Illuminating thermal phonons using optical spectroscopy and ab-initio calculations

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The thermal transport properties of materials are of fundamental interest and practical importance in applications ranging from space power generation to thermal management. In this talk, I will introduce our efforts to use novel optical spectroscopy methods and ab-initio calculations to provide a unique microscopic picture of the atomic vibrations that transport heat in solids, providing the foundational knowledge necessary to create materials with exceptional properties. In particular, I will describe the first ab-initio calculations of the thermal conductivity of molecular crystals as well as the first measurements of reflection coefficients of THz frequency phonons from atomically rough surfaces.

Austin Minnich is a Professor of Mechanical Engineering and Applied Physics at the California Institute of Technology. He received his Bachelor’s degree from UC Berkeley in 2006 and his PhD from MIT in 2011, after which he started his position at Caltech. He is the recipient of a 2013 NSF CAREER Award, a 2015 ONR Young Investigator Award, a 2017 Director of Research Award from the Navy, the 2017 Junior Prize from the International Photothermal and Photoacoustics Association, and the 2017 Bergles-Rohsenow Young Investigator Award from the American Society of Mechanical Engineers.

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