Study of unbound ^{19}Ne states via the proton transfer reaction ^{2}H(^{18}F,$\alpha + {}^{15}$O)n[1]

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The nuclear structure of ^{19}Ne near the proton threshold is of interest for understanding the rates of proton-induced reactions on ^{18}F in novae. The proton transfer reaction ^{18}F$(d,n)^{19}$Ne has been measured by bombarding a 720-μg/cm^2 CD_2 target with a 150-MeV ^{18}F^{9+} beam at ORNL's Holifield Radioactive Ion Beam Facility. Approximately 110 hours of ^{18}F$(d,n)^{19}$Ne data were accumulated at an average beam intensity of 2×10^6/s. The ^{19}Ne states of interest near the proton threshold decay by breakup into $\alpha + {}^{15}$O which are detected in coincidence with position-sensitive $E - \Delta E$ Si telescopes. The coincidence requirement together with particle identification eliminates essentially all background events. The reconstruction of the relative energy reveals the excited states of ^{19}Ne which are populated. The mirror reaction ^{2}H(^{18}F,α+^{15}N)p has been measured simultaneously. The implications for the ^{18}F$(p,\alpha)^{15}$O reaction and ^{19}Ne-^{19}F mirror symmetry will be discussed.

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