Q 32 Poster Ultrakalte Moleküle

Zeit: Dienstag 16:30–18:30 Raum: Labsaal

Q 32.1 Di 16:30 Labsaal

A second generation Cs BEC experiment — •Elmar Haller, Matthias Gustavsson, Anton Flir, Gabriel Rojas-Kopeinig und Hanns-Christoph Nägerl — Institut für Experimentalphysik, Innsbruck University

We present the status of a new Cs BEC experiment aiming to use a BEC as a source for precision measurements. An all-optical BEC will be produced in a glass cell apparatus, representing a major improvement compared to our first Cs BEC experiment, because it allows maximum optical access and faster switching of magnetic fields. A high loading rate and a large-volume optical dipole trap at near infrared wavelengths together with optimized 3D Raman sideband cooling should allow for large Cs condensates with more than 10ˆ6 atoms.

The s-wave interactions tunable through Feshbach resonances at low magnetic fields enable us to study the regime of zero scattering length. A BEC without perturbing mean-field shifts is ideally suited for atom interferometry in precision measurements. As an example, it is possible to determine the fine structure constant via a measurement of the photon recoil in an atom interferometer.

We report on the status of loading the Cs BEC into a 3D optical lattice. Combined with the tunable interactions, this is a convenient environment for the detailed exploration of weakly and strongly interacting atoms, the study of collisions and the formation of a molecular BEC starting from a Mott insulator state.

Q 32.2 Di 16:30 Labsaal

Understanding the Efimov-effect — •Bettina Berg, Lev Plimak, and Wolfgang P. Schleich — University Ulm, Germany

Bound states of three identical bosons interacting resonantly condense. That is, the low-lying levels form a geometrical progression converging to zero, $E_N/E_{N+1} = e^{-\frac{2\pi}{|s_0|}}$, where $s_0 \approx i$. This effect was discovered by V.N. Efimov in 1971. Although there exists an indication that Efimov states contribute to three-body losses in trapped ultracold atomic gases, until now these states have been eluding direct observation. We discuss certain aspects of the Efimov effect including the overall energy balance in the system of three interacting particles.

[1] V. N. Efimov: Weakly-Bound States of Three Resonantly-Interacting Particles, Sov. Jou. Nucl. Phys. 12, 589-595 (1971)
[2] V. N. Efimov: Effective interaction of three resonantly interacting particles and the force range, Phys. Rev. C 47, 1876-1884 (1993)
[3] D.V. Fedorov and A.S. Jensen: Efimov Effect in Coordinate Space Faddeev Equations, Phys. Rev. Lett. 71, 4103-4106 (1993)