Coherent control of dense Rydberg gases

Tilman Pfau[1]

[1] *5. Physikalisches Institut, Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart, Germany*

Abstract

We report on coherent interaction effects involving Rydberg atoms in a dense gas. Their long-range strong interaction is responsible for novel many-body physics. Universal scaling behaviour due to an underlying quantum phase transition is observed [1]. Also the coherence properties of Frster resonances giving rise to resonant dipolar interactions were investigated using a pair state interferometer [2]. We also report on our recent observation of coherent control of Rydberg atoms and van der Waals interaction between Rydberg atoms in thermal vapor cells.

References

[1] R. Löw, H. Weimer, U. Raitzsch, R. Heidemann, V. Bendkowsky, B. Butscher, H. P. Büchler, and T. Pfau, Phys. Rev. A **80**, 033422 (2009)
H. Weimer, R. Lw, T. Pfau, and H. P. Bchler, Phys. Rev. Lett. **101**, 250601 (2008).

[2] J. Nipper, J. B. Balewski, A. T. Krupp, B. Butscher, R. Löw, T. Pfau, Phys. Rev. Lett. **108**, 113001 (2012)
J. Nipper, J.B. Balewski, A.T. Krupp, S. Hofferberth, R. Löw, T. Pfau, accepted in Phys. Rev. X.

[3] B. Huber, T. Baluktsian, M. Schlagmüller, A. Kölle, H. Kübler, R. Löw, T. Pfau, Phys. Rev. Lett. **107**, 243001 (2011)
B. Huber, T. Baluktsian, R. Löw, T. Pfau, submitted for publication.