

Hindered proton collectivity in ${}^{28}_{16}\text{S}_{12}$: Possible magicity at $Z = 16$

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The reduced transition probability $B(E2; 0_{gs}^+ \rightarrow 2_1^+)$ for the proton-rich nucleus ${}^{28}\text{S}$ was obtained experimentally using Coulomb excitation at 53 MeV/nucleon [1]. The experiment was performed using the RI Beam Factory accelerator complex at RIKEN Nishina Center. The resultant $B(E2)$ value $181(31) e^2\text{fm}^4$ is smaller than the expectation based on empirical $B(E2)$ systematics [2]. The proton and neutron transition matrix elements, M_p and M_n , for the $0_{gs}^+ \rightarrow 2_1^+$ transition were evaluated from the $B(E2)$ values of ${}^{28}\text{S}$ and the mirror nucleus ${}^{28}\text{Mg}$. The double ratio $|M_n/M_p|/(N/Z)$ of the $0_{gs}^+ \rightarrow 2_1^+$ transition in ${}^{28}\text{S}$ was obtained to be 1.9(2), showing the hindrance of proton collectivity relative to that of neutrons. These results indicate the emergence of the magic number $Z = 16$ in the $|T_z| = 2$ nucleus ${}^{28}\text{S}$.

References

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