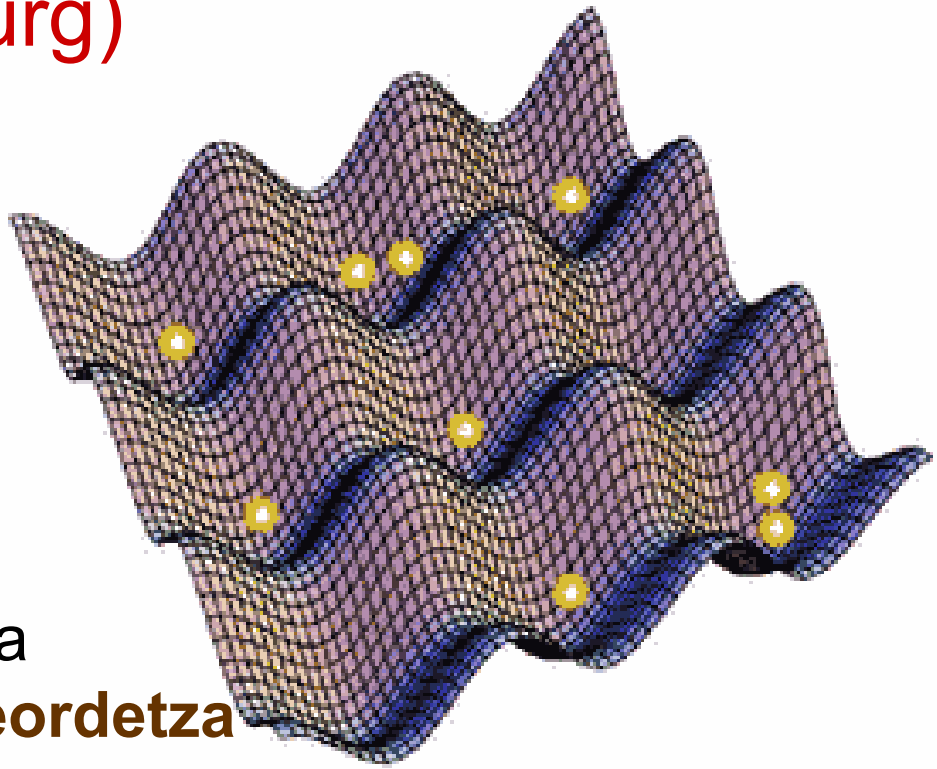
Atoms at ultra-low temperatures & Optical Lattices

Andreas Hemmerich
(ILP, Hamburg)

Salón de Grados FCT-ZTF
Nov 4th: 15.00, 16.00
Nov 5th: 10.00, 11.00



QUINST, Dpto. de Química Física
Bizkaiko Campuseko Errektoreordetza

An **optical lattice** is formed by the interference of counter-propagating laser beams, creating a spatially periodic polarization pattern. It may trap cooled neutral atoms that congregate in the locations of potential minima. The resulting arrangement of trapped atoms resembles a crystal lattice. Optical lattices have been used in creating gratings and photonic crystals. They are also useful for sorting microscopic particles, and may be useful for assembling.

Andreas Hemmerich

Biography:

1985: diploma in mathematical physics at the Max-Planck-Institute of Astrophysics in Munich (Germany) with a thesis on general relativity.
1987: he joined the newly founded experimental group of Theodor Hänsch (Nobel Prize in 2005)
1990: doctoral degree with a thesis on "2D trapping of cold atoms in light-induced waveguides". He then was invited to build up and head a cold atom team in T. Hänsch's second group at Munich.
1992: his team was the first to trap atoms in 2D and 3D optical lattices.
1996: he joined the newly founded Institute of laser physics at Hamburg
1997-2006 he developed novel laser cooling technology for metastable two-electron atoms and pioneered the non-linear and non-local physics of large ultracold atom samples trapped in light fields inside ultra-high finesse resonators.
1999-2003: managing director of the Institute of Laser Physics.
2003-present: he has explored techniques to simulate magnetic fields in optical lattices and reported the first observations of orbital superfluidity in higher bands.

PROGRAM

Nov 4th, 15h : Atomic gases at ultra-low temperatures (Introductory 2 x 50 min)
• Laser Cooling; Magnetic Trapping; Bose Einstein condensation; Detection; Properties of BECs : Coherence, Superfluidity, Optical Lattices

Nov 5th, 10h: Optical Lattices (2 x 50 min)
• Ground state optical lattices; Excitation of higher bands: P-Band, F-Band; Driven optical lattices