Gamma-electron spectroscopy with Solenogam: Isomeric Decay in 145Sm

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Solenogam is a recoil spectrometer designed for electron and gamma-ray spectroscopy at the ANU Heavy Ion Accelerator Facility. The design enables the study of nuclear excitations populated in the decay of long-lived states such as isomers and radioactive ground states. First used on a 6.5 T gas-filled solenoid for the study of isomeric decays in ^{189}Pb [1], Solenogam is now installed on an 8 T gas-filled solenoid and preliminary results for this configuration have been reported [2]. The solenoid is used to transport the products of fusion-evaporation reactions to a focal plane where Solenogam is situated, consisting of high-sensitivity gamma-ray and electron detector arrays for singles and coincidence measurements.

Among the N=83 isotones, high-spin isomers have been reported at $\sim$8 MeV for Z=60-68 [3]. Based on experimental g-factor measurements and quadrupole moments in ^{147}Gd [4], these states have been interpreted previously as shape isomers; however, in most cases the spin and parity assignments remain tentative. We have studied the decay of the high-spin, $t_{1/2}$=0.96 μs isomer in ^{145}Sm [5], using the ^{124}Sn(^{26}Mg,5n) reaction at a beam energy of 115 MeV. Microsecond chopped beams were used to isolate the isomeric decay resulting in a (longer) revised lifetime, while conversion coefficients were measured with Solenogam to confirm the isomer spin and parity for the first time. In addition, a significantly revised level scheme has been constructed. These results will be presented, together with an interpretation of the level structures supported by shell-model calculations performed using the K-Shell code [6].

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