

Abstract Submitted
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Table-top setup for molecular imaging with high femtosecond electron pulses¹ YANWEI XIONG, KYLE WILKIN, MARTIN CENTURION, University of Nebraska-Lincoln, CENTURION GROUP TEAM — Ultrafast electron diffraction measurements of isolated molecules have recently showed the capability to capture structural dynamics with great detail, including the motion of nuclear wavepackets in complex molecules. These advances have been facilitated by the use of relativistic electron pulses to reach sub-200 fs resolution, such as the MeV-UED setup at SLAC National Lab. We have developed a table-top setup for ultrafast electron diffraction which reaches femtosecond resolution using sub-relativistic electrons at an energy of 90 keV. Electrons are produced at a repetition rate of 5 kHz using a photocathode and a DC acceleration stage, and temporally compressed on the target using an RF cavity that is synchronized to the laser. We demonstrate an overall resolution of the instrument of 270 fs by capturing a rotational wavepacket in Nitrogen molecules. We have also characterized the time of arrival drift between laser and electron pulses to be on the order of 100 fs over several hours.

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