Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Tetratic and smectic liquid crystals on a sphere: defects, patterns and cubes[1] OKSANA MANYUHINA, MARK BOWICK, Syracuse University — We construct the elastic free energy for tetratic order and find a closed form solution for +1/4 disclinations. Confined to a sphere we expect tetratic order to manifest itself in eight +1/4 disclinations, giving the total charge of +2. Within the one elastic constant approximation for the tetratic free energy, their equilibrium positions define the vertices of a cube, rather than the twisted cube, found earlier within the XY-model. We show that it is energetically favorable for the sphere to deform to a rounded cube with flattened faces and locally high Gaussian curvature at the eight vertices. Motivated by experimental observations of smectic shells, we apply our analytic results to study the relative stability of defect configurations and the formation of periodic texture for thick smectic shells.

[1]The authors acknowledge financial support from the Soft Matter Program of Syracuse University

Oksana Manyuhina
Syracuse University

Date submitted: 14 Nov 2014 Electronic form version 1.4