

Study of $N=20$ shell gap with $^1\text{H}(^{28}\text{Ne}, ^{27,28}\text{Ne})$ reactions

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We report on the $^1\text{H}(^{28}\text{Ne}, ^{28}\text{Ne})$ and $^1\text{H}(^{28}\text{Ne}, ^{27}\text{Ne})$ reactions studied at intermediate energy using a liquid hydrogen target [1]. From the cross section populating the first 2^+ excited state of ^{28}Ne , and using the previously determined $B(E2)$ value, the neutron quadrupole transition matrix element has been calculated to be $M_n=13.8\pm 3.7$ fm². In the neutron knock-out reaction, two low-lying excited states were populated in ^{27}Ne . Only one of them can be interpreted by the sd shell model while the additional state may intrude from the fp shell. These experimental observations are consistent with the presence of fp shell configurations at low excitation energy in $^{27,28}\text{Ne}$ nuclei caused by a vanishing $N=20$ shell gap at $Z=10$.

[1] Zs. Dombrádi et al., Phys. Rev. Lett. (2006), accepted