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(UG*) Commissioning a Laser Ablation Ion Source For TITAN Mass Spectrometry

Tuesday 28 May 2024 15:00 (15 minutes)

A Laser Ablation Source (LAS) can be used as an adaptable tool for ion production in mass spectrometry experiments [1]. The choice in ablation material allows for diverse production of ion species. This flexibility particularly complements online ion-trap-based mass spectrometry experiments, which require a variety of calibrant species across a wide range of masses. A LAS is currently being developed as an ion source for TRIUMF's Ion Trap for Atomic and Nuclear Science (TITAN). The LAS will couple to TITAN's Multiple-Reflection Time of Flight Mass Spectrometer (MR-TOF-MS) [2] to enhance the variety of stable and long-lived species for calibration during on-line experiments, off-line experiments, and technical developments. The LAS will additionally aid the other ion traps at TITAN in tuning prior to experiments through the production of chemical or mass analogs of targeted isotopes. Optimization of the ion optics and the overall design have been completed. Manufacturing is underway at the University of Calgary, where assembly and off-line testing will be completed before installation onto the on-line TITAN facility. The status of the LAS will be discussed, including characterizations of the assembled system such as the spatial resolution of the laser ablation spot on multi-material targets. The addition of the LAS to TITAN will not only improve the precision of online ion-trap-based mass spectrometry experiments through the introduction of isobaric mass calibrants, but also open new pathways for TITAN to engage in a variety of environmental and medical studies.

References
1. K. Murray et al. "Characterization of a Spatially Resolved Multi-Element Laser Ablation Ion Source". In: International Journal of Mass Spectrometry 472 (2022), p. 116763. issn: 13873806. doi: 10.1016/j.ijms.2021.116763
2. T. Dickel et al. "Recent upgrades of the multiple-reflection time-of-flight mass spectrometer at TITAN, TRIUMF". in: Hyperfine Interactions 240.1 (2019). issn: 0304-3843. doi: 10.1007/s10751-019-1610-y

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Laser ablation ion source

Keyword-2

Mass spectrometry

Keyword-3

Ion optics

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