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The Uniformity of Jammed Soft Disk Packings ANTHONY CHIECO, CARL GOODRICH[1], University of Pennsylvania, NING XU, University of Science and Technology of China, ANDREA LIU, DOUGLAS DURIAN, University of Pennsylvania — Rattler-free jammed packings were conjectured by Torquato & Stillinger to be hyperuniform, such that volume-fraction fluctuations across a set of L^d measuring windows is $\sigma_\phi^2(L) \sim 1/L^{d+1}$. For simulations of bidisperse soft disks of average area $\langle a \rangle$, we thus propose to quantify the uniformity of the packings by the value of a hyperuniformity disorder length, h_e, defined by $\sigma_\phi^2(L)/\phi = 4\langle a \rangle h_e/L^3$ and equal to the distance from the window boundary over which density fluctuations occur. Independent of system size, preparation protocol, and fraction of rattlers, we find $h_e = 0.084\sqrt{\langle a \rangle}$, which is only 14% larger (i.e. only 14% less uniform) than for a triangular lattice of close-packed disks. However, for windows larger than a certain size L_e we find liquid-like Poissonian fluctuations of $h(L) = (h_e/L_e)L$, as defined by $\sigma_\phi^2(L)/\phi = 4\langle a \rangle h(L)/L^3 \sim 1/L^2$. For a rapid quench protocol, the value is $L_e = 65\sqrt{\langle a \rangle}$, independent of system size and fraction of rattlers. For slower quenches, L_e increases and is the subject of current study.

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