Coulomb excitation of re-accelerated ^{208,210}Rn and ^{206}Po beams

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In regions near magic nuclei, seniority can be regarded as a good quantum number. In the trans-Pb nuclei near the $Z = 82$ and $N = 126$ shell closures, relative high-j single-particle proton orbitals dominate the structure and thus levels up to $I = 2j - 1$ could, in principle, be understood within the seniority scheme. In $N = 122$, $N = 124$ and especially in the closed shell $N = 126$ isotones with $Z \geq 82$, behaviour of the $B(E2)$ values resembling the seniority scheme predictions has been observed. These nuclei lie in, or at the boundary of the region where seniority scheme should persist. However, contributions from collective excitations may be present when moving away from the $N = 126$ closed shell. To date, surprisingly little is know of the transition probabilities between the low-spin states in this region.

In the present study, $B(E2; 0^+ \rightarrow 2^+)$ values have been measured in ^{208,210}Rn and ^{206}Po nuclei through Coulomb excitation of re-accelerated radioactive beams in inverse kinematics. The radioactive beams were produced at ISOLDE by bombarding a UC_x primary target with 1.4 GeV protons. The mass separated radioactive beams were re-accelerated with the REX-ISOLDE linear accelerator to 2.8 MeV/u and delivered to the target position of the MINIBALL γ–ray spectrometer, which recorded γ–rays following Coulomb excitation. The experimental setup and resulting $B(E2; 0^+ \rightarrow 2^+)$ in ^{208,210}Rn and ^{206}Po are presented and discussed in terms of systematics and relevant nuclear models. The presents study provides new insight into the interplay between collective excitations and single-particle regime near $N = 126$.