Abstract Submitted
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Ultrafast Electron and Ion Dynamics in Strong-Field-Ionized Liquid Water[1] ZHI-HENG LOH, JIALIN LI, ZHAOGANG NIE, YI YING ZHENG, SHUO DONG, PEI JIANG LOW, Nanyang Technological University — The ionization of liquid water functions as the principal trigger for a myriad of phenomena that are relevant to radiation chemistry and biology. The earliest events that follow the ionization of water, however, remain relatively unknown. Here, femtosecond coherence spectroscopy is combined with polarization anisotropy measurements to elucidate the ultrafast electron and ion dynamics in ionized water. The results show that strong-field ionization of liquid water produces an aligned p electron distribution. Furthermore oscillations observed in the polarization anisotropy are suggestive of valence electron motion in the highly reactive H_2O^+ radical cation, whose lifetime with respect to proton transfer is found to be 196 $\pm$ 5 fs. Coherent intermolecular motions that signal initial solvent reorganization and subsequent long-lived ballistic proton transport that involves the H_3O^+ end-product are also detected in the time domain. These results offer new insight into the elementary dynamics of ionized liquid water.

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