Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Scars and the stability of crystalline shells under external pressure[1] DUANDUAN WAN, MARK BOWICK, Syracuse University, RASTKO SKNEPNEK, University of Dundee — While continuum elastic theory predicts the mechanical properties of ideal spherical shells under external pressure, on microscopic scale the response of shells to pressure may be affected by their crystalline order and defect structure. Here we compare the stability, under external pressure, of shells with a minimal set of topologically-required defects to shells with extended defect arrays (grain boundary "scars"). In particular, we perform Monte Carlo simulations to compare how shells with and without scars deform quasi-statically under external hydrostatic pressure. We find that the critical pressure at which shells collapse is lowered when the scar distribution breaks icosahedral symmetry and raised when symmetry is preserved. The particular shapes resulting from collapses which break icosahedral symmetry depend crucially on the Föppl-von Kármán number.

[1]We thank the Soft Matter Program of Syracuse University for support.

Duanduan Wan
Syracuse University

Date submitted: 12 Nov 2014 Electronic form version 1.4