LENS-QSTAR Seminar
February 21, 2014 at 11:00, Aula Querzoli (LENS)

Pierfrancesco Buonsante
QSTAR & INO-CNR

Interacting Bosons in a Disordered Lattice:
Dynamical Characterization of the Quantum Phase Diagram

The interplay of disorder and interaction in quantum systems is the subject of active theoretical and experimental investigation. While disorder tends to localize the particles, interactions can either suppress or favor localization, thus strongly affecting the single particle picture. This competition is mirrored in the rich phase diagram of the system, featuring superfluid and insulating (Bose-glass and Mott) phases. Less is known about the dynamical properties of an interacting disordered system.

Stimulated by recent experiments with ultra cold gases, we study the superfluid flow of Bosons through a disordered three-dimensional lattice. Based on a Gutzwiller approach, we identify the ranges of interaction and disorder strengths where the superfluid current is stable. We find that the region of dynamical instability exhibits a remarkable overlap with the Bose-glass phase.

Contact: pierfrancesco.buonsante@ino.it