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Jammed elastic shells - a 3D experimental soft frictionless granular system JISSY JOSE, GERHARD A. BLAB, ALFONS VAN BLAADEREN, ARNOUT IMHOF, Utrecht University — We present a new experimental system of monodisperse, soft, frictionless, fluorescent labelled elastic shells for the characterization of structure, universal scaling laws and force networks in 3D jammed matter. The interesting fact about these elastic shells is that they can reversibly deform and therefore serve as sensors of local stress in jammed matter. Similar to other soft particles, like emulsion droplets and bubbles in foam, the shells can be packed to volume fractions close to unity, which allows us to characterize the contact force distribution and universal scaling laws as a function of volume fraction, and to compare them with theoretical predictions and numerical simulations. However, our shells, unlike other soft particles, deform rather differently at large stresses. They deform *without* conserving their inner volume, by forming dimples at contact regions. At each contact one of the shells buckled with a dimple and the other remained spherical, closely resembling overlapping spheres. We conducted 3D quantitative analysis using confocal microscopy and image analysis routines specially developed for these particles. In addition, we analysed the randomness of the process of dimpling, which was found to be volume fraction dependent.

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