Contribution ID: **33** Type: **Contributed Oral**

Investigation of States Populated in the 102Ru(p,t)100Ru Two Neutron Transfer Reaction

Saturday, 18 February 2023 17:45 (15 minutes)

One of the foremost goals of nuclear physics is to provide an understanding of how nuclei are assembled from the basic constituent building blocks of protons and neutrons. Preceding studies have attempted to achieve this by observing the excitation's of nuclei under fine-tuned experimental conditions with the most advanced detectors available on the planet. Nevertheless, this initiative continues to present as extraordinarily non-trivial in nature, as these complex nucleic systems exhibit unique characteristics and trends in different areas of the chart of nuclides, many of which are yet to be fully understood and parameterized. A prime example of one such characteristic is the behaviour of collective states within the context of the shell model, and how this feature evolves in different Z areas of the chart of nuclides. With Z = 44 and N = 56, 100Ru lies near the middle of the Z = 40 − 50 shell, and ergo investigation into the excited states of this nucleus stands to offer an increased understanding of the evolution of collectivity in the Z = 40 − 50 region. The experiment under discussion herein focuses on the study of 100Ru via a two-neutron transfer reaction experiment that was performed using the Q3D magnetic spectrograph at the Maier-Leibnitz Laboratory, in Garching, Germany, in 2019. The experimental procedure employed the use of a 102Ru target which was bombarded with protons in order to effectively pick-up two neutrons from the target, resulting in the production of 100Ru. Removing a pair of particles from the system enables the study of the neutron-pair properties of the states observed in the reaction, which in turn renders a more robust understanding of the structure of 100Ru. Results of the analysis of this experiment will be discussed and their future significance will be highlighted.

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Session Classification: February 18 Afternoon Session

Track Classification: Nuclear Structure