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Measurement of the ${}^1\text{H}({}^{17}\text{F},\alpha){}^{14}\text{O}$ Cross Section and the ${}^{14}\text{O}(\alpha,\text{p}){}^{17}\text{F}_{g.s.}$ Reaction Rate J. C. BLACKMON, Z. MA, G. RAJBAIDYA, M. S. SMITH, Physics Division, ORNL¹, D. W. BAR-DAYAN, A. E. CHAMPAGNE, C. M. ROWLAND, R. C. RUNKLE, UNC-Chapel Hill, R. L. KOZUB, Tenn. Tech. U., W. BRADFIELDSMITH, A. A. CHEN, P. D. PARKER, K. B. SWARTZ, D. W. VISSER, Yale U., K. I. HAHN, Ewha W. U., T. DAVINSON, A. C. SHOTTER, P. J. WOODS, U. of Edinburgh — The ${}^{14}\text{O}(\alpha,\text{p}){}^{17}\text{F}$ reaction initiates a reaction sequence that leads to the synthesis of heavier elements in X-ray bursts. Significant uncertainties in the ${}^{14}\text{O}(\alpha,\text{p}){}^{17}\text{F}$ reaction rate have persisted because of uncertainties in the properties of excited states in ${}^{18}\text{Ne}$ and the unmeasured direct reaction cross section. We have studied the ${}^1\text{H}({}^{17}\text{F},\alpha){}^{14}\text{O}$ reaction, the time-inverse of the ${}^{14}\text{O}(\alpha,\text{p}){}^{17}\text{F}_{g.s.}$ reaction, using a radioactive ${}^{17}\text{F}$ beam at ORNL's Holifield Radioactive Ion Beam Facility. The (p,α) reaction and (p,p) elastic-scattering cross sections were measured over the entire energy range of interest for the ${}^{14}\text{O}(\alpha,\text{p}){}^{17}\text{F}$ reaction ($E_{cm}^\alpha = 1.0 - 2.6$ MeV). Properties of states in ${}^{18}\text{Ne}$ with excitation energies $E_x = 6.0 - 7.7$ MeV were determined, including the important 1^- state near $E_x = 6.2$ MeV.

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Prefer Oral Session
 Prefer Poster Session

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