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Abstract for an Invited Paper
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Eggstreme Mechanics of Thin Shells

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I will present a series of experimental explorations on the rich mechanical behavior of thin elastic shells, subject to different forms of loading. First, I will discuss the geometry-induced rigidity of non-spherical pressurized shells under indentation, that can be used for non-destructive testing. I will proceed by characterizing the emergence and evolution of point and linear-like loci of localization on thin shells indented well into the nonlinear regime. I will then present a new mechanism that utilizes the compression of a thin-shell/soft-core system for switchable and tunable wrinkling on curved surfaces, that can be exploited for active aerodynamic drag control. Finally, I shall introduce the framework for buckling-induced folding (or "Buckligami") that involves functional structural transformations of patterned shells that can be excited to achieve encapsulation, flexure and twist. The main common feature underlying these series of examples is the prominence of geometry in dictating the complex mechanical behavior of slender soft structures, thereby making our results relevant and applicable over a wide range of length scales. Moreover, our findings suggest that we rethink our relationship with mechanical instabilities which, rather than modes of failure, can be embraced as opportunities for functionality that are scalable, reversible, and robust.