

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Trapping and sorting active granular rods SRIRAM RAMASWAMY¹, TIFR Centre for Interdisciplinary Sciences, 21 Brundavan Colony, Narsingi, Hyderabad 500 075, NITIN KUMAR, James Franck Institute, University of Chicago, Chicago IL 60637, HARSH SONI, School of Engineering, Brown University, Providence RI 02912, RAHUL GUPTA, TIFR Centre for Interdisciplinary Sciences, 21 Brundavan Colony, Narsingi, Hyderabad 500 075, AJAY SOOD, Department of Physics, Indian Institute of Science, Bangalore 560 012 — We report experiments and simulations on collective trapping in a horizontal monolayer of tapered granular rods rendered motile by mechanical vibration. A macroscopic fraction of the particles are trapped by a V-shaped obstacle if its opening angle is less than a threshold value of about 120 degrees, consistent with active Brownian simulations [PRL 108, 268307 (2012)]. the transition between trapped and untrapped states becomes sharper with increasing system size in our numerical studies. We offer a theoretical understanding of this nonequilibrium phase transition based on collective noise suppression and an analysis of fluxes. We show also that the trap can serve to separate particles based on their motility and rotational diffusivity.

¹on leave from Dept of Physics, Indian Institute of Science

Sriram Ramaswamy
TIFR Centre for Interdisciplinary Sciences, 21 Brundavan Colony, Narsingi, Hyderabad 500 075

Date submitted: 06 Nov 2015

Electronic form version 1.4