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Dynamic control of electron correlations in photodoped charge-transfer insulators

Thursday, June 26, 2025 3:00 PM (20 minutes)

The electronic properties of correlated insulators are governed by the strength of Coulomb interactions, enabling the control of electronic conductivity with external stimuli. In this talk, I will highlight that the strength of electronic correlations in nickel oxide (NiO) can be coherently reduced by tuning the intensity of an optical pulse excitation above the charge-transfer gap. Remarkably, this weakening of correlations persists for hundreds of picoseconds and exhibits a recovery time independent of the photodoping density across two orders of magnitude. A broadening of the charge-transfer gap is also observed, consistent with dynamical screening. The high degree of control achieved over both the energy and temporal dynamics of electronic correlations offers a promising avenue to a full optical control of correlated systems and the Mott transition.

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