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**One-Proton Breakup of $^{18}$F and the $^{17}$O(p,$\gamma$)$^{18}$F Reaction in Classical Novae** BRYAN ISHERWOOD, A. BANU, James Madison University, Harrisonburg, VA 22807, E491 COLLABORATION — Classical nova studies are of considerable interest for understanding the chemical evolution of the Galaxy. They have been proposed as the most significant source for the nucleosynthesis of the isotopes $^{13}$C, $^{15}$N, and $^{17}$O in the Universe. Novae are also likely to synthesize the short-lived radioisotope $^{18}$F ($T_{1/2}$ = 110 min), which is expected to be the most important contributor to the observed emission of 511 keV gamma radiation by space-based $\gamma$-ray telescopes. This emission is produced by electron-positron annihilation following the beta+ decay of radioactive nuclei. A detection of these gamma rays could significantly constrain the nova simulation models. $^{18}$F nucleosynthesis in classical novae strongly depends on the thermonuclear rate of the $^{17}$O(p,$\gamma$)$^{18}$F reaction, which is part of the CNO cycle. This work presents preliminary results toward determination of the $^{17}$O(p,$\gamma$)$^{18}$F reaction cross section, which was measured by the indirect method of one-proton nuclear breakup at intermediate energies. The experiment was carried out at GANIL using a beam of $^{18}$F at 40 MeV/u impinging on a carbon target. Longitudinal momentum distributions of the $^{17}$O breakup fragments were measured in coincidence with $\gamma$-rays emitted by $^{17}$O residues.

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