Spectroscopy of Neutron-rich Plutonium Nuclei*

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Spectroscopic studies of nuclei in the A~250, Z~100 region provide critical input to theoretical models that attempt to describe the structure and stability of the heaviest elements. In addition to single-particle energies, the availability of low-lying high-K configurations in this region allows additional parameters, such as pair gaps and spin-spin residual interactions, to be deduced experimentally, through the population and decay of K-isomers. We report here on new spectroscopic observations in the N=150,151 nuclei ^{244,245}Pu (Z=94). This continues our exploration of specific high-K configurations observed in the heavier neutron-rich $^{246\text{-}249}$Cm (Z=96) and $^{247\text{-}249}$Cf (Z=98) nuclei using deep-inelastic and transfer reactions [1], which complement physics results obtained from fusion-evaporation studies [2] of $Z \geq 100$ nuclei (see Fig.1).

High-spin states in ^{244,245}Pu were populated via inelastic and transfer reactions using ^{47}Ti and ^{208}Pb beams incident on a ^{244}Pu target. Delayed and prompt gamma rays were detected with Gammasphere. A new K-isomer in ^{244}Pu, with energy and decay similar to 2-quasineutron 8^- isomers in heavier N=150 neighbors, has been identified, and its half-life measured. A new 2-qp rotational band structure, with properties consistent of being built on top of this isomer, has also been identified, along with other new rotational band structures in ^{244,245}Pu. The new results will be discussed in the larger context of emerging data [3] and theoretical expectations in neutron-rich $N \geq 150$ nuclei.

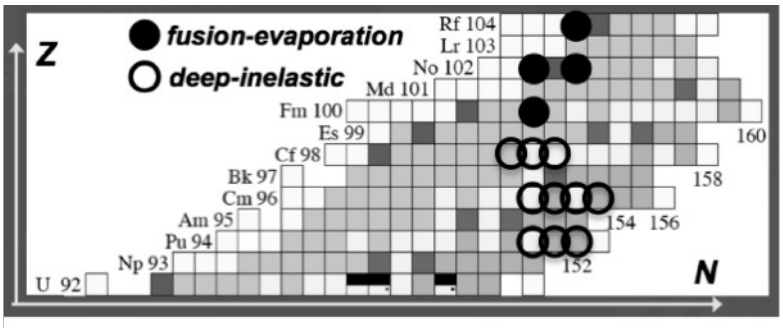

Figure 1: Neutron-rich A~250 nuclei investigated via inelastic and transfer reactions in this work.

*Supported by USDOE Grants DE-FG02-94ER40848 and DE-AC02-06CH11357.
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