

Tuesday 9/12

Speaker: Maurizio Fagotti

TITLE: Quantum jamming brings quantum mechanics to macroscopic scales

ABSTRACT: A quantum spin-1/2 chain with an axial symmetry is normally described by quasiparticles associated with the spins oriented along the axis of rotation. Kinetic constraints can enrich such a description by setting apart different species of quasiparticles, which can get stuck at high enough density, realizing the quantum analogue of jamming. I introduce a family of interactions satisfying simple kinetic constraints and consider generic translationally invariant models built up from them. I study, in particular, dynamics following a local unjamming perturbation in a jammed state. I propose a duality mapping that has the practical effect of removing the kinetic constraints and whose "non"locality properties account for the change of scale at which the phenomena manifest themselves. Scattering of quasiparticles, formation of bound states, eigenstate localisation become indeed all visible at macroscopic scales. Depending on whether a symmetry is present or not, the microscopic details of the jammed state turn out to have either a marginal or a strong effect. In the former case or when the initial state is almost homogeneous, I show that even a product state is turned into a macroscopic quantum state.