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Glassy Spin Dynamics in Buckled Colloidal Crystal[1] DI ZHOU, FENG WANG, YILONG HAN, Department of Physics, Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong — Geometric frustration arises when lattice structure prevents simultaneous minimization of local interaction energies. It leads to highly degenerate ground states and complex behaviors in frustrated magnetic materials. Here we experimentally studied buckled 1.5-layer colloidal NIPA microgel crystals confined between parallel plates. Spheres buckled up and down are analogous to antiferromagnetic Ising spins. These spins on the distorted triangular lattice exhibit glassy dynamics at low temperatures. In particular, a spin only has 13 nearest-neighbor configurations, which enables to reveal the correlation between structures and dynamical heterogeneity. Soft modes also localize at high-energy regions. Further, we compared the colloidal spin system with kinetic constrained models (KCMs) and observed dynamical facilitation behaviors including excitations lines in space-time. Similar structures and glassy dynamics are also observed in our simulation of Coulomb charges on a triangular lattice.

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