Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Circular dichroism in few-photon ionization of excited, polarized, and dressed lithium atoms[1] NISHSHANKA DE SILVA, BISHNU ACHARYA, KEVIN ROMANS, KYLE FOSTER, KATRINA COMPTON, COLE RISCHBIETER, ONYX RUSS, SANTWANA DUBEY, DANIEL FISCHER, Missouri ST —
We report on an experiment studying the few-photon ionization of atomic lithium. The experiment consist of three parts: First, an all-optical atom trap to prepare an atomic lithium target cloud at milli-Kelvin temperatures where the atoms can be excited and polarized to the 2p (m_l=+1); second, an OPCPA that provides intense (typ. 10^{12}W/cm^2) femtosecond laser pulses with a bandwidth of about 20nm and a center wavelength that can be tuned between 660 and about 800nm; and third, a cold target recoil ion momentum spectrometer (COLTRIMS) recording the photo-electron and recoil ion momenta. In a first investigation we studied circular dichroism for photon energies close to the lithium 2s-2p or 2p-3s resonances. The dressing of the atoms in the field of the ionizing laser causes Autler-Townes shifts that strongly depend on the polarizations of the excited target atoms and of the laser field. This results in a strong circular dichroism that affects not only the total ionization rate and the photo-electron angular distributions but also the energy of the emitted photons. The measured energy spectra and momentum distributions are in very good agreement with a theoretical model solving the time-dependent Schrödinger equation in the single-active electron approximation.

[1]Work supported by the NSF under PHY-1554776

Daniel Fischer
Missouri Univ of Sci
Tech

Date submitted: 31 Jan 2020 Electronic form version 1.4