

TACTICa: Laser Ablation and Trapping of Thorium

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Thorium isotopes became of high interest in the search for new physics, and fundamental physics tests, because of their unique nuclear and atomic properties. The Trapping And Cooling of Thorium Ion spectroscopy via Calcium (*TACTICa*) project develops ion trapping and spectroscopic techniques for a precise determination of the nuclear moments, hyperfine intervals, and isotope shifts with different Th isotopes [1]. In order to reliably produce thorium ions, two methods were used, laser ablation on thorium directly and the highly charged recoil ions of thorium from the α decay of a uranium mother nucleus [2].

Within the TACTICa project, the groups of Dimitry Budker (HIM), Ferdinand Schmidt-Kaler (QUANTUM, Inst. Physics) and Christoph E. Düllmann (Department of Chemistry – TRIGA Site) have joined forces to explore the fundamental constants of this world through interdisciplinary exchange of the topics of nuclear chemistry in the handling and supply of rare and radioactive elements, and physics in the trapping and manipulation of ions in Paul traps.

The first part of this seminar is about the results of the master thesis of Jonas Stricker (Düllmann Group) and gives an exciting outlook on future laser ablation experiments on thorium at the JGU in Mainz. The second part of the seminar is about quantum logic spectroscopy on thorium in a linear Paul trap and will be held by Azer Trimeche (Schmidt-Kaler Group).

[1] F. Stopp, K. Groot-Berning, G. Jacob, D. Budker, R. Haas, D. Renisch, J. Runke, P. Thörle-Pospiech, Ch. E. Düllmann, F. Schmidt-Kaler, *Hyp. Int.* **2019**, *240*, 33.

[2] R. Haas, T. Kieck, D. Budker, Ch. E. Düllmann, K. Groot-Berning, W. Li, D. Renisch, F. Schmidt-Kaler, F. Stopp, A. Viatkina, *Hyperfine Interactions* **2020**, 241:25; [arXiv:1911.11674](https://arxiv.org/abs/1911.11674).