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Standing on the shores of jamming: Structure and local rigidity in packings below the jamming transition.¹
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The glass transition and the athermal jamming transition are both transitions from one disordered state to another marked by a sudden increase in rigidity. Before the onset of rigidity, thermal hard spheres and athermal soft spheres both share the same configuration space. Is there a signature of the glass transition in the topology of the allowed configuration space, and is this same signature present for athermal spheres? I will answer these questions by employing the concept of local rigidity, and in doing so, I will demonstrate the existence of a pre-jamming phase transition coinciding with the thermal mode coupling glass transition density. In this way I hope to show that the growth and percolation of local rigidity in an athermal system is connected to the appearance of long-lived regions of correlated motion in thermal systems.

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