**Poster-1-2**

## Ultrafast momentum-resolved electron energy loss spectroscopy in graphite

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The investigation of collective excitations is essential for explaining the behavior of interacting electrons in correlated materials. Phonons, plasmons, excitons, and magnons are among the responsible modes for solids properties. Measuring their dispersion in momentum space enables exploring their interplay across different phases. Out-of-equilibrium systems offer a rich framework where collective modes evolve and can be tracked on the ultrafast timescale. Here, we demonstrate time- and momentum-resolved electron energy loss spectroscopy in an ultrafast transmission electron microscope. We probe the plasmons of graphite across the first Brillouin zone and we follow the dispersion dynamics ensuing the excitation of conduction electrons employing ultrafast infrared pulses. We compare the relaxation timescales of high symmetry points in momentum space and discuss the role of electron scattering. We show the capabilities of our technique to study different phase transitions and how to simultaneously gain information on structural and electronic ultrafast dynamics.