Abstract for an Invited Paper
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Interactions of cold Rydberg atoms[1]

GEORG RAITHEL, University of Michigan

Rydberg-atom clouds excited from cold atomic gases exhibit a rich variety of collision processes. A review of state-changing and ionizing collisions in these systems will be provided. I will then focus on the role of attractive / repulsive interatomic forces between Rydberg atoms. The effects of Rydberg-excitation blockades that result from these interactions will be discussed. I will also report on progress in experiments on the interaction of cold Rydberg atoms with modulated ponderomotive potentials. In the second part of the talk, advances in the laser-cooling and trapping of ground-state and Rydberg atoms in strong magnetic fields of several Tesla will be described. Collisions in cold, magnetized Rydberg-atom gases lead to the production of long- lived atoms in so-called drift states, also known as guiding-center states. In low-temperature collision-rich environments, such as in the cold Rydberg atom gases and plasmas studied in this work, they are quite abundant. Results on the trapping of such atoms in conservative potentials and on the evolution of Rydberg-atom gases in cold plasmas in strong magnetic fields will be presented.

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