

The physics and geometry of colloidal sphere clusters

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I will discuss experiments on simple systems that we use to understand the physics of self-assembly -- the spontaneous formation of order from disorder. We make clusters of small numbers ($N \sim 10$) of spherical colloidal particles that attract each other over a short distance, and we observe their structures and dynamics using optical microscopy. We find that the probability of self-assembling a particular configuration can be understood in terms of the geometry of sphere packings. The geometrical model gives some insights into how phase transitions emerge as N approaches the bulk limit.