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A changing nuclear structure beyond N=126 from isomers in ^{211,213}Tl and ^{210}Hg

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Magic nuclei are the cornerstone of our understanding of the nuclear structure, and the double shell closure in ^{208}Pb (Z=82, N=126) makes no exception. The persistence of these magic number far from ^{208}Pb is a key issue for the understanding of heavy nuclei as well as for the r-process path. While the region beyond N=126 and below Z=82 is difficult to reach with multi-nucleon transfer or fusion-evaporation reactions, the exploitation of cold fragmentation reactions from ^{238}U at GSI has allowed one to perform a first spectroscopy study of these nuclei by isomer decay spectroscopy. Predicted seniority isomers were found in $^{212-216}$Pb as well as in ^{213}Pb, pointing out the role of $0\hbar\omega$ excitations across the ^{208}Pb core in determining the quadrupole polarization properties of excited states in these semi magic nuclei.
However, the combination of the high selectivity of the FRS spectrometer with the high sensitivity of the RISING γ-ray array at GSI, led to the population and study for the first time of the exotic nuclei ^{211,213}Tl and ^{210}Hg, three to four neutrons beyond N=126. The talk will address the deviation of the observed isomers (and their decay pattern) from shell-model predictions and seniority-scheme systematic from the neighboring lead isotopes. In particular, we will underline issues with the proton-hole space below Z=82, and compare our findings with the well understood structure of Tl and Hg isotopes with N<126.
Finally, new opportunities for studying these nuclei with in-flight as well as ISOL beams, measuring different variables and trying to extend the isomer spectroscopy up to ^{218,220}Pb, ^{215}Tl and ^{212}Hg will be pointed out, also in view of the FAIR facility operation.

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