

Invariant-Mass Spectroscopy at the low-Z Shore of the Island of Inversion

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The so-called “island of inversion” is a region in the nuclear landscape where shell-structure changes are observed and in particular the magic neutron number at $N=20$ vanishes. For those nuclei at $Z=10-12$ and around $N=20$, the shell gap at $N=20$ quenches and pf-shell intruder configurations become important. We address the question how strong such configurations are for very neutron-rich but $Z=9$ fluorine isotopes. Such exotic nuclei are produced at the radioactive-ion beam factory (Japan) at beam energies around 250 MeV/u. $^{29}\text{F}^*$ & ^{30}F are studied in inverse kinematics at the SAMURAI experimental setup by (p,2p) reactions on neon isotopes. The two and one neutron-unbound states, respectively, are investigated in terms of invariant-mass spectroscopy where the decay neutrons are measured explicitly. The resulting excitation-energy spectra are compared to different shell-model based calculations. Moreover, $^{29}\text{F}^*$ shows a strong two-neutron sequential decay that is also analyzed by means of Jacobi coordinates.

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