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Harnessing amplified ultrafast laser pulses for studying and controlling quantum materials

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Quantum materials exhibit a range of astonishing phenomena that embody the central scientific questions currently challenging condensed matter physics. Within these systems, ultrashort light pulses can create controlled non-equilibrium electronic conditions to reveal physical properties not accessible at equilibrium. Beyond uncovering the interaction mechanisms between electrons, lattice, and spin, it is also a new and rich landscape in which photonic-based coherent control methods can be implemented with goals of driving and controlling internal quantum states in the condensed phase. I will discuss our efforts toward developing technology and techniques for probing quantum materials along with results from these studies.

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