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Mass measurements of exotic nuclides in the vicinity of ^{100}Sn and their implications to nuclear structure

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The heavy $N = Z$ nuclei and the nuclei in their vicinity are highly interesting to study; they can provide important insights about nuclear structure, symmetries and interactions and have a high impact in modelling nuclear astrophysics processes (rp-process, νp-process). A few examples of the striking phenomena are the formation of high-spin isomeric states, the direct and/or β-delayed proton emission from ground or excited states and the strong resonances in Gamow-Teller transitions close to the proton dripline. The FRS Ion Catcher (FRS-IC) experiment at the in-flight fragment separator FRS at GSI enables highly accurate direct mass measurements ($\delta m/m \sim 10^{-8}$) with thermalized projectile and fission fragments by combining a cryogenic stopping cell and a multiple-reflection time-of-flight mass spectrometer. Supported by mass measurements at the FRS-IC within FAIR Phase-0, including the first direct mass measurement of ^{98}Cd, the evolution of Gamow-Teller transition strengths (B(GT)) for even-even $N = 50$ and $N = 52$ isotones was studied [1]. Comparing experimental and theoretical B(GT) values sheds more light on the controversy around the mass of ^{100}Sn [2,3,4]. Additionally, the excitation energy of the long-lived isomer in ^{94}Rh was determined for the first time; comparing the value of which with shell model calculations allows to understand the level ordering and spin-parity assignments of the observed states [1]. The mass of ^{93}Pd was measured directly for the first time, reducing the mass uncertainty by an order of magnitude. This helps to further unravel the riddle surrounding the exotic decay modes of the (21^+) high-spin isomer of ^{94}Ag, the investigations of which were summarized in Ref.[5,6].

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