

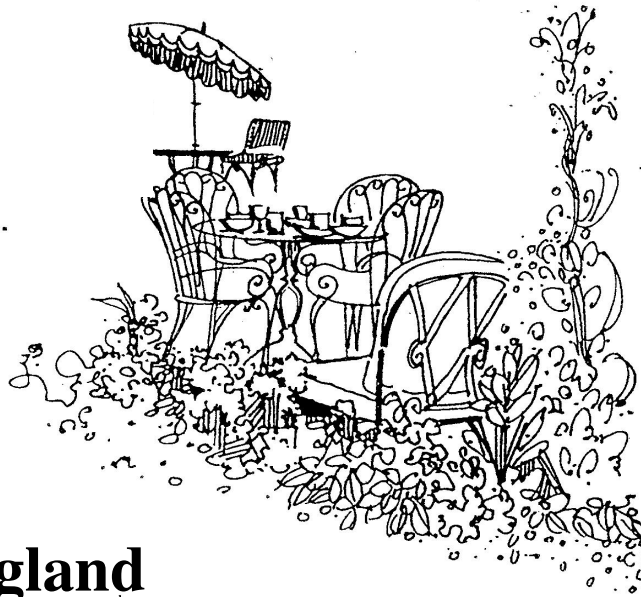
Chez Pierre

Presents ...

Monday, May 4, 2015

12:00pm

MIT Room 4-331



Jeremy England

Massachusetts Institute of Technology

***“Boltzmann's Dog and Darwin's Finch:
Understanding self-replication and evolutionary
adaptation through the lens of thermodynamics in
driven, many-body systems.”***

Living things operate according to well-known physical laws, yet it is challenging to discern specific, non-trivial consequences of these constraints for how an organism that is a product of evolution must behave. Part of the difficulty here is that life lives very far from thermal equilibrium, where many of our traditional theoretical tools fail us. However, recent developments in nonequilibrium statistical mechanics may help light a way forward. By writing the appropriate generalization of free energy in many-body classical systems driven from equilibrium while in contact with a heat bath, it is possible to discern general physical principles that should govern the self-organization of such systems over time. The goal of this talk will be to explain these principles, and show how they begin to offer a new perspective on the physics behind self-replication, natural selection, and evolution.