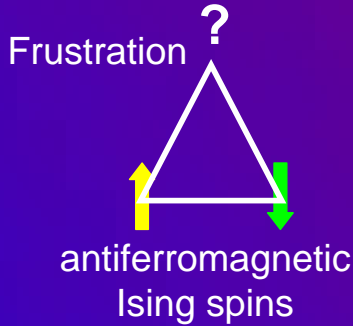


Geometric Frustration in Buckled Colloidal Monolayers

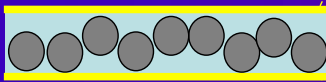
Nature 456, 898-903 (2008)

Yilong Han, Yair Shokef, Ahmed Alsayed, Peter Yunker, Tom Lubensky, and Arjun Yodh

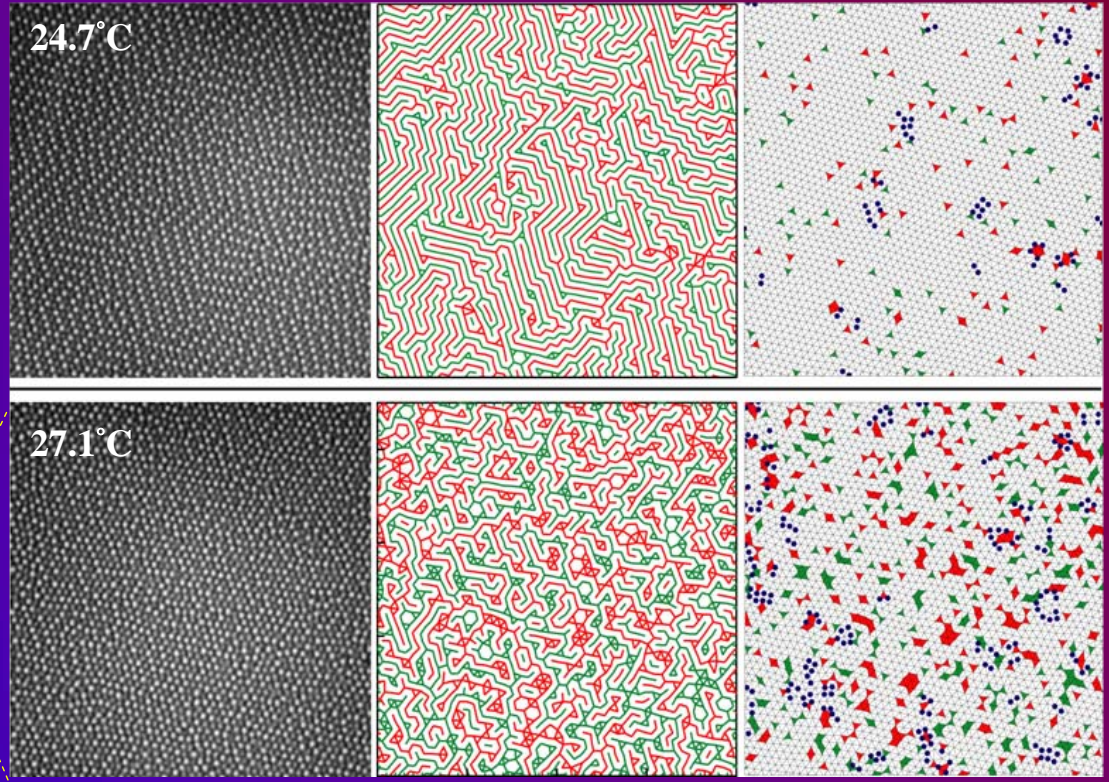
Micrometer sized colloidal microgel spheres are self-assembled into a buckled triangular lattice with either up or down displacements analogous to an antiferromagnetic Ising model on a triangular lattice. This simple tunable soft-matter system provides the first direction visualization of single spin dynamics, thermal excitations, and defects in a geometrical frustrated system.



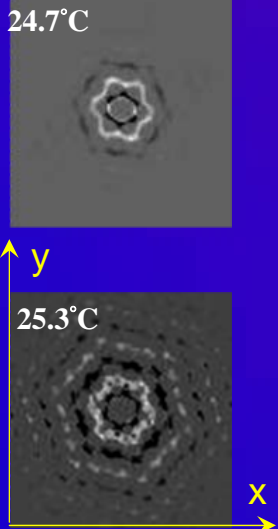
1.5-layer micro-spheres in water at equilibrium



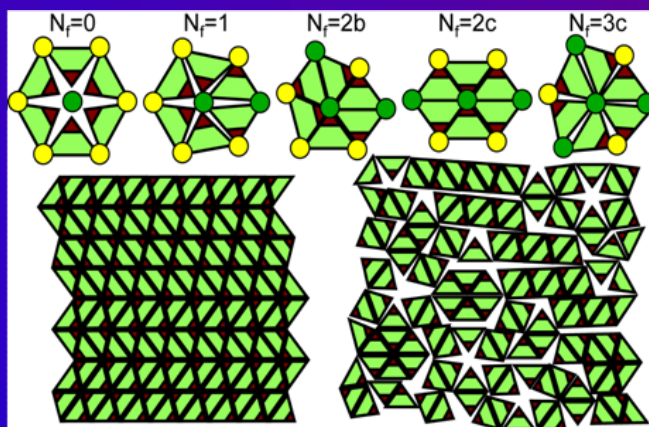
diameter tunable:



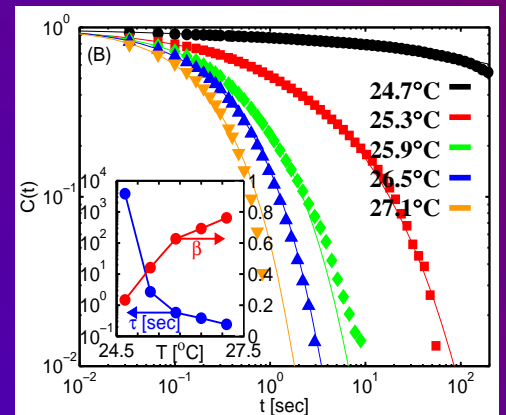
up ● down ● frustrated bonds: ●—● thermal excitations: ▲ defects: ●



Spatial spin correlations



In-plane lattice distortions partially relieve frustration and produce ground-states with zigzagging stripes and subextensive entropy



Spin autocorrelations: stretched exponential $C(t) \sim e^{-(t/\tau)^\beta}$ \Rightarrow Glassy dynamics

Press:

The eternal triangle, Nature, 456, 886-887 (2008).

ScienceDaily: <http://www.sciencedaily.com/releases/2008/12/081217190340.htm>