances Identified in ^{19}Ne Using GODDESS

Detecting gamma rays from a nova explosion would provide a good test of current nova explosion models and nucleosynthesis predictions. Annihilation radiation produced when β^+-unstable isotopes decay could have the largest flux and be detectable by gamma-ray telescopes. It is believed that ^{18}F will be the most important source of the annihilation radiation, but it is destroyed prior to decay by the $^{18}F(p,\alpha)$ reaction. Therefore, determination of this rate is an important ingredient in estimating how much ^{18}F is left in the envelope of the explosion to decay. Much of the uncertainty in the reaction rate stems from the unknown energies of two $3/2^+$ states near the proton threshold in the compound nucleus ^{19}Ne. To find these levels, Gammasphere ORRUBA Dual Detectors for Experimental Structure Studies (GODDESS) was used. Gamma rays from the decay of ^{19}Ne were detected in Gammasphere in coincidence with tritons detected in the Oak Ridge Rutgers University Barrel Array (ORRUBA) from the $^{19}F(^3He,t\gamma)^{19}Ne$ reaction. The level structure of ^{19}Ne determined in the experiment as well as its astrophysical implications will be discussed.