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Statistical Mechanics and Hydrodynamics of Self-Propelled Hard Disks BENJAMIN HANCOCK, APARNA BASKARAN, Brandeis University — Active particle fluids have constant energy production and dissipation at the level of its constituent particles. Yet, despite its out-of-equilibrium nature, analogies have been drawn between the steady state behavior of active fluids and their passive fluid counterparts. While most of the studies have been phenomenological or numerical, in this talk we present a first systematic derivation of the statistical mechanics and hydrodynamics of self propelled hard disks in particular we focus on two results. First, a dynamical instability signaling the onset of phase separation and cluster formation is derived and compared to existing phenomenological and kinetic estimates. Second, a leading order contribution to the pressure due to particle interactions is derived and compared with simulations of active brownian particles.

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