TERMINATING STRUCTURES AND LIFETIME MEASUREMENTS IN ^{87}Nb

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Two experiments have been performed using the ^{32}S(^{58}Ni, $3p$) reaction at 135 MeV with GAMMASPHERE and the MICROBALL to study the high-spin structure of the transitional nucleus ^{87}Nb. The first experiment using a thin target provided a considerable extension and refinement of the level and decay scheme, as well as firm spin assignments from DCO ratios. Sub-picosecond lifetimes were measured in the second backed-target experiment using the Doppler-shift attenuation method. The lifetimes imply a rather modest average deformation of $\epsilon_2 \sim 0.1$, but with considerable variation from state to state. Strong alternations were observed in the $B(M1)$ strengths of transitions between some pairs of bands. The experimental results were compared with calculations performed within the configuration-dependent shell-correction approach using a cranked Nilsson potential. The calculations generally reproduce the irregularities in the band structure and plunging Q_t values, explaining them as reflections of the underlying microscopic shell structure leading to band terminations. For example, band termination is indicated in the figure by the rise in $E - E_{ld}$ at high spin coupled with a simultaneous drop in Q_t.

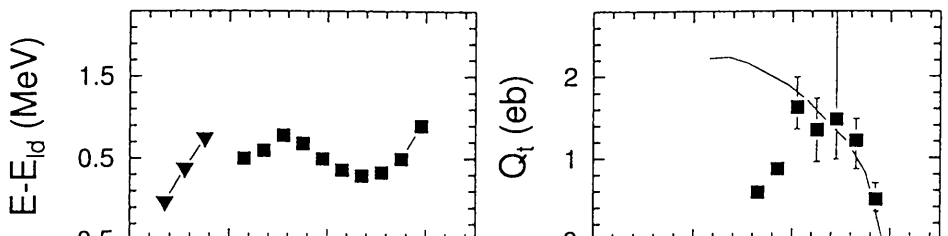

Figure 1: Left: The observed states with $\pi = +$, $\alpha = -\frac{1}{2}$ are plotted against spin with the energy of a "standard" rigid rotor subtracted. Right: Q_t values for the transitions between these states are plotted against spin along with the CNSM predictions.

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