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Transition from Wrinkling to Crumpling in a Sheet Floating on a Drop¹ HUNTER KING, NARAYANAN MENON, ROBERT SCHROLL, BENNY DAVIDOVITCH, University of Massachusetts, Amherst — An ultrathin* circular polystyrene sheet floating on the surface of a water drop stretches radially and compresses along its circumference as the curvature of the drop increases. The compression is at first fully relaxed by a wrinkle pattern extending inward from the edge. When the wrinkles occupy too large a fraction of the area of the sheet, sharp, localized, crumpled features continuously emerge. We show that the onset of crumpling is a primary symmetry breaking transition of the stress field. We experimentally characterize this transition from wrinkling to crumpling by studying the distribution of gaussian curvature in the film, measured by optical profilometry. *Typical dimensions are tens of nanometers in thickness and millimeters in lateral size.

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