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Investigation of ^{182}Pt via β decay of ^{182}Au

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On behalf of IS665 and IDS Collaboration.

Shape coexistence is a well-established phenomenon in which two or more different types of deformation coexist at low excitation energy within the same nucleus [1]. One of the most extensive manifestations of shape coexistence can be found in the neutron-deficient isotopes near the closed proton shell of lead (Z = 82). Exotic nuclei in this region have been extensively studied using various experimental methods, one of which is β-delayed γ-ray spectroscopy. This method is valuable for studying such nuclei because it allows us to identify and study levels in the daughter nucleus up to relatively high excitation energy. Since β decay is sensitive to the change of nuclear structure between the mother nucleus and the populated state, this method can be used for the determination of properties of excited levels, such as nuclear spin.
One of the nuclei from this part of the nuclear chart is ^{182}Pt, the daughter nucleus after the EC/β^+ decay of ^{182}Au, which was studied at the ISOLDE Decay Station (IDS) [2]. The γ rays originating from the de-excitation of states in ^{182}Pt populated in this β decay were measured using four HPGe Clover detectors. In comparison to the previous study [3], we collected over an order of magnitude higher statistics. This increase in data allowed us to significantly expand the currently known level scheme of ^{182}Pt by the use of the prompt γ-γ coincidence technique. We observed all previously known transitions and about 200 new transitions and 80 new levels up to the excitation energy of ~ 3.7 MeV were placed in the level scheme. Additionally, we evaluated the β-decay feeding intensities into levels in ^{182}Pt and calculated corresponding log *ft* values for the first time for this β decay. The log *ft* values for several already known 2^+ and 3^+ states are consistent with the allowed decay of 2^+ ground state in ^{182}Au [4]. Moreover, the obtained log *ft* values will be used to hint at the spin and parity of levels for which they are not yet known.

[1] K. Heyde and J. L. Wood, Rev. Mod. Phys. 83 (2011) 1467.
[2] ISOLDE Decay Station website. https://isolde-ids.web.cern.ch/.
[3] P. M. Davidson et al., Nucl. Phys. A 657 (1999) 219.
[4] R. D. Harding et al., Phys. Rev. C 102 (2020) 024312.

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