

Abstract Submitted
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Ultrafast electron diffraction imaging of isolated molecules with a high repetition-rate relativistic electron gun¹ DANIEL SLAUGHTER, Lawrence Berkeley National Laboratory, XIAOJUN WANG, KYLE WILKIN, University of Nebraska Lincoln, BRANDON GRIFFIN, University of Nevada Reno, FU-HAO JI, Lawrence Berkeley National Laboratory, JOSHUA WILLIAMS, University of Nevada Reno, MARTIN CENTURION, University of Nebraska Lincoln, DANIELE FILIPPETTO, Lawrence Berkeley National Laboratory — We report recent developments at a new facility to directly measure the molecular structure of gases with ultrafast (100 fs) pulses of electrons with relativistic energies (780 keV). We aim to measure the changes in internal structure of a molecule as it evolves on ultrafast timescales during a chemical reaction, using the High Repetition-rate Electron Scattering (HiRES) beamline at the Advanced Photo-injector Experiment (APEX) facility at LBNL. The unique capabilities of the beamline are MHz electron pulse repetition rates, allowing high electron flux and high spatial and temporal resolution. Highly coherent electrons are produced by laser and RF electron pulse shaping in space time and energy. This combination provides unprecedented capability to track molecular structural dynamics on ultrafast timescales. Details of the instrumentation and analysis will be presented with preliminary results from first experiments on gases.

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