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High-spin spectroscopy after multinucleon transfer

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Multinucleon transfer reactions (MNT) are a competitive tool to populate exotic neutron-rich nuclei. Excited reaction products have been measured (i) in transfer products of ^{136}Xe+^{238}U and ^{136}Xe+^{208}Pb MNT reactions and (ii) as a fission product after the ^{136}Xe+^{238}U reaction employing the high-resolution Advanced Gamma Tracking Array (AGATA) coupled to the mass spectrometer PRISMA at LNL (INFN, Italy). Furthermore, the ^{136}Xe+^{198}Pt MNT reaction was studied with the γ-ray spectrometer GAMMASPHERE in combination with the gas detector array CHICO at LBNL. Mass yields of the ^{136}Xe+^{238}U reaction have been extracted and compared with calculations based on the GRAZING model for MNT reactions. Population yields for nuclei in the actinide region were obtained and compared to x-ray yields measured by AGATA. An extension of the ground-state rotational band in ^{240}U was achieved and evidence for an extended first negative-parity band in ^{240}U is found. The results were compared to recent mean-field and DFT calculations. Several high-spin states on top of long-lived isomers in the $N \sim 82$ nuclei ^{134}Xe, ^{135}Xe, and ^{137}Ba were discovered based on $\gamma\gamma$-coincidence relationships and information on the γ-ray angular distributions as well as excitation energies from the total kinetic energy loss and fission fragments. Latest shell model calculations employing different effective interactions reproduce the experimental findings and support the new spin and parity assignments. Supported by the German BMBF (05P12PKFNE TP4), ENSAR-TNA03, BCGS.

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