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Time Dependence of Many-Body Interactions in Ultra-cold Rydberg Atom Samples of Different Geometries THOMAS CARROLL, CORDELIA OCHIS, MICHAEL NOEL, Bryn Mawr College — Ultra-cold highly-excited atoms in a magneto-optical trap 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 and by varying the time during which the atoms are allowed to interact. We excited Rydberg atoms in two different geometries: a nearly one dimensional column with a diameter on the order of the typical interatomic spacing and a more three dimensional column with a diameter a few times larger than the typical spacing. In each volume, the interaction time was varied from 0 to 8 μs. Many-body effects are seen to be important in the time development of the three-dimensional system, while they are suppressed in the one dimensional case. This work was supported by the National Science Foundation under Grant No. 0134676.

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