

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Hydrodynamics of self-propelled hard particles.** APARNA BASKARAN, Physics Department, Syracuse University, Syracuse, NY 13244 , CRISTINA MARCHETTI, Physics Department, Syracuse University , Syracuse, NY 13244 — Motivated by recent simulations and by experiments on aggregation of gliding bacteria, we study a physical model of the collective dynamics of self-propelled hard particles on a substrate in two dimensions. The particles have finite size, interact via excluded volume and are frictionally damped by the interaction with the substrate. Starting from a microscopic model of dynamics that includes non-thermal noise sources, we derive a continuum description of the system. The hydrodynamic equations are then used to characterize the possible steady states as a function of the particles' packing fraction and examine their stability. Research support by the NSF award number DMR-0305407.

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Date submitted: 20 Nov 2006

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