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Quantum State Selective Decay Spectroscopy of ^{213}Ra

By combining the mass resolving power of SHIPTRAP with the charged-particle- multicoincidence setup TASISpec [1] the decay path of the ^{213}Ra ground state has been exclusively studied and revised decay data has been obtained. In regions far from the line of beta-stability the preparation of isotopically clean sources and thus unambiguous decay information becomes most essential and challenging. With the aid of virtual experiments using Geant4 [2, 3], high-resolution quantum-state selective decay spectroscopy enables insight in these regions.

The experimental scheme has been realized at GSI Darmstadt where a ^{48}Ca beam, provided by the UNiversal Linear ACcelerator (UNILAC), was impinging on a thin ^{170}Er target foil. After standard velocity filtering in the Separator for Heavy Ion reaction Products (SHIP), the nuclear ground state of ^{213}Ra was mass-selected in SHIPTRAP [4] and transferred to the TASISpec decay-station.

The most recent as well as most comprehensive study of ^{213}Ra has been performed by Kuusiniemi et al. [5]. However, the β^+/EC -branching of the ^{213}Ra ground state has been unchanged since the first studies nearly 50 years ago [6].

This study exemplifies the immense potential of high-resolution quantum-state selective decay spectroscopy to gain insight into nuclear structure properties.

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