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Geometric and Topological Transitions of Small Clusters of Liquid Particles JAMES GIAMMONA, OTGER CAMPAS, Univ of California - Santa Barbara — The geometry and topology of small particle clusters has been studied in several disciplines due to the fundamental nature of the problem and its relevance to applications. Recent theoretical work can predict observed packings for small numbers of hard, spherical particles, but little is known about how using deformable particles changes the geometry and topology of these clusters. To study this problem, we simulate small clusters of liquid particles using a Langevin approach and obtain the geometrical and topological transitions for clusters of N particles (up to N=7) as the particles interfacial tension and adhesion energy are varied. As particles become more adhesive and increase their contact angle, we observe well-defined packing transitions in the clusters. For N=5, a topological transition occurs at a critical value of the contact angle. For N=6, we obtain two stable cluster geometries for a given value of the contact angle, namely an 8-faced deltahedron and an octahedron. For N=7, there appears to be a complex landscape of cluster geometries and topologies, with transitions occurring at well-defined values of the contact angle. Our findings can help in the controlled assembly of particular arrangements of small clusters of bubbles or adherent droplets.

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