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An E5 transition in the ^{137}Cs decay[1] K. MORAN, Physics Department, U. Mass. Lowell, Lowell MA 10854, E.A. MCCUTCHAN, National Nuclear Data Center, Brookhaven National Laboratory, Upton NY 11973, S. ZHU, Physics Division, Argonne National laboratory, Lemont IL 60439, C.J. LISTER, E. MERCHAN, R. SHEARMAN, Physics Department, U. Mass. Lowell, Lowell MA 10854
— The beta decay of ^{137}Cs is mainly to the $J^\pi=11/2^-$ 661.66 keV isomeric excited state in ^{137}Ba and is usually followed by emission of a single gamma ray as the nucleus relaxes to the $J^\pi=3/2^+$ ground state. It is a well-known standard γ-ray calibration reference. There is only one intermediate state, with $J^\pi=1/2^+$ at 283.50 keV. The γ-ray decay branch to this level has never been observed. The transition must be of E5 or M6 multipolarity. The phase space limitation hinders this decay and a $\sim 10^{-8}$ branch can be anticipated from the few known E5 decay matrix elements. The use of the Gammasphere detector array at Argonne National Lab allows a search for these rare events by selection of an optimal detector opening angle for coincidences, chosen to minimize the effects of Compton cross-scattering in the array. In this manner the E5 cascade transition was observed and the branching ratio measured. Rigorous E5 transitions are only known in four other cases to date, so this measurement adds significantly to the body of knowledge surrounding E5 matrix elements.

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Katharine Moran
Physics Department, U. Mass. Lowell, Lowell MA 10854

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