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【718】Optically induced transient enhancement of a structural order parameter monitored via a FEL

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Ultrafast optical control of correlation-induced order parameters in complex materials is a key challenge en route to new functional materials. Here we employ above-bandgap femtosecond pulses with various wavelenghts to excite $EuTiO_3$ out of its low-temperature antiferrodistortive equilibrium phase. Monitoring the subsequent transient intensity of distortion-induced superlattice reflections via 80-fs hard x-ray pulses at LCLS, we observe a transient increase of their intensities in a sub-ps time window. This represents an optically induced ultrafast increase of the structural order parameter, which stands in strong contrast to the reduction of the distortion with thermal heating in equilibrium. Preliminary DFT calculations identify 4f-hole-doping as possible driving force.

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