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New β-decaying state in ^{214}Bi

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The structure of the odd-odd, neutron-rich bismuth isotopes provides an excellent testing ground for shell-model calculations. While the low-lying structure in ^{210}Bi ($Z = 83$, $N = 127$) is expected to be dominated by $(\pi h_{9/2})(\nu g_{9/2})$ configurations, the gradual filling of the $\nu g_{9/2}$ and higher-lying shells will alter this situation. For ^{210,212,214}Bi, $I^{\pi} = 1^{-}$ ground states were suggested [1], while in contrast to this, high-spin [$I^{\pi} = (6 - 8^{-})$] ground states were proposed for ^{216,218}Bi [2,3]. Low-lying high-spin [$I^{\pi} = (8, 9^{-})$] isomers were observed in ^{210,212}Bi [1,4,5] and low-spin [$I^{\pi} = (3^{-})$] isomer was suggested in ^{216}Bi [1]. Moreover, β decays of these isotopes allow for investigation of excited levels in polonium isotopes [1-4] and for testing seniority scheme in these nuclei.

In this contribution, an identification of a new β-decaying state in ^{214}Bi is discussed. The experiment was carried out at ISOLDE Decay Station (IDS) as a part of a campaign dedicated to decay- and laser-spectroscopy studies of bismuth isotopes performed by our collaboration at ISOLDE-CERN. We investigated β decays of ^{214}Bi and observed strong feeding to high-spin levels in ^{214}Po, more particularly, to the 8^{+}_{1} level [6] and states above, which unambiguously proves the existence of a high-spin β-decaying state in ^{214}Bi. Half-life of this new state was determined and by using γ-γ coincidences the level scheme of ^{214}Po was extended. Based on the β-decay feeding pattern a spin and parity assignment of $I^{\pi} = (8, 9^{-})$ is preferred for the new β-decaying state in ^{214}Bi.

The existence of two β-decaying states in ^{214}Bi completes the chain of low-lying isomers present in odd-odd bismuth isotopes from ^{210}Bi to ^{216}Bi. The results will be discussed in connection to systematics in neighboring nuclei and compared with shell-model calculations.

References

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