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Beta-decay study of the shape coexistence in ^{98}Zr.

Understanding the phenomenon of shape evolution in atomic nuclei has been one of the main quests in nuclear physics. While throughout the nuclear chart the evolution of a spherical ground-state shape into a deformed one is usually a gradual process, in the Zr isotopic chain an abrupt shape transition is observed at N=60. This dramatic onset of deformation in ^{100}Zr was recently well reproduced in the state-of-the-art Monte Carlo Shell Model calculations, which also predict that the same deformed configuration may coexist at higher excitation energies in the lighter Zr isotopes. The ^{98}Zr is of particular interest in this regard as it is a transitional nucleus which lies on the interface between both spherical and deformed nuclear phases. Thus, significant amounts of experimental and theoretical research efforts have been made to study the shape coexistence phenomena in ^{98}Zr. While they demonstrate a good overall description of the ^{98}Zr nuclear structure, the interpretation of the higher-lying shape coexisting bands is still uncertain. In particular, several discrepancies between theoretically calculated and experimentally deduced reduced transition probabilities were noted, highlighting the need for further investigations.

Based on the above, a β-decay experiment was performed at TRIUMF-ISAC facility utilising the 8π spectrometer in conjunction with auxiliary β-particle detectors to measure the branching ratios and multipolarity mixing ratios for the transitions in ^{98}Zr. The high-quality and high-statistics data obtained with this setup allowed for the determination of branching ratios for very weak transitions important for assigning band structures. Furthermore, gamma-gamma angular correlation measurements enabled both spin assignments and mixing ratio determinations. The new results will be presented, and discussed in relation to both the MCSM and recent IBM configuration mixing calculations.

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