Structure of ^{182}Pt investigated via β decay of ^{182}Au

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The investigation of neutron-deficient isotopes in the lead region is of great significance in nuclear research since they manifest interesting phenomena of nuclear structure and radioactive decay. One of them is a shape coexistence [1] whereby two (or more) different types of deformation coexist at low excitation energy within the same nucleus. This phenomenon is well established in even-even platinum nuclei, such as ^{182}Pt, which is a daughter nucleus in β decay of ^{182}Au. A great tool to study these isotopes is the spectroscopy of γ rays following their β decay which allows us to identify and study levels in the daughter nucleus up to relatively high excitation energy. Current measurement techniques allow us to reach a significant improvement in the quality of information known about the isotope ^{182}Pt.

The β decay of ^{182}Au has been investigated at the ISOLDE facility at CERN [2]. This isotope was produced in a bombardment of a thick uranium target by protons. The high-purity ion beam of ^{182}Au was obtained by means of laser ionisation by RILIS [3] and mass separation. The measurement of its β decay was performed at the detection system ISOLDE Decay Station (IDS) [4] with four HPGe Clover detectors for γ-ray detection.

The method of prompt γ-γ coincidences was used for the investigation of excited levels in ^{182}Pt populated in the β decay of ^{182}Au. We confirmed all transitions known from the previous β-decay study of ^{182}Au [5] and identified many new transitions and levels. The β-decay feeding intensities into levels in ^{182}Pt and corresponding log ft values were evaluated for the first time. The log ft values for 2^+ and 3^+ states are consistent with the allowed decay of 2^+ ground state in ^{182}Au [6]. Additionally, log ft values will be used to gain information about spin and parity of levels, for which they are not known. In total, we observed about 200 new transitions and 80 new levels up to the excitation energy of $\sim$ 3.7 MeV in ^{182}Pt which allows us to significantly expand its level scheme. This result shows the great potential of this type of studies at IDS.

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