Abstract Submitted
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Two-Dimensional Microfluidics: Hydrodynamic Interactions in Ultra-Thin Smectic Liquid Crystal Films[1] ZOOM NGUYEN, AARON GOLDFAIN, CHEOL PARK, JOE MACLENNAN, MATT GLASER, NOEL CLARK, Physics, University of Colorado at Boulder, LCMRC TEAM — Hydrodynamics is important in nature and has a wide range of applications in science and industry. Most studies of fluid dynamics have been carried out in 3D systems, but there is an increasing interest in the hydrodynamics in confined geometries. Smectics can form ultra-thin, stable fluid films of uniform but readily variable thickness, a structure which enables the quantitative study of 2D hydrodynamics. Hydrodynamic interactions in 2D extend much further across the fluid than in 3D, and all the dynamics is confined to a well-defined plane, facilitating clean, high-contrast and high-resolution experiments. Here, we explore the hydrodynamic interactions of disk-like smectic islands with other islands and with a straight film boundary acting as a 1D wall. High speed video microscopy confirms that the translational diffusion of an island is anisotropic in the vicinity of another island or the wall, and this anisotropy persists even at large separations many times the island radius.

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