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Emergent SO(3) Symmetry of the Frictionless Shear Jamming Transition MARCO BAITY-JESI, Institut de Physique Theorique, DRF, CEA Saclay, France, CARL P. GOODRICH, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA 02138, USA, ANDREA J. LIU, Department of Physics and Astronomy, University of Pennsylvania, Philadelphia, Pennsylvania 19104, USA, SIDNEY R. NAGEL, James Franck Institute, Enrico Fermi Institute, and Department of Physics, The University of Chicago, USA, JAMES P. SETHNA, Department of Physics, Cornell University, Ithaca, New York 14850, USA — We study the shear jamming of athermal frictionless soft spheres, and find that in the thermodynamic limit, a shear-jammed state exists with different elastic properties from the isotropically-jammed state. For example, shear-jammed states can have a non-zero residual shear stress in the thermodynamic limit that arises from long-range stress-stress correlations. As a result, the ratio of the shear and bulk moduli, which in isotropically-jammed systems vanishes as the jamming transition is approached from above, instead approaches a constant. Despite these striking differences, we argue that in a deeper sense, the shear jamming and isotropic jamming transitions actually have the same symmetry, and that the differences can be fully understood by rotating the six-dimensional basis of the elastic modulus tensor.

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