Andrew Lucas

Title: Fracton hydrodynamics with and without time-reversal

Abstract: I will introduce “fracton hydrodynamics”, which corresponds to the effective (field) theory of thermalization for interacting many-body systems subject to kinetic constraints such as dipole conservation. I will review manifestations of the simplest theory (sub diffusion with dipole conservation) both in numerics and experiment. Then I will propose a new minimalist framework for hydrodynamic effective field theory based on the MSR formalism, but with a careful treatment of time-reversal symmetry which is inspired by recent developments in high energy physics. Using this framework we can carefully determine the consequences of broken time-reversal symmetry in fracton hydrodynamics (a question which appears beyond the conventional Landau paradigm for fluid mechanics). I will predict the existence of new dynamical universality classes which arise from broken-time reversal symmetry, and present some numerical evidence for their existence.