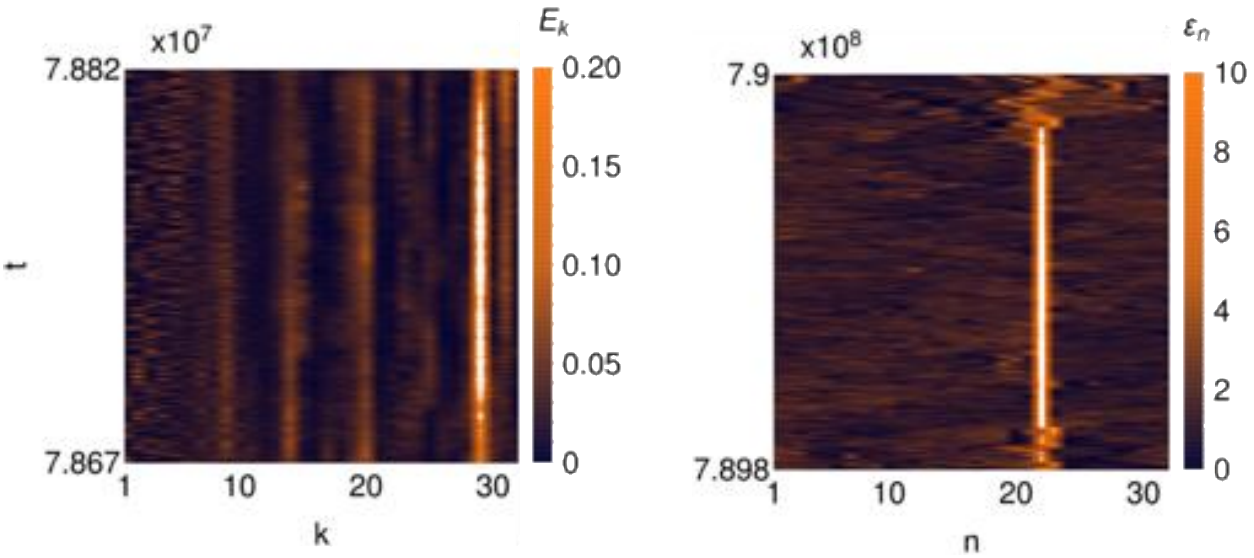
The Subtle Road to Equilibrium:
Intermittent Many-Body Dynamics at Equilibrium

Dynamical Systems Seminar
Boston University
November 12, 2018

David K Campbell *
Department of Physics
Boston University



The equilibrium value of an observable defines a manifold in the phase space of an ergodic and equipartitioned many-body system. A typical trajectory pierces that manifold infinitely often as time goes to infinity. I use these piercings to measure both the relaxation time of the lowest frequency eigenmode of the Fermi-Pasta-UlamTsingou (FPUT) chain, as well as the fluctuations of the subsequent dynamics in equilibrium. The dynamics in equilibrium is characterized by a power-law distribution of excursion times far off equilibrium, with diverging variance. Long excursions arise from sticky dynamics close to q-breathers localized in normal mode space. Measuring the exponent allows to predict the transition into nonergodic dynamics.I generalize the method to Klein-Gordon lattices (KG) where the sticky dynamics is due to discrete breathers localized in real space. If time permits, I will discuss some recent results on a putative "dynamical glass phase" in certain 1D nonlinear lattices as well as possible implications for other many body systems.

* Work in collaboration with Carlo Danieli and Sergej Flach