

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Population Annealing Simulations of Binary Hard Sphere Mixtures¹ JARED CALLAHAM, University of Massachusetts - Amherst, JONATHAN MACHTA, University of Massachusetts - Amherst; Santa Fe Institute — Population annealing is a sequential Monte Carlo algorithm that has proven successful in studying spin glass systems. In this talk I describe its application to a binary mixture of hard spheres. A large population of replicas of the system are simulated in parallel using Event Chain Monte Carlo and as the population is gradually compressed, the replicas are randomly resampled to preserve the equilibrium hard sphere distribution. Population annealing provides a direct estimate of the entropy of the system as a function of packing fraction. Using population annealing, we are able to maintain equilibrium into the high density glassy regime and accurately measure the equation of state and its deviations from the BMCSL equation of state. For even higher packing fractions, equilibration is lost but population annealing serves as a useful jamming protocol. We conclude that population annealing is an effective tool for studying equilibrium glassy fluids and the jamming transition.

¹NSF Grant No. DMR-1507506

Jared Callaham
University of Massachusetts - Amherst

Date submitted: 09 Nov 2016

Electronic form version 1.4