SFB/TRR 21 - Seminar
28. Januar 2010, Stuttgart

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Coherent control of matter waves

In this talk, we will discuss different techniques to coherently control either the external or the internal degrees of freedom of atomic systems. Regarding the external degrees of freedom, we will show how single atoms and Bose Einstein condensates (BECs) in two or three trapped states coupled via tunneling can be coherently manipulated using a technique analogous to STImulated Raman Adiabatic Passage (STIRAP). Also, the control of the dynamics of matter wave solitons generated in repulsive BECs using defects will be reported. In this context, switches, memories or cavities can be implemented. And finally, we will introduce a novel approach for subwavelength atomic localization and coherent patterning with matter waves by means of the Subwavelength Localization via Adiabatic Passage (SLAP) technique. Possible implementations of the SLAP technique for a Ne* matter wave and for a ^{87}Rb BEC will be presented.

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