
Experimental investigation of the dipole-dipole interaction between few cold atoms

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Résumé

This talk will present our ongoing effort to understand and use the dipole-dipole interaction between ultra-cold atoms. On one setup we use small arrays of individual atoms that we excite to Rydberg states. There, the interaction energy is very large even for atoms separated by tens of micrometers. It can be used as a resource for quantum engineering of entangled states. Along this way, the talk will detail our recent measurement of the van der Waals interaction between two individual atoms separated by a few micrometers. On a second setup, we prepare a very dense sample of atoms containing a few hundred atoms in a volume, which size is on the order of the wavelength of an optical transition. We scatter near resonant light on the sample. The induced dipoles interact and we are looking for signatures of collective effects such as super and sub-radiance.

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