Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Swarming Bristle-Bots: Exploring Properties of Active Matter
MARTIN B. FORSTNER, DAMIAN BEASOCK, Syracuse University — Active Matter describes an ubiquitous class of non-equilibrium systems that encompasses a diverse range of phenomena in the living and non-living realm. Examples are microscopic bio-filaments and their associated motor proteins, flocks of birds and fish, vibrated rods and disks, or nanoscale colloids actuated by catalytic activity on their surface. What unifies these systems is that they are all composed of self-driven units. In consequence, these systems are not driven into non-equilibrium by energy input at their boundary, but by local energy injection. As fascinating as these systems are, there are currently barely any laboratory systems that allow for controlled experiments in dry active matter. That is, systems not immersed in a fluid that can be observed without specialized equipment. Here we present a two-dimensional 'active matter' system consisting of hundreds of macroscopic (˜0.05 m long), modified, commercially available bristle-bots. We show that this swarm of toys classifies as active matter as it exhibits properties such as dynamic phase separation. Because of their straight forward implementation, their size and controllability, such swarms can not only answer scientific questions, but they have great potential as educational tools in teaching labs and classrooms.

Martin Forstner
Syracuse University

Date submitted: 06 Nov 2015 Electronic form version 1.4