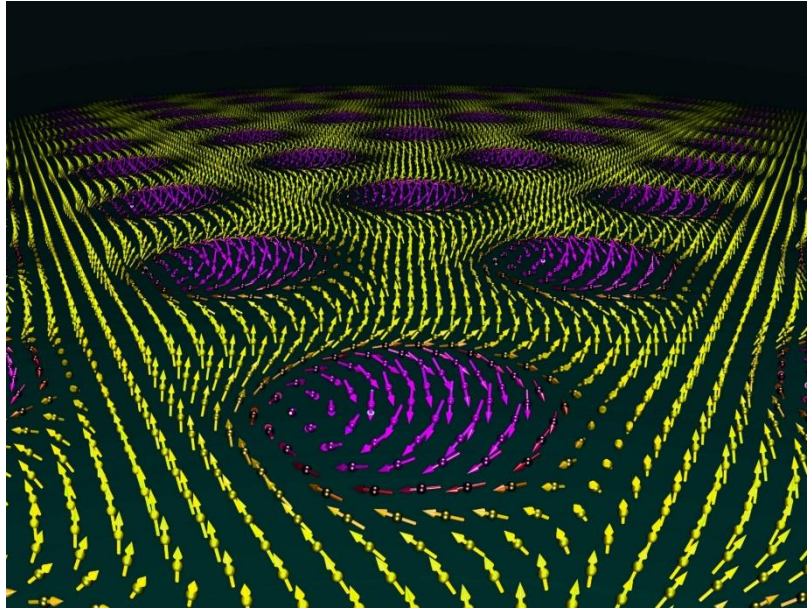


COLLOQUIUM



Dr. Ettore Vitali
CSU Fresno

Computer simulations: from toy models to superfluids and superconductors

Abstract

Starting from simple random walks, I will show how it is possible to use a computer to study physical systems, and in particular quantum systems, creating a virtual laboratory where we can see Quantum Mechanics at work. Since the earliest days of Quantum Mechanics, we witnessed great achievements in the exploration of how Nature works at the atomic scale. Nevertheless, unravelling the complexity of highly correlated systems is still a huge challenge. Fascinating new features appear when the interactions become strong and new approaches are needed to shed light on the physical mechanism underlying the puzzling emergent phenomena. In the petaflops era, we are in a unique position to pave the way for deeper insights. I will present cutting-edge results for superfluids and cold atomic systems, for which we are now able to predict dynamical quantities that can be directly compared with experiments, and for high-temperature superconductors, where we are finding novel fascinating orders. The methodologies themselves can also have important applications beyond the realm of strongly correlated quantum physics.

3:30-4:30 p.m., Friday, September 14th, McLane Hall 162