Abstract Submitted
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Geometry, mechanics and statistical physics in crumpled structures LAURENT BOUÉ, AREZKI BOUDAOUD, MOKHTAR ADDA-BEDIA, STÉPHANIE DEBOEUF, EYTAN KATZAV, Laboratoire de Physique Statistique, ENS Paris — There's been a recent surge of interest in the study of low-dimensional packed elastic manifolds. In fact, the simple act of crumpling a piece of paper does require the simultaneous interaction of many fascinating mechanisms. These include energy condensation from large length scales to small singular structures, topological self-avoidance and complex phase space landscapes reminiscent of frustration in the context of glassy systems. We will present a numerical experiment modeling the folding of an elastic rod (1D) restricted to a shrinking 2D space. The confinement is obtained by preparing an initially disordered elastic line embedded in a quadratic potential. Varying the strength of this confining potential shows that many metastable states can be observed. We are interested in a statistical analysis of the emerging folded patterns. We will discuss the relevance of our results with recent theoretical models (inspired by the free-volume theory of Edwards in the context of granular matter) and recent experiments of crumpled paper.
Some references: L. Boué *et al*, PRL **97** (2006) 166104, L. Boué and E. Katzav EPL **80** (2007) 54002, E. Katzav, M. Adda-Bedia and A. Boudaoud PNAS **103** (2006) 18900-18904.

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