Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Dissipation, diffusion and phase separation of driven disks[1]
CLARA DEL JUNCO, SURIYANARAYANAN VAIKUNTANATHAN, Univ of Chicago — Active matter systems have been used to elucidate many aspects of non-equilibrium self-assembly. However, the tradeoffs between energy consumption and organization in these systems are still not well-understood. I will present simulations of a minimal but non-trivial model of a driven non-equilibrium liquid that enables us to explore this question. Phase separation has been broadly observed in active and driven systems. Likewise, this system exhibits rich phase behavior - specifically, a transition from a mixed steady state to a time-periodic, separated state and back to a mixed state as the activity is increased. Surprisingly, the phase behavior of this system is explained by a quantitative connection between the work done on the system by the non-equilibrium forces, and the renormalized diffusion constant of the liquid. I will show how we can use a set of analytical models to argue that the relation between energy dissipation and diffusion can be generalized to other settings, and demonstrate that it holds for a second non-equilibrium liquid with qualitatively different activity. These results lay the groundwork for exploring tradeoffs between dissipation and organization in many-body non-equilibrium systems.

[1]The authors were funded by NSF DMR-MRSEC 1420709.

Clara del Junco
Univ of Chicago

Date submitted: 14 Nov 2016 Electronic form version 1.4