



CONSIGLIO NAZIONALE DELLE RICERCHE
ISTITUTO NAZIONALE DI OTTICA

AVVISO DI SEMINARIO

Il giorno giovedì 5 dicembre 2013 alle ore 11,00
presso l'Area della Ricerca CNR di Pisa
Aula 44, primo piano, Edificio "A"

la Dr.ssa Eleonora LUCIONI

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terrà un seminario sul tema:

Physics of disorder with a Bose-Einstein condensate

The interplay between disorder and interactions lies at the heart of many physical phenomena and its study has recently attracted more and more interest. Although it is present in any real physical system, disorder is difficult to control, to tune, and therefore to study. Even more challenging is the investigation of the combined effect of disorder and interactions. The possibility of tuning independently and in a large range of values these two parameters is in fact a rare feature for both real and experimental systems. Ultracold atoms experiments are in general very versatile tools and they allow to control and tune all the important parameters of the investigated system.

We study one-dimensional atomic Bose-Einstein condensates of ^{39}K in disordered optical lattices from the non-interacting limit to the strongly correlated one. Disorder induces localization of non-interacting particle via the celebrated Anderson localization phenomenon. Interactions can instead support superfluidity, a state of matter normally impervious to disorder. The complex interplay between the two can lead to new, unconventional phases. We combine coherence, transport and excitation spectra measurements to characterize the different quantum phases of the system and, in particular, to demonstrate the presence of a glassy phase in both regimes of weak interactions and strong correlations