Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Viral nematics in confined geometries[1] KYLE LAWLOR, OKSANA MANYUHINA, MARK BOWICK, CRISTINA MARCHETTI, Syracuse Univ — Motivated by recent experiments on the rod-like virus bacteriophage fd confined to circular and annular regions, we present a theoretical study of confined nematic liquid crystals in such two-dimensional geometries. It is well known that a dense suspension of the fd-virus exhibits nematic order. Recent experimental work and comparison with numerical modeling predicts that in this system the ratio of the bend and splay elastic constants is close to unity. Using the one-elastic-constant approximation for the Frank free energy of nematic liquid crystals, we examine the competition between bulk elasticity and surface anchoring in controlling confined director configurations. We show that many of the observed configurations can be described in terms of bulk and surface topological defects. A similar effect is known to occur in 3D nematic droplets, where a change in anchoring conditions can drive the splitting of a bulk defect into surface defects. In contrast, in our 2D systems, such a splitting is driven by changes in the size and geometry of the system. We show that the continuum theory is capable of accounting for many of the observed configurations.

[1]This work was supported by the National Science Foundation Grants DMR-1305184 and DMG-1068780 and by the Syracuse Soft Matter Program.

Kyle Lawlor
Syracuse Univ

Date submitted: 07 Nov 2014 Electronic form version 1.4