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From Spheres to Ellipsoids: The Story of the Density of States¹ ZORANA ZERAVCIC, Institute Lorentz, University of Leiden and The James Frank Institute, University of Chicago, NING XU, Department of Physics and Astronomy, University of Pennsylvania and The James Frank Institute, University of Chicago, SIDNEY R. NAGEL, The James Frank Institute, University of Chicago, ANDREA J. LIU, Department of Physics and Astronomy, University of Pennsylvania — Packings of frictionless ellipsoids have not only captured the imagination of the public, but also bring up a number of fundamental issues regarding the properties of jammed media. For instance, the average contact number Z of such packings at jamming varies continuously between the spherical isostatic value $Z_{\rm iso}=6$ and the value $Z_{\rm iso}=10$ for ellipsoids of revolution if the ellipticity $\epsilon-1$ is turned on. Here we study the vibrational spectra of soft ellipsoids both as a function of density and ϵ . Our spectra show a two-band structure. For small aspect ratios there is first a rotational band, then a gap and then a second band of translational character. As we increase the aspect ratio, the gap closes and the remaining band has a mixed character. We discuss various surprising features of the spectrum in detail and show how the changes in the gap are related with the change of Z with ϵ .

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