

CEA - Saclay 91191 Gif-sur-yvette Cedex
Service de Physique de l'Etat Condensé
SÉMINAIRE

Mercredi 5 mars 11h15

Orme des Merisiers SPEC Salle Itzykson, Bât.774

AtomChips: Integrated circuits for mater waves

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AtomChips [1] aim at the miniaturization and integration of quantum optics and atomic physics on to a single chip, analogous to electronic circuits. It combines the best of both worlds: The perfected manipulation techniques from atomic physics with the capability of nanofabrication. AtomChips promise to allow coherent manipulation of matter waves on the quantum level by using high spatial resolution electro magnetic potentials from structures on the atom chip or by employing adiabatic radio frequency (RF) or micro wave (MW) potentials.

The talk will give an overview of the recent advances in the concepts, fabrication and experimental realization of AtomChips by illustrating the many different tasks that can be performed using ultra cold or Bose-Einstein condensed (BECs) atoms manipulated on the chip. These range from measuring magnetic and electric fields with unprecedented sensitivity by observing the density modulations in trapped highly elongated 1d BECs [2], to fundamental studies of the universal properties in low dimensional systems like non equilibrium dynamics and coherence decay [3] or signatures of thermal and quantum noise [4] in one dimensional super fluids. The talk will give an overview of the recent advances and experiments.

This work was supported by the European Union MC network AtomChips, integrated project SCALA, the DIP the FWF and the Wittgenstein Prize.

[1] For an overview see: Microscopic atom optics: from wires to an atom chip. Folman, R., Krüger, P., Schmiedmayer, J., Denschlag, J. Henkel, C., Adv. At. Mol. Opt. Phys. 48, 263 (2002).

[2] St. Wildermuth et al. Nature 435, 440 (2005); S. Aigner et al. Science 319, 1226 (2008)

[3] Hofferberth et al. Nature 449, 324 (2007)

[4] Hofferberth et al. Nature Physics in print (2008) arXiv:0710.1575

Un café sera servi à 11h.