

ULTRALONG-RANGE INTERACTIONS IN A COLD RYDBERG GAS

M. Reetz-Lamour, T. Amthor, J. Deiglmayr, S. Westermann, K. Singer, L.G.

Marcassa, and M. Weidemüller

Physikalisches Institut der Albert-Ludwigs-Universität Freiburg, Freiburg, Germany

We report on the observation of ultralong-range interactions in a gas of cold rubidium Rydberg atoms (principal quantum number ~ 100). The van der Waals interactions between pairs of Rydberg atoms separated as far as 10^5 Bohr radii features two effects: spectral broadening of the resonance lines and the suppression with increasing density (local dipole blockade) [1,2]. Besides spectral signatures of Rydberg-Rydberg interactions, we also observe mechanical effects of the ultralong range interactions which result in the formation of an ultracold plasma through ionizing collisions. In recent experiments we studied Förster resonances involving different combinations of Rydberg pairs. In addition, we have implemented schemes to coherently excite the Rydberg atoms using narrow-band cw light. Future prospects of the experiment will be discussed.

References

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2. D. Tong *et al.*, *Phys. Rev. Lett.* **93**, 063001 (2004).

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