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SPECTROSCOPY OF ^{98}Ru

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A recent survey [1] of potential candidates for spherical vibrational motion [2] concluded that very few passed the criteria; of those that did, $^{98,100}\text{Ru}$ were the most promising. However, in part this may have been due to the lack of detailed spectroscopic data for $^{98,100}\text{Ru}$. In order to remedy this, we have performed a high-statistics measurement of the β decay of $^{98,100}\text{Rh}$ using the newly commissioned β decay Tape Station at iThemba labs located near Cape Town, South Africa. Activities of $^{98,100}\text{Rh}$ were produced using fusion evaporation reactions of ^{14}N and ^{16}O beams on an ^{89}Y target, which was then transported from the irradiation station to a counting station. The counting station consisted of 4 clover-type high-purity germanium detectors, augmented by a TIGRESS detector, a plastic scintillator for the β particles, and an in-vacuum Si(Li) detector for conversion electrons. The decay of ^{98}Rh and ^{100}Rh to ^{98}Ru and ^{100}Ru was the first measurement to be completed on this new facility. Very high-statistics data sets were collected for $^{98,100}\text{Ru}$, resulting in considerable expansions of their decay schemes. In this presentation, we concentrate on the results for ^{98}Ru from the analysis of the γ - γ coincidence matrix.

A main focus of this work has been on possible states associated with the first excited 0^+ state, the 0_2^+ level. Several weak E2 transitions – the 495 keV ($2_3^+ \rightarrow 0_2^+$), 402-keV ($2_3^+ \rightarrow 2_2^+$) and 419-keV ($2_3^+ \rightarrow 4_1^+$), were newly observed. The E2 transition to the 0_2^+ state possesses the largest relative B(E2) value, strongly suggesting that the 2_3^+ state is a band member of the excited 0_2^+ band. We have also observed a candidate level for the 4+ rotational band member, suggesting that ^{98}Ru possesses a more-deformed excited 0^+ band coexisting with a less-deformed ground state.

Details of the analysis of the ^{98}Rh decay to date will be given.

[1] P.E. Garrett, J.L. Wood, and S.W. Yates, Phys. Scripta 93, 063001 (2018).

[2] J. Kern et al., Nucl. Phys. A593, 21 (1995).

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