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Probing 174Yb and 178Hf Structure With (p,t) Reactions

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Two-neutron transfer reactions work exceptionally well as low-spin probes into nuclei. With a distinct 0+ cross-section shape, peaking at the most forward angles, and their ability to populate a range of nuclear levels without injecting large amounts of spin into the system, they can be used to study the competing modes of excitation and shapes of nuclei at low excitation energies. The nature of the low-lying 0+ states in nuclei are often unclear with a variety of theoretical treatments leading to different interpretations of the underlying nuclear structures. Given the nature of two-neutron transfer reactions, pairing correlations are expected to drive the majority of the cross section into the ground state. Juxtaposed with the still significant cross sections observed in a variety of excited states can give further insight into the structure of nuclei. To study 0+ states in 174Yb and 178Hf, the two-neutron transfer reactions 176Yb(p,t) and 180Hf(p,t) were studied at the Q3D spectrometer at the Maier-Leibnitz Laboratory at the Technical University of Munich. Preliminary results on the resulting spectra will be presented. The motivation is to confirm previously observed 0+ states in 174Yb and 178Hf, identify possible new 0+ states, their cross-sections, and aid in the theoretical interpretation of the rich nuclear structure in this region. FRESCO calculations were used to aid in understanding behavior of states close to the ground state.

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