Analysis of states above the $K^{\pi}=8^{-}$ isomer in ^{138}Gd

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Abstract

States above the known $K^{\pi}=8^{-}$ isomer in ^{138}Gd were populated with the ^{106}Cd(^{36}Ar^{8+},2p2n) interaction, at a beam energy of 180 MeV, using the K130 cyclotron accelerator at the University of Jyväskylä, Finland. The recoil isomer tagging technique was utilised to correlate delayed γ ray decays detected in the GREAT focal plane spectrometer, with prompt decays measured in the JUROGAM spectrometer at the target position. Current analysis has managed to measure more accurately the lifetime of the isomeric state, with a value of 6.2(2) μs. Angular distributions have been performed for the known states above the isomer and confirm their placements as either E2 or M1 transitions. The band above the isomer has also been extended with the addition of both an E2 and M1 transition, and the measurement of g_k values for all the states in this band further confirm its assignment to the two-quasineutron [514]9/2$\otimes$[404]7/2 configuration. Several other bands above the isomer have been observed and work is currently undergoing to determine whether these belong to rotational structures at higher spin, which are seen in the lower-mass even-even nuclei ^{136}Sm [1] and ^{134}Nd [2].

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