Random matrix definition of the boson peak
M. LISA MANNING, Department of Physics Syracuse University, ANDREA J. LIU, Department of Physics and Astronomy University of Pennsylvania — The density of vibrational states for glasses and jammed solids exhibits universal features, including an excess of modes above the Debye prediction known as the boson peak, located at a frequency $\omega^*$. We show that the eigenvector statistics for modes in the boson peak are universal and emerge from the interplay of disorder and global translation invariance in the dynamical matrix. We demonstrate that a very large class of random matrices contains a band of modes with this same universal structure, and conjecture the existence of a new universality class. We characterize the eigenvector statistics as a function of coordination number, and find that one member of this new class reproduces the scaling of $\omega^*$ with coordination number that is observed near the jamming transition.