

Rapid onset of collectivity in the vicinity of ^{78}Ni

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γ -rays following the β and β -n decay of the very neutron rich $^{84}_{31}\text{Ga}_{53}$ produced by photo-fission of ^{238}U have been studied at the newly built ISOL facility of IPN Orsay: ALTO. Two activities were observed and assigned to two β -decaying states: ^{84g}Ga , $I^\pi = (0^-)$ and ^{84m}Ga , $I^\pi = (3^-, 4^-)$. Excitation energies of the 2^+_1 and 4^+_1 excited states of $^{84}_{32}\text{Ge}_{52}$ were measured at $E(2^+_1) = 624.3\text{keV}$ and $E(4^+_1) = 1670.1\text{keV}$. Comparison with HFB+GCM calculations allows to establish the collective character of this nucleus indicating a substantial $N=50$ core polarization. The excitation energy of the $1/2^+_1$ state in $^{83}_{32}\text{Ga}_{51}$ known to carry a large part of the neutron $3s_{1/2}$ strength was measured at 247.8keV . Altogether these data allow to confirm the new single particle state ordering which appears immediately after the double $Z=28$ and $N=50$ shell closure and to designate ^{78}Ni as a fragile and easily polarized doubly-magic core.