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The flocking-laning transition in systems of self-propelled rods HUI-SHUN KUAN, ROBERT BLACKWELL, MATTHEW A. GLASER, MEREDITH D. BETTERTON, Univ of Colorado - Boulder — Collective motion occurs in a wide range of active systems, from flocks of birds to actin filaments in motility assays. In systems of self-propelled high-aspect ratio rods in two dimensions, flocking and laning phases can occur. We use Brownian dynamics simulation to study the collective motion of self-propelled rods in 2D for aspect ratios 20 and 40, packing fraction from 0.3 to 0.9, and Peclet number from 0 to 8. The flocking phase is globally isotropic, highly inhomogeneous, and exhibits high-density polar clusters. The laning phase has global nematic and local polar order and is relatively homogeneous. We study the transition from laning to flocking and show that this can be regarded as a transition from a fluid to a locally jammed state based on measurements of the contact number distribution, stress autocorrelation function, and structure factor autocorrelation function.

Hui-Shun Kuan
Univ of Colorado - Boulder

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