Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Patterns in highly indented elastic shells MATTEO TAFFETANI, DOMINIC VELLA, Mathematical Institute, University of Oxford, Woodstock Rd, Oxford, OX2 6GG — Depending on its geometry, its mechanical properties and the loading conditions, an elastic shell shows a large variety of behaviors when indented. Although the classical picture is that, under indentation, the preferred low energy configuration is an axisymmetric 'mirror buckled' shape, this ideal shape is only observed rarely. More often indentation gives rise to wrinkling or polygonal buckling, depending on the presence or absence of an internal pressure. We consider the 'Near Threshold' behavior of such systems (to determine the buckling transition) but then focus on the evolution of instability 'Far from Threshold'. In particular, we use finite element simulations, together with analysis of the shallow shell equations to study the spatial variation of the instability's wavenumber, as well as the evolution of this pattern with increasing indentation. In so doing we offer some new insights into why these wrinkled and crumpled structures are 'better' than mirror buckling.

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Date submitted: 11 Nov 2016 Electronic form version 1.4