



Professor Ken A. Dill

Laufer Center for Physical & Quantitative Biology,
Chemistry & Physics Departments
Stony Brook University

“Maximum Caliber, a Second-Law-like Variational Principle for Dynamics & Networks”

Ever since Clausius in 1865 and Boltzmann in 1877, the concept of entropy and its maximization have been the foundation for predicting material equilibria. But, despite advances by Onsager, Prigogine and others, there has been no equally satisfactory variational principle for dynamical laws, of particle diffusion, heat flow, or chemical reactions. However, in 1980, a new path forward was lit by papers from ET Jaynes and from Shore & Johnson. Maximum Caliber is a Maximum-Entropy-like principle for inferring pathways and rate distributions of kinetic processes, even far away from equilibrium. I will describe the principle, its foundations, how it resolves problems from earlier efforts, and some new applications that have emerged from it, such as finding reaction coordinates in molecular simulations; non-linear dynamics in gene circuits, power-law-tail distributions in 'social-physics' networks, and others.

Monday, May 20, 2019
2033 Young Hall
4:00PM

Reception at 5:00PM (Young Hall 3037)