



AVVISO DI SEMINARIO

**Il giorno giovedì 22 maggio 2014 alle ore 11,00
presso l'Area della Ricerca CNR di Pisa
Aula 44, primo piano, Edificio "A"**

Il Dr. Carlo SIAS

*Istituto Nazionale di Ottica (INO-CNR), and European Laboratory for Nonlinear Spectroscopy
(LENS), Florence, Italy, carlo.sias@ino.it*

terrà un seminario sul tema:

A one-dimensional liquid of Fermions with tunable spin

Correlations in physical systems with spin degree of freedom are at the heart of several fundamental phenomena, ranging from magnetism to superconductivity. In general, the effects of correlations depend strongly on the dimensionality of the system. A striking example are fermions confined in one dimension, whose small-energy excitations have a collective nature. We report on the realization of multi-component one-dimensional liquids of ultracold ^{173}Yb fermions. These two-electron atoms are characterized by a large nuclear spin and highly-symmetric atom-atom interactions, which result in the possibility of performing quantum simulations of systems with intrinsic $\text{SU}(N)$ symmetry. In one dimension, repulsive interactions between atoms in different nuclear spin states cause static and dynamic properties of the system to significantly depart from those of an ideal Fermi gas, in accordance with the Luttinger theory for a 1D liquid of spin-1/2 interacting fermions. Much stronger deviations are measured when the fermionic liquid is prepared in more than 2 internal states. This work provides the first experimental study of Luttinger physics with repulsive spinful atoms and the first realization of multi-component Luttinger liquids with tunable $\text{SU}(N)$ symmetry.