Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Membrane rafts stabilized by chiral liquid crystal correction to bare interfacial tension LOUIS KANG, T. C. LUBENSKY, University of Pennsylvania — Lipid rafts are hypothesized to facilitate protein interaction, tension regulation, and trafficking in biological membranes, but the mechanisms responsible for their formation and maintenance are not clear. Recently, experiments showed that bidisperse mixtures of filamentous viruses can self-assemble into colloidal monolayers with thermodynamically stable rafts that exhibit chiral structure and repulsive interactions. We quantitatively explain these observations by modeling the membrane particles as chiral liquid crystals. Chiral twist promotes the formation of finite-sized rafts by decreasing the effective interfacial tension between rafts and background membrane. It also mediates a repulsion that distributes rafts evenly throughout the membrane. Although this system is composed of filamentous viruses whose aggregation is entropically driven by dextran depletants instead of phospholipids and cholesterol with prominent electrostatic interactions, colloidal and biological membranes share many of the same physical symmetries. Chiral twist can contribute to the behavior of both systems and may account for certain stereospecific effects observed in molecular membranes.

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Date submitted: 11 Nov 2016 Electronic form version 1.4