

School of Physics and Astronomy

COLLOQUIUM



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Ulm University

Molecules, bound states and few-body physics in ultracold quantum gases

Interactions between ultracold atoms lead to a broad range of interesting phases, bound states and dynamics, where often two-body, three-body and four-body physics is involved. I will give an overview over some of our experiments in Ulm where we investigate bound states and their dynamics. For example, I will discuss three-body recombination of bosonic Rb atoms where we are able to measure the product distribution of the produced Rb_2 molecules on the quantum level. For this, we detect the vibrational, rotational, electronic, hyperfine and magnetic quantum numbers of individual Rb_2 molecules. I will then switch to discussing bound states in a spin-balanced, quantum degenerate gas of fermionic Lithium atoms in the vicinity of the BEC-BCS cross over. While in the BEC regime the gas essentially only consists of Li_2 molecules at low enough temperatures, towards the cross over many-body aspects come into play turning the molecule gradually into a Cooper pair. We have recently probed the two-body bound state components in this Fermi gas and measured the pair fraction as a function of temperature and coupling strength. Furthermore, we have investigated the dynamics of the reactive collisions of two Li_2 bound pairs. We extract scaling laws for these dynamics as a function of scattering length and temperature and compare them to theoretical predictions.

Date:	Wednesday 5 th February
Time:	2pm
Venue:	L1, Seminar Room 107, 10 College Walk, Clayton

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