

IN-BEAM γ -RAY SPECTROSCOPY OF $^{88,90,92,94}\text{Se}$

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The neutron-rich nuclei $^{88,90,92,94}\text{Se}$ were investigated via in-beam γ -ray spectroscopy using radioactive beams at the RIBF facility of the RIKEN Nishina Center. The experiment was performed as part of the SEASTAR project, using the DALI2 detector array combined with the MINOS device. Low-lying excited states of the Se isotopes were populated via knock-out reactions in the thick MINOS liquid hydrogen target, while the de-excitation γ -rays detected by DALI2.

Level energies of the first excited 2^+ , 4^+ states for all these Se isotopes and the second 2^+ states for $^{88,90,92}\text{Se}$ were measured for the first time. For ^{88}Se , the previously reported 2^+ level energy was not confirmed. The systematic plot of $E(2^+)$ shows a gradual decrease from $N = 50$ to $N = 60$. Overall, a comparison with the Kr isotopic chain suggests a similar onset of collectivity, as recently observed via “safe”-energy Coulomb excitation. Comparison to initial theoretical calculations confirm the smooth onset of collectivity and suggest a shape transition from prolate to oblate deformed nuclei at around $N = 56$ as well as shape-coexistence in this region of the nuclear chart.