LIFETIMES AND BAND TERMINATIONS IN ^{86}Zr *

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The transitional nucleus ^{86}Zr lies between highly deformed ^{80}Zr and nearly spherical ^{90}Zr. An earlier investigation of its high-spin structure in conjunction with calculations performed within the configuration-dependent shell-correction approach using a cranked Nilsson potential (CNSM) showed evidence of band terminations at the 24^+, 27^-, and 30^+ states [1]. A characteristic feature of band terminations is a rapid drop in collectivity approaching termination. The present work was undertaken to measure transition strengths in ^{86}Zr to examine the evolution of collectivity.

^{86}Zr was populated in the ^{58}Ni(^{32}S,3pn) reaction at 135 MeV using the 88-Inch Cyclotron at LBNL. Recoiling ^{86}Zr nuclei were stopped in a thick Ta backing. Prompt multi-γ coincidences with evaporated charged particles were detected using GAMMASPHERE and the MICROBALL. To improve statistics data from pairs of nearby detector rings were combined and whenever possible lifetimes were measured at each of the four angles 34.95°, 52.81°, 127.19°, and 145.45°. Mean lifetimes of 36 levels in ^{86}Zr were measured using the Doppler-shift attenuation method. In many cases the lineshapes were gated by transitions above the one of interest to eliminate the uncertainties of side feeding.

The transition quadrupole moments Q_t inferred from the measured lifetimes in the yrast positive-parity band are graphed as a function of the spin of the initial state in Fig. 1. The sharp drops in collectivity approaching the 24^+ and 30^+ states support the interpretation [1] of band termination in these configurations.

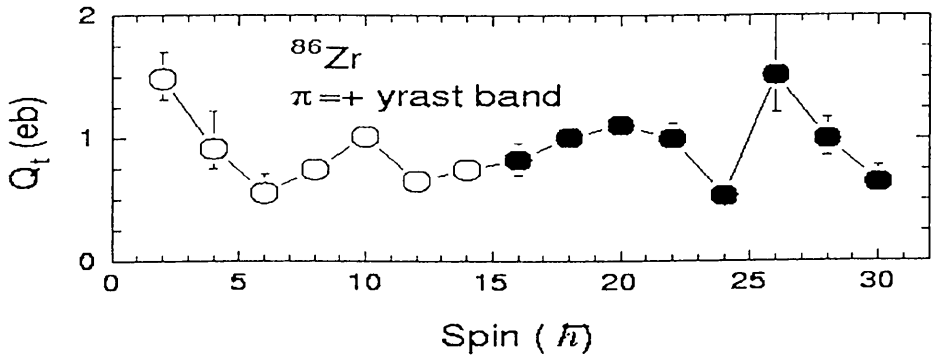

Figure1: The transition quadrupole moment Q_t versus spin in the yrast band. Open circles indicate Q_t values calculated using lifetimes from previous work [2,3].

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