Contribution ID: **26** Type: **Poster**

New structure features revealed in isomeric spectroscopy in the Z ~ 82, N ~ 104 region

Neutron-deficient nuclei around mid-shell at $N \sim 104$ in the lead region provide many examples of shape coexistence and shape isomers. In order to study shape coexistence in this region, prompt and delayed γ-ray spectroscopy of the ^{187}Pb, ^{183}Hg and ^{188}Bi isotopes produced in the reaction ^{50}Cr+^{142}Nd$\rightarrow$^{192}Po* has been performed at the Argonne Gas-Filled Analyzer.

In ^{187}Pb, a new 5.15(15)-μs isomeric state at 308 keV above the spherical 3/2$^-$ ground state was identified. A strongly-coupled band is observed on top of this isomer, which is nearly identical to the one built on the prolate 7/2$^-$[514] Nilsson state in the isotone ^{185}Hg. Based on this similarity and on the result of the potential-energy surface calculations, the new isomer in ^{187}Pb was proposed to be prolate with J^π = 7/2$^-$ and classified as a shape isomer. The retarded character of the 308-keV (7/2$^-$)$\rightarrow$3/2$^-_{gs}$ transition with a deduced $B(E2)$ = 5.6(2) $\times$ 10^{-4} W.u. can be well explained by the significant difference between the prolate parent and spherical daughter configurations, leading to the shape isomerism.

In ^{183}Hg, the decay of the nearly spherical 13/2$^+$ isomeric state was first observed following the α decay of the 13/2$^+$ isomer in ^{187}Pb. By the α – γ correlation measurement, the half-life of this isomer was measured to be T1/2 = 290(30) μs. This isomer was proposed to deexcite by retarded $M2$ transition, which can be explained by the notable shape change between the initial and the final states.

Recently, a strong shape staggering was found in the charge radii of ^{187,188,189}Bi. To further characterize this phenomenon in ^{188}Bi, its in-beam and decay spectroscopy was studied in the same experiment. A new 0.25(5)-μs isomeric state decaying via a 243-keV transition to the (10$^-$) ^{188m}Bi was identified.

[1] P. Möller et al., Phys. Rev. Lett. 103, 212501 (2009)

[2] W. Q. Zhang et al., submitted to Physics Letters B.

[3] A. Barzakh et al., Phys. Rev. Lett. 127, 192501 (2021).

.

Primary authors: ZHANG, W. Q. (Institute of Modern Physics, Chinese Academy of Sciences); ANDREYEV, A. N.; LIU, Z.; HUANG, H.; Prof. SEWERYNIAK, D. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); LI, Z. H. (State Key Laboratory of Nuclear Physics and Technology, School of Physics, Peking University, Beijing 100871, China); LI, J. G. (Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China); GUO, C. Y. (State Key Laboratory of Nuclear Physics and Technology, School of Physics, Peking University, Beijing 100871, China); DOHERTY, D. T. (Department of Physics, University of Surrey, Guildford, GU2 7XH, United Kingdom); BARZAKH, A. E. (Petersburg Nuclear Physics Institute, NRC Kurchatov Institute, 188300 Gatchina, Russia); DUPPEN, P. Van. (KU Leuven, Instituut voor Kern- en Stralingsfysica, 3001 Leuven, Belgium); CUBISS, J. G. (Department of Physics, University of York, York, YO10 5DD, United Kingdom); ANDEL, B. (KU Leuven, Instituut voor Kern- en Stralingsfysica, 3001 Leuven, Belgium); ANTALIC, S. (Department of Nuclear Physics and Biophysics); BLOCK, M. (Helmholtz-Institut Mainz, Mainz, 55128, Germany); BRONIS, A. (Department of Nuclear Physics and Biophysics); CARPENTER, M. P. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); COPP, P. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); DING, B. (Institute of Modern Physics, Chinese Academy of Sciences); FAVIER, Z. (IRFU, CEA, Université Paris-Saclay, F-91191 Gif-sur-Yvette, France); GIACOPPO, F. (Helmholtz-Institut Mainz, Mainz, 55128, Germany); HUANG, T. H. (Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China); KINDLER, B. (GSI Helmholtzzentrum für Schwerionenforschung Darmstadt, Darmstadt, 64291, Germany); KONDEV, F. G. (Physics

Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); LAURITSEN, T. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); LI, G. S. (Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China); LOMMEL, B. (GSI Helmholtzzentrum für Schwerionenforschung Darmstadt, Darmstadt, 64291, Germany); LU, H. Y. (Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China); MONTHERY, M. A. (Department of Physics, University of York, York, YO10 5DD, United Kingdom); MOˇSAˇT, P. (Department of Nuclear Physics and Biophysics); NIU, Y. F. (Lanzhou University, Lanzhou 730000, China); RAISON, C. (Department of Physics, University of York, York, YO10 5DD, United Kingdom); REVIOL, W. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); SAVARD, G. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); STOLZE, S. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); WILSON, G. (Physics Division, Argonne National Laboratory, Argonne, Illinois 60439, USA); WU, H. Y. (State Key Laboratory of Nuclear Physics and Technology, School of Physics, Peking University, Beijing 100871, China); WANG, Z. H. (Lanzhou University, Lanzhou 730000, China); XU, F. R. (State Key Laboratory of Nuclear Physics and Technology, School of Physics, Peking University, Beijing 100871, China); YU, X. H. (Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China); ZENG, Q. B. (Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China); ZHOU, X. H. (Institute of Modern Physics, Chinese Academy of Sciences, Lanzhou 730000, China)

Presenter: ZHANG, W. Q. (Institute of Modern Physics, Chinese Academy of Sciences)