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Material Flows in an Active Nematic Liquid Crystal STEPHEN DECAMP, GABRIEL REDNER, APARNA BASKARAN, MICHAEL HAGAN, ZVONIMIR DOGIC, Brandeis University — Active matter systems are composed of energy consuming constituent components which drive far-from-equilibrium dynamics. As such, active materials exhibit energetic states which would be unfavorable in passive, equilibrium materials. We study one such material; an active nematic liquid crystal which exists in a dynamical steady state where +/-1/2 defects are continuously generated and annihilated at a constant rate. The active nematic is composed of micron-sized microtubule filaments which are highly concentrated into a quasi-2D film that resides on an oil-water interface. Kinesin motor proteins drive inter-filament sliding which results in net extensile motion of the microtubule film. Notably, we find a mesophase in which motile +1/2 defects, acquire system-spanning orientational order. Currently, we are tracking material flows generated by the active stresses in the system to measure length scales at which energy is dissipated, and to measure the relation between internally generated flows and bend in the nematic field.

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