MAR07-2006-020329

Abstract for an Invited Paper
for the MAR07 Meeting of
the American Physical Society

Ultracold Atoms in Optical Potentials and Novel Quantum Phases

MASSIMO INGUSCIO, LENS, University of Florence

The experimental study of ultracold atoms in optical lattices has thrown a bridge between the realms of atomic physics and solid state physics. Laser beams in standing wave configuration provide ideal periodic potentials for the atoms, thus constituting a test ground for the quantum theory of transport in periodic structures. On the other hand, laser light can also be used to engineer controlled disorder in the form of speckle fields or multi-chromatic lattices with incommensurate wavelengths. These aperiodic potentials can be used to study the physics of disordered systems and the emergence of quantum localization phases, such as Anderson insulators or strongly interacting Bose Glass phases. I will review some of the latest advances in this exciting field, discussing experiments with quantum degenerate gases in disordered optical potentials.