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Mapping shape transitions in neutron-rich $A \sim 190$ nuclei from isomeric fragments of ^{198}Pt

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The well-explored $A \sim 190$ Hf-Ta-W nuclei near the valley of stability feature robust axially symmetric prolate shapes and associated high- K isomerism. The very-neutron-rich isotopes of these elements are far less explored experimentally as they cannot be accessed via fusion-evaporation or neutron-transfer reactions, and varying predictions of prolate-to-oblate shape transitions in different theoretical models remain untested. To access this neutron-rich region, a ^{198}Pt primary beam at NSCL was fragmented for the first time, populating a wide palette of isotopes in high-spin metastable states. Following momentum-analysis by the A1900 fragment separator over a ~ 400 ns flight path, the isotopes were implanted in a Si detector stack surrounded by the GRETINA array to detect delayed gamma rays correlated with the implants. A range of new as well as previously observed isomers, with half-lives from a few hundred ns to few hundred μs , were populated in $72 < Z < 77$ nuclei. With the available gamma-gamma resolving power of GRETINA, collective band structures were populated in some cases and level schemes deduced from the isomeric decays. These first spectroscopic data on high-spin excitations in this rather inaccessible region of the nuclear chart will be presented and discussed within the framework of available model predictions.

This collaborative work, spearheaded by UMass Lowell, involved researchers from Michigan State, Central Michigan and Western Michigan universities, RIKEN, Lawrence Livermore and Lawrence Berkeley National Laboratories, and the National Nuclear Data Center at Brookhaven National Laboratory. The work is supported by the U.S. Department of Energy and the National Science Foundation.

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