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Study of low-lying resonant states in ^{16}F using an ^{15}O radioactive ion beam DONGWON LEE, LBNL, KARI PERAJARVI, STUK, Finland, JAMES POWELL, JIM O'NEIL, LBNL, DENNIS MOLTZ, University of California, Berkeley, VLADILEN GOLDBERG, Texas A&M University, JOSEPH CERNY, LBNL
— Among the A=16, T=1 isobaric triad, many states in ^{16}O and ^{16}N have been well established, but less has been reported about ^{16}F. Experimental studies with stable beams have established spin-parity values for the first four low-lying states of ^{16}F, but only upper limits or rough estimates of their level widths have been reported. The spins and parities of the low-lying states have been found to be 0^-, 1^-, 2^-, and 3^- in ascending order in energy, and are believed to have ^{15}O core-single proton configurations of $1p_{1/2}^{-1}\ 2s_{1/2}$ for the 0^-, 1^-, and $1p_{1/2}^{-1}\ 1d_{5/2}$ for the 2^-, 3^-. A recently developed ^{15}O ($T_{1/2}$= 122 sec.) radioactive ion beam from the BEARS (Berkeley Experiments with Accelerated Radioactive Species) facility was used to study the structure of ^{16}F using ^{15}O+p elastic scattering and the Thick Target Inverse Kinematics method on a polyethylene target. The level widths of the first four states in ^{16}F were determined using R-matrix analysis, and our results show that the 0^- state has a level width of 22.8 $\pm$ 14.4 keV, and that the broad 1^- state has a width of 103 $\pm$ 12 keV. The level width of the 2^- state is found to be 4.0 $\pm$ 2.5 keV which is much narrower than the compiled value, while 15.1 $\pm$ 6.7 keV for the 3^- state is in good agreement with previous studies.

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