Resonant Ionization of Atomic Tellurium with Ti:Sapphire Lasers

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MOTIVATION

- Resonance ionization laser ion sources have become essential tools for the production of isobarically pure radioactive ion beams for nuclear research [1]
- Efficient resonant ionization of beams of atomic tellurium using a combination of Ti:Sapphire and dye lasers has been recently reported [2]. However, the ionization schemes are not applicable to laser ion sources equipped only with Ti:Sapphire lasers
- This study investigates potential resonant ionization schemes of tellurium using only Ti:Sapphire lasers
- The resonant ionization laser ion source (RILIS) at the Oak Ridge National Laboratory (ORNL) is equipped with three tunable Ti:Sapphire lasers and is well suited for this study

EXPERIMENTAL

- Experiment conducted at the Injector for Radioactive Ion Species (IRIS2)
- IRIS2: an ISOL production station for former Holifield Radioactive Ion Beam Facility (HRIBF). The major components for this study include:
  1. Target and ion source (TIS) assembly located on a 60-kV platform
  2. Switching magnet
  3. Mass-separator magnets with a nominal resolving power of 1000 : 1
  4. Faraday cups (FC) to measure the ion beam currents
  5. Vacuum window for laser beam injection

CONCLUSION

- Three-step resonant ionization of Te with all Ti:Sapphire lasers is demonstrated
- Analysis of the photoionization spectra is in progress to identify potentially efficient ionization schemes
- Next step: evaluate the efficiency of selected candidate schemes

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