SFB/TRR 21 - Seminar

3. Juni 2015, Ulm

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Strongly correlated phases of Rydberg-dressed quantum gases

The ability to control and modify inter-particle interactions using external electric, magnetic and electromagnetic fields has proven an outstanding tool to cool and stabilize gases of atoms and simple molecules, and to harness novel quantum many-body phases in these systems. In this talk we review results for groundstate alkali atoms weakly dressed by laser light with a highly-excited Rydberg state. We demonstrate that laser-dressing can induce novel exotic many-body phenomena: examples that we will discuss include a phase transition from a Bose-Einstein condensate to the elusive supersolid quantum crystal and an anomalous Luttinger liquid in one-dimensional channels.

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