

Control of Quantum Systems

PEP Seminar Series

Bose-Einstein condensates in a one-dimensional optical lattice

Wednesday, October 1st, 3:00 PM Babio 210

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Our recent work on the dynamics on BECs in combinations of one-dimensional optical lattices and magnetic traps will be described. I will first review some experimental methods used. In experiments with shallow lattices (depth about one recoil energy), we have implemented an atom cavity. On one side, atoms trapped in the cavity are confined by the magnetic potential, while on the other the atoms are Bragg-reflected by the optical lattice. We have demonstrated the cavity by recording the momentum-space Bloch oscillation of the BEC as a function of time. The atom cavity configuration presents the possibility of realizing a Mach-Zehnder-type atom interferometer. We have performed initial atom interference experiments that demonstrate the viability of the scheme. In a second experiment, we have studied the transition of a superfluid into an insulating state using a deep, one-dimensional optical lattice (depth up to 80 recoil energies). The results are consistent with a superfluid to Mott insulator transition of the three-dimensional BEC in a one-dimensional lattice.

Georg Raithel obtained his PhD at the University of Munich, Germany in 1987 under H. Walther. He worked as a Postdoctoral Researcher at the National Institute of Standard and Technology at Gaithersburg, Maryland. He is a Professor at the University of Michigan at the Department of Physics (1997-Present). In February 2008, the Raithel group obtained the first Bose-Einstein condensate (BEC) in Michigan, his further interest in research includes the construction of a continuous-wave atom laser based on the magnetic guiding of atoms. Professor Raithel is a Fellow of the American Physical Society and is currently the Director of the NSF-funded Physics Frontier Center "Frontiers in Optical, Coherent and Ultrafast Science" (FOCUS)

This talk is sponsored by the PEP department. Refreshments will be served at 2:30PM

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