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Lifetime measurements to study shell evolution beyond N=50

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Recent experimental discoveries have revealed that the neutron effective single particle evolution above 78Ni shows peculiar behaviours. The neutron monopole drifts towards 78Ni remain an open and urgent question and the light odd-neutron N=51 nuclei (towards 78Ni) constitute the most interesting cases to study this evolution. Low-lying states in N=51 isotones may naturally be understood in terms of single-particle configurations and core-particle coupled (collective) states. Both structures were historically well identified in 89Sr Z=38,N=51) which can be considered as a reference nucleus. The aim of the experiment was to determine the nature of the low-lying Yrast or quasi Yrast states in 83Ge (Z=32) in order to assess their collective (shorter lived) or single-particle (longer lived) origin and disentangle monopole drift effects from the rest of the structure evolution towards 78Ni core. Calculations and systematics show that there is a difference of about two orders of magnitude between core-particle coupled state (shorter lived) and single-particle state (longer lived) half lives. The relevant nuclei were produced via a fusion-fission reaction with a 238U beam at 6.2 MeV/u energy impinging on a Be target. The beam current was around 0.5 pnA. The Recoil Distance Doppler-Shift method was employed using the OUPS plunger, with three degrader positions. The gamma rays were detected by the AGATA array in coincidence with the VAMOS mass spectrometer. The half lives of several states of interest were measured and preliminary results will be presented.

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