University of Texas at San Antonio

Department of Physics & Astronomy

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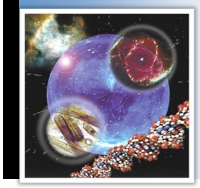
Time: 3:00 p.m.-4:00 p.m.

BB 3.03.02

Glass Transition in a Hard Sphere Fluid

A new order parameter is defined that allows every system configuration of a hard sphere (HS) fluid to be classified as either "disordered" or "ordered." Monte Carlo simulations are used to determine this order parameter in the stable and metastable fluid regimes. At any given density, the configurational states of a HS system can be classified as a belonging to either the disordered (random) sub-ensemble or to the ordered sub-ensemble. The Kauzmann density is defined as the density where the configurational entropies of these 2 sub-ensembles become equal. A thermodynamic glass transition (second order) is predicted at the Kauzmann density at a packing fraction of $\eta \approx 0.54$. With respect to this transition, congruence is found with the traditional ideas espoused by Gibbs, DiMarzio, and Adam. It is the rapid disappearance of disordered (random) configurations with increasing density that drives the glass transition and slows the dynamics.



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