

Abstract Submitted
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Nematic, Smectic and Possibly Tetratic Steady States in Agitated Monolayers of Rods VIJAY NARAYAN, Indian Institute of Science, NARAYANAN MENON, University of Massachusetts Amherst, MA, SRIRAM RAMASWAMY, Indian Institute of Science — We present experimental results on the nonequilibrium phase diagram and dynamics of a vertically vibrated monolayer of rodlike particles (diameter d from 0.5 to 1 mm) lying horizontally in a quasi-2d cell of height $< 2d$. With increasing area fraction, rods with aspect ratio ~ 12 form nematics and, possibly, translationally ordered phases. Rods with aspect ratio ~ 5 form striped phases instead. While these results agree with thermal equilibrium simulations [Bates and Frenkel, (2000), Lagomarsino et al. (2003), Khandkar and Barma (unpublished)], some clear nonequilibrium signatures are observed, including global, systematic rotation of the ordered phase in response to weak asymmetries in the sample cell. To find nematics and smectics it was crucial to taper the tips of the rods, without which only tetratic correlations were seen. We will present comparisons with the theory of active nematics [EPL 62 (2003) 196-202], and discuss the possibility of long-ranged nematic and quasi-long-ranged smectic order in these nonequilibrium 2d systems.

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