Universal Sound Attenuation in Amorphous Solids DERVIS CAN
VURAL, University of Illinois at Urbana Champaign — A large class of amorphous
materials, including glasses, polymers, disordered crystals and in some cases quasi-
crystals and proteins, show a striking degree of universality in their low temperature
acoustic and thermal properties. Among the least understood is the dimensionless
acoustic mean path $l/\lambda \sim 150$. Although many theories have been proposed to
explain the universality of this constant, they rely on detailed phenomenological
assumptions, such as the existence of tunneling two-state systems. In this talk, I
present the many-body acoustic response of elastically coupled random matrices to
demonstrate that the universality is a property of a general class of theories, and
emerges regardless of the detailed assumptions regarding the constituents of the
amorphous solid.

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