Along the N=126 closed shell: isomer studies around ^{204}Pt

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First results from a major new initiative of experiments focusing on the study of the internal structure of nuclei at the extremes of N/Z ratio using isomer spectroscopy will be reported. These experiments represent the first of the Stopped Beam section of the *Rare Isotopes Investigations at GSI* (RISING) project. Exotic nuclei were synthesised using relativistic projectile fragmentation of ∼500→1000 MeV/u beams of (i) ^{107}Ag; (ii) ^{208}Pb; and (iii) ^{58}Ni provided by the SIS synchrotron at GSI. The exotic fragments produced were separated and identified event-by-event using the GSI FRagment Separator (FRS). The final reaction products were stopped in layers of plastic, copper or beryllium at the final focal point of the FRS and viewed by the high-efficiency, high granularity Stopped RISING gamma-ray spectrometer, consisting of 15 Euroball cluster Ge-detectors. Time-correlated gamma decays from individually identified nuclear species have been measured, allowing the clean identification of isomeric decays in a wide range of exotic nuclei both at the proton drip-line and in heavy, neutron-rich systems.

Selected highlights of the initial experimental results from this highly successful campaign will be presented, with the focus on heavy systems populated in the fragmentation of the ^{208}Pb projectile:
(i) the first observation of excited states in the N=126 closed-shell nucleus, ^{204}Pt following the internal decay of I^{π}=(5^{-}) and (10^{+}) isomeric states. In addition, new experimental information has been obtained on a range of nuclei in the region: ^{203}Pt, ^{189}Ta, ^{190}W.
(ii) decays from the previously reported isomeric $I = 27$ and $I = (49/2)$ states in ^{148}Tb and ^{147}Gd, respectively, have been observed. These isomeric decays represent the highest discrete spin states observed to date following a projectile fragmentation reaction, and opens up the possibility of doing high-spin physics using this technique.

The structure of the N∼ 126 nuclei will be discussed, together with the reaction mechanism employed to synthesise them.