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Long Range Order of Motile Defects in Active Nematic Liquid Crystals STEPHEN DECAMP, GABRIEL REDNER, MICHAEL HAGAN, ZVONIMIR DOGIC, Brandeis University — Active 2D nematic liquid crystals exist in a dynamical steady state in which +1/2 and -1/2 defects are spontaneously generated and annihilated at a constant rate. Active stresses in the material are thought to destroy nematic order through the generation of these defects. We present an active nematic mesophase in which motile defects of charge +1/2 spontaneously acquire long range order. The system is composed of microtubule filaments and kinesin motor protein clusters which are confined to a flat, 2D oil-water interface. The addition of ATP results in microtubule bundles which exhibit kinesin-driven extensile motion. By tuning the density of the nematic material at the 2D interface, we can tune the order parameter of the +1/2 defect ordered mesophase. Additionally, the defect alignment persists over samples at the centimeter scale.

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