

Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Emission of fast Rydberg atoms from cold Rydberg-atom gases

BRENTON KNUFFMAN, GEORG RAITHEL, University of Michigan, Ann Arbor — Rydberg-Rydberg collisions in a cold, dense Rydberg gas may lead to the conversion of internal energy into center-of-mass energy of the colliding atoms, resulting in Rydberg-atom velocities much larger than the initial velocities in the gas. We prepare cold Rydberg-atom gases by laser excitation of laser-cooled atom clouds, and use time-of-flight measurements to demonstrate the production of fast Rydberg atoms. The velocity distributions of Rydberg atoms emerging from the Rydberg-atom gases are obtained. State-selective field ionization spectra indicate a correspondence of fast Rydberg atoms with strong l -mixing and Penning ionization signals, which are characteristic of collisions between Rydberg atoms. The production of fast Rydberg atoms exhibits a strong dependence on the density of the atomic sample. The dependence on the initial principal quantum state of the Rydberg atoms is also discussed.

Brenton Knuffman
University of Michigan, Ann Arbor

Date submitted: 01 Feb 2005

Electronic form version 1.4