Clusters with short-range interactions: a tutorial

Miranda Holmes-Cerfon, Courant Institute of Mathematical Sciences

This talk will be an introduction to the thermodynamics of clusters of a finite number N hard spheres, bound by a “sticky” (infinitesimally short-range) interaction potential. We will talk about how to find all the ground states, how to evaluate their free energies, and what these calculations imply for experimental systems where the interaction range is not infinitesimal. We will also show how these calculations break down for certain clusters that are geometrically “singular," and suggest a way to fix them. Finally, we will show new data on the set of ground states for larger N that suggests interesting questions in geometry, statistical mechanics, and materials science.