

Abstract Submitted
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Nanoscale Charge-order Dynamics in Stripe-phase Nickelates Probed via Ultrafast THz Spectroscopy¹ GIACOMO COSLOVICH, SASCHA BEHL, BERNHARD HUBER, Lawrence Berkeley National Laboratory, WEI-SHENG LEE, ZHI-XUN SHEN, SIMES, SLAC National Accelerator Laboratory, Stanford University, TAKAO SASAGAWA, Tokyo Institute of Technology, HANS A. BECHTEL, MICHAEL C. MARTIN, ROBERT A. KAINDL, Lawrence Berkeley National Laboratory — Here we report ultrafast optical pump-THz probe spectroscopy of the model stripe-ordered system $\text{La}_{1.75}\text{Sr}_{0.25}\text{NiO}_4$. Ultrafast experiments in the multi-THz spectral range show strong THz reflectivity variations around the phonon bending mode frequency (≈ 11 THz). At low temperatures this phonon mode exhibits a splitting directly related to the formation of long-range stripe-order, while the background conductivity is reminiscent of the opening of the mid-IR pseudogap due to charge localization. The transient THz probe therefore captures both the electronic and structural dynamics in a single light pulse. The results reveal the dynamical interplay between charge localization and the bending mode folding, providing insight in the emergence of nanoscale charge-order in complex oxides.

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