

Reactive Scattering between Metastable Helium and Magneto-Optically Trapped Lithium Atoms

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The experimental study of Penning ionization reactions, i.e., the reactive scattering of metastable rare gas atoms with neutral species, has recently attracted a lot of attention through the observation of orbiting resonances at low collision energies [1].

Our project is aimed at a detailed study of reactive Penning collisions between quantum-state-selected lithium atoms (Li) and metastable helium atoms (He*) in order to elucidate the influence of spin polarization on the reaction rate. Our setup consists of a cryogenically cooled source for the production of velocity-tunable, supersonic beams of metastable helium atoms and a magneto-optical trap (MOT) for ul-

tracold Li atoms which serves as a stationary scattering target. By selectively switching off the MOT laser beams, we can selectively populate one of the two hyperfine components of the $^2S_{1/2}$ electronic ground state of Li. In this contribution, we will present first experimental results for reactive Penning collisions between He* and Li at different collision energies, including a detailed discussion of the supersonic beam and MOT characteristics.

References

- [1] A. B. Henson, S. Gersten, Y. Shagam, J. Narevicius, E. Narevicius 2012 *Science* **338** 234

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