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Searching for triaxial deformation in highly exotic nuclei towards the neutron dripline

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A leading challenge in nuclear-structure research is to experimentally establish regions of oblate and triaxial deformation. Such a phenomenon is not only interesting from a fundamental structure perspective, but could also provide vital understanding and constraints of the flow of r-process nucleosynthesis in the vicinity of the $N = 82$ shell closure [1]. The very neutron-rich Mo-Ru-Pd nuclides, which exhibit filling of the neutron $vh_{11/2}$ and proton $\pi g_{9/2}$ orbitals and an abundance of low-energy 2_2^+ states, are expected to lie in a relatively rare region of triaxial-oblate deformation [2,3]. The opening of the Facility for Rare Isotope Beams (FRIB) enables the study of these highly exotic nuclei along the neutron drip line.

Using the world-class FRIB Decay Station initiator (FDSi), we performed discrete spectroscopy on over 100 nuclei, including the very-exotic ^{114}Mo, ^{116,118}Ru, and ^{120,122}Pd isotopes, to probe their shape degrees of freedom. A determination of energies and transition strengths is expected to provide direct evidence of triaxial deformation. The FDSi coming online is an exciting development in the community as it is an assembly of cutting-edge clovers, particle detectors, an ultra fast-timing array and a neutron time-of-flight array. This work presents spectroscopy of several exotic nuclei between Rb ($Z = 37$) and Ag ($Z = 47$), which includes ground and exited-state lifetime measurements and several instances of first spectroscopy. We focus on a preliminary analysis and will discuss the likely direction of future work.

References

[1] P. Möller, R. Bengtsson, et al. Atomic Data and Nuclear Data Tables 94.5 (2008), pp. 758–780.
[2] D. T. Doherty, J. M. Allmond, et al. Physics Letters B 766 (2017), pp. 334–338.
[3] J. Ha, T. Sumikama, et al. Physical Review C 101.4 (2020), p. 044311.

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