Centre for Quantum Engineering and Space-Time Research
Cluster of Excellence
quest

Leibniz Universität Hannover

Research position (PhD)

Einstein-Podolsky-Rosen entanglement in ultracold atoms

Group of Prof. Dr. Wolfgang Ertmer and PD Dr. Carsten Klempt
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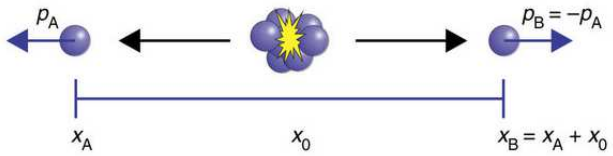

Original Einstein-Podolsky-Rosen thought experiment

At ultra-cold temperatures bosonic atoms accumulate in the absolute ground state of a system. They cross the phase transition to a Bose-Einstein condensate, the analogue of a laser consisting of atoms instead of photons.
In our experiments, we create such atom lasers which are entangled – exactly in the sense of Einstein, Podolsky and Rosen in their famous paper of 1935. We recently demonstrated the first experimental realization of continuous variable Einstein-Podolsky-Rosen entanglement with massive particles [*Nat. comm.* (2015), doi:10.1038/ncomms9984]. This strong form of entanglement was first introduced as a contradiction to quantum mechanics, but is nowadays a resource for building quantum computing applications and for performing high-precision measurements. In the future, we would like to test the validity of quantum mechanics by performing Bell tests with our entangled atoms. At the same time, we will further develop our entanglement generation for its application for high-precision measurements or for the detection of gravitational waves.

In the framework of this project the group "Atom Optics and Quantum Sensors" lead by Prof. Dr. Wolfgang Ertmer and PD Dr. Carsten Klempt at the Institute of Quantum Optics offers attractive opportunities for PhD candidates.

In order to support the existing team, a research position (PhD) in experimental physics (TV-L E13 ¾) is offered.

The PhD position will be integrated in our high-level graduate education program which is organized within our Research Training Group (http://www.rtg1729.uni-hannover.de). Within the scope of our work multiple state-of-the-art experimental methods and technologies (laser physics, high-frequency technology, analog and digital electronics, control engineering, programming, magnetic field design, etc.) are applied. A degree in physics or a neighboring course of studies is required for applicants. Experience in atomic and laser physics and/or quantum optics are helpful but not required.

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