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N=126 Kink in Mean-square Charged Radii of Tl Isotopes Studied by In-source Laser Spectroscopy at IDS/RILIS-ISOLDE

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It is well-known that there is a kink in nuclear charge radii when crossing the magic number $N=126$. This phenomenon has been observed in the Hg ($Z=80$), Pb ($Z=82$) and Bi ($Z=83$) isotopes [1]. At present, the charge radii of Tl ($Z=81$) isotopes are only known up to ^{208}Tl ($N=127$). In order to observe such a kink for the Tl chain, the isotope shift (IS) and hyperfine structure (hfs) of heavier isotopes needs to be measured. However, production of pure heavy Tl isotopes is hampered by strong Fr isobaric contamination.

During the April 2022 LOI219 experiment, a collaborative effort was made by the RILIS and IDS teams to measure the IS/hfs of Tl isotopes from ^{205}Tl to ^{209}Tl ($N=124-128$). The RILIS in LIST mode was applied to suppress Fr contamination. Counting of photo-ions was made by Faraday cup and IDS. For the first time, IS/hfs has been measured for ^{209}Tl establishing the kink at $N=126$ for the Tl isotopic chain. In addition, the first measurement of the magnetic moment and charge radius for the $11/2^-$ isomeric state of ^{207}Tl has been achieved. In this contribution, results on the HFS/IS of the $^{207-209}\text{Tl}$ isotopes, as well as some preliminary data on charge radii and magnetic moments, will be presented.

[1]: Day Goodacre, T. et al. "Laser Spectroscopy of Neutron-Rich $^{207,208}\text{Hg}$ Isotopes: Illuminating the Kink and Odd-Even Staggering in Charge Radii across the $N=126$ Shell Closure." *Physical review letters* 126 3 (2021): 032502.

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