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Towards absolute nuclear charge radius measurements of Ag isotopes

Nuclear charge radii of silver isotopes have been extensively investigated using laser spectroscopy [1,2,3]. However, the dependence of this method on large-scale atomic calculations for mass and field shift determination introduces significant systematic uncertainties that dominate the uncertainty of the extracted radii. Deviations with nuclear density functional theory [1,3] further emphasize the necessity for precise investigation of the mass and field shift for silver. Experimental determination is planned to be performed by employing muonic x-ray spectroscopy on ^{107}Ag, ^{109}Ag and ^{108m}Ag (longest-lived radio-isotope of Ag, half-life = 483 years).

The absolute charge radius of at least three silver isotopes is imperative for experimental determination of the mass and field shift.
While ^{107}Ag and ^{109}Ag can be readily enriched in large amounts, ^{108m}Ag requires a more intricate approach and can only be produced in microscopic quantities.
Nonetheless, advancements in the muonic x-ray spectroscopy method have enabled the treatment of targets down to 5\,μg [4].

In this contribution, we report on the preliminary measurements performed at the Paul Scherrer Institute in October 2023.
Furthermore, we outline the progress made in producing the ^{108m}Ag target, including insights from a proof-of-concepts experiment conducted at CERN-ISOLDE in November 2023.

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