Abstract Submitted
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**Ultrafast electron diffraction study of ab-plane dynamics in superconducting $Bi_2Sr_2CaCu_2O_{8+d}$**[1] TATIANA KONSTANTINOVA, BNL/Stony Brook, ALEXANDER REID, SLAC, LIJUN WU, BNL, HERMANN DURR, XIJIE WANG, SLAC, YIMEI ZHU, BNL — The role of phonons and other collective modes in cooperative electron phenomena in high-$T_C$ cuprate superconductors is an extensively interesting topic. Time-resolved experiments provide temporal hierarchy of the bosonic modes interacting with electrons. However, majority of research in this field explore dynamics of electronic states and can only make indirect conclusion about involvement of the lattice. We report time-resolved study of optimally doped $Bi_2Sr_2CaCu_2O_{8+d}$ lattice response to photo-excitation by means of ultrafast electron diffraction that is directly sensitive to atomic motion. Data analysis utilizing Bloch-wave calculation of diffraction peak intensity allows separation of Cu-O in-plane vibration building up on the sub picosecond time scale from the low energy phonon population growth with a much slower rate. This study confirms the assumption of strong electron coupling to the Cu-O plane phonons.

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