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Many-Body Interactions in a Restricted Dimensionality Sample of Ultra-cold Rydberg Atoms THOMAS J. CARROLL, SHUBHA SUNDER, MICHAEL W. NOEL, Bryn Mawr College — Ultra-cold highly-excited atoms in a magneto-optical trap (MOT) are strongly coupled by the dipole-dipole interaction. We have investigated the importance of many-body effects by controlling the dimensionality and density of the excited sample. We excited a long, thin column of atoms in the MOT to Rydberg states. At low density, where the sample is nearly one-dimensional, many-body interactions are suppressed. At higher densities the sample becomes three-dimensional and many-body effects are apparent. This work was supported by the National Science Foundation under Grant No. 0134676.

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