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Self-Assembly of Spherical Colloidal Particles at Low N NATALIE ARKUS, VINOTHAN MANOHARAN, MICHAEL BRENNER, Harvard University — The number of rigid structures that a system of N particles can form grows exponentially with N. Stabilizing any one structure over all others is thus a challenging problem. We consider a system of N spherical colloidal particles that cannot deform or overlap, and which exhibit a short-range attractive force. We present a method, using graph theory and geometry, that solves for all possible rigid packings of N particles - the resultant set of packings is provably complete. We then present a mechanism that is capable of stabilizing any one structure over all others (in the zero temperature limit), and which is experimentally realizable - thereby, potentially allowing us to direct the self-assembly of a desired structure. We compare to preliminary experimental results.

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