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**Soft modes near the buckling transition of icosahedral shells**

MICHAEL WIDOM, Carnegie Mellon University, JACK LIDMAR, Royal Institute of Technology, Sweden, DAVID NELSON, Harvard University — Closed shells comprised of pentamers and hexamers may be smooth and nearly spherical, or sharply faceted and icosahedral, depending on the elastic constants of the shell. We interpret the transition from smooth to faceted as a soft-mode transition. Our analysis is based on the phonon spectrum of a simplified mass-and-spring model of the shell. In contrast to the case of a disclinated planar network, where the transition is sharply defined, the mean curvature of the sphere smooths the transition rather like a magnetic field smears out a ferromagnetic phase transition. We define susceptibilities of the transition as the response to forces applied at vertices, edges and faces of an icosahedron. At the soft-mode transition the vertex susceptibility is largest, but as the shell becomes faceted the edge and face susceptibilities greatly exceed the vertex susceptibility.

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