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Spatial Manipulation of Heat Flow by Surface Boundaries at the Nanoscale ABHINAV MALHOTRA, MARTIN MALDOVAN, Georgia Inst of Tech — The precise manipulation of phonon transport properties is central to controlling thermal transport in semiconductor nanostructures. The physical understanding, prediction, and control of thermal phonon heat spectra and thermal conductivity accumulation functions - which establish the proportion of heat transported by phonons with different frequencies and mean-free-paths - has attracted significant attention in recent years. In this talk, we advance the possibilities of manipulating heat by spatially modulating thermal transport in nanostructures. We show that phonon scattering at interfaces impacts the most preferred physical pathway used by heat energy flow in thermal transport in nanostructures. The role of introducing boundaries with different surface conditions on resultant thermal flux is presented and methodologies to enhance these spatial modulations are discussed. This talk aims to advance the fundamental understanding on the nature of heat transport at nanoscale with potential applications in multiple research areas ranging from energy materials to optoelectronics.

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