Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Topologically protected modes in non-equilibrium stochastic systems SURIYANARAYANAN VAIKUNTANATHAN, University of Chicago — Non-equilibrium driving of biophysical processes is believed to enable their robust functioning despite the presence of thermal fluctuations and other sources of disorder. Such robust functions include sensory adaptation, enhanced enzymatic specificity and maintenance of coherent oscillations. Elucidating the relation between energy consumption and organization remains an important and open question in non-equilibrium statistical mechanics. Here we report that steady states of systems with non-equilibrium fluxes can support topologically protected boundary modes that resemble similar modes in electronic and mechanical systems. Akin to their electronic and mechanical counterparts, topological protected boundary steady states in non-equilibrium systems are robust and are largely insensitive to local perturbations. We argue that our work provides a framework for how biophysical systems can use non equilibrium driving to achieve robust function.

Suriyanarayanan Vaikuntanathan
University of Chicago

Date submitted: 11 Nov 2016 Electronic form version 1.4