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Growing Hyperuniformity of Bidisperse Soft Discs on Approach to Jamming ANTHONY CHIECO, CARL GOODRICH, ANDREA LIU, DOUGLAS DURIAN, University of Pennsylvania — We study the development of hyperuniformity in simulated systems of bidisperse soft discs as the packing fraction ϕ is increased from below to above jamming, using the real-space spectrum of hyperuniformity disorder lengths, $h(L)$. For a set of randomly placed $L \times L$ measuring windows, $h(L)$ specifies the distance from the window boundaries over which fluctuations are important; for liquid-like systems, $h(L)$ scales like L; but for strongly hyperuniform systems, $h(L) = h_e$ is constant. We use two preparation protocols, one rapidly-quenches a system by immediately minimizing particle overlap and the other allows particles to move under low temperature thermal driving. Above jamming, both systems become strongly hyperuniform as signified by $h(L) \to R_{small}/5$ at large L. Below jamming, but near the transition, the behavior of $h(L)$ at small L is just like above jamming. But for larger L, $h(L)$ breaks away and grows in a protocol-dependent fashion. In general, thermal systems are more uniform than quenched systems, as signified by smaller hyperuniformity disorder lengths. And the development of hyperuniformity happens simultaneously with the onset of jamming.

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