Rydberg excitation blockade effects in strongly magnetized atom clouds

E. PARADIS, C. HEMPEL, B. KNUFFMAN, R. MHASKAR, M. SHAH, G. RAITHEL, University of Michigan, FOCUS center — We present progress on work towards characterizing the Rydberg blockade mechanism within a strong magnetic field (B = 3T). Either permanent quadrupole moments or induced dipole moments could provide a strong interaction between neighboring Rydberg atoms, leading to a blockade. These interactions cause deviations of the spatial Rydberg atom distribution from random ordering that can be detected in a spatially-resolved read-out of Rydberg excitations. The high magnetic field setup offers several key advantages in realizing such a measurement: Diamagnetic Rydberg states are well suited for this research because they are non-degenerate and have large oscillator strengths for photo-excitation. Further, electron imaging in strong magnetic fields lends itself to straightforward realization of imaging with considerable magnification. In this poster, we will present experimental and theoretical progress on this project.

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Date submitted: 04 Feb 2008