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Orthogonal DNA-colloid Clusters[1] JESSE W. COLLINS, Harvard SEAS, VINOTHAN N. MANOHARAN, Harvard Physics and SEAS — We experimentally investigate the self-assembly of colloids labelled with different DNA strands into small clusters. We coat 1 micron diameter spheres with 65 base DNA strands having highly specific "sticky ends." Particles with different surface-bound DNA sequences represent different particle "types." We tune the short-ranged, pairwise interactions between some types to be attractive and interactions between other types to be purely repulsive; in this sense, the interactions are orthogonal. The magnitude of attraction (and repulsion) is constant across various types. We control the number and types of colloids at the single particle level, and distinguish the type of each particle from the types of their binding partners within each cluster. In an example experiment, 2 particles of each of 3 different types explore a volume less than 100 picoliters and assemble into equilibrium configurations. We characterize the structures with a microscope and compare observed averages with statistical mechanical predictions.

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