Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Curvature-induced stiffness and the spatial variation of wavelength in wrinkled sheets NARAYANAN MENON, JD PAULSEN, EVAN HOHFELD, HUNTER KING, JIANGSHUI HUANG, THOMAS RUSSELL, ZHANLONG QIU, BENNY DAVIDOVITCH, U of Massachusetts, Amherst, DOMINIC VELLA, Mathematical Institute, Oxford University — Natural wrinkle patterns often inhabit surfaces of curved substrates, and typically are spatially nonuniform. However, the unified understanding of wrinkle wavelength [1] in terms of a competition between the bending energy of a sheet and the stiffness provided by the tension or potential energy of the supporting substrate, applies only to nearly-planar, parallel, and spatially uniform wrinkle patterns. We describe theory and experiment that extend this understanding in two major directions. The first is to show that the underlying curvature may be treated as a distinct term in the substrate stiffness. The second is to demonstrate in two very different settings that the local value of the wavelength is determined by the local stiffness of the subphase. Both results are encapsulated in a simple, local law for the wavelength that has greatly expanded applicability. We acknowledge support from the WM Keck Foundation 1. Cerda, E., & Mahadevan, L. (2003). *Physical review letters*, *90*, 074302.

Narayanan Menon
U of Massachusetts, Amherst

Date submitted: 06 Nov 2015 Electronic form version 1.4