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Ultrafast Dynamics of Ozone Exposed to Ionizing Radiation
CRAIG HOGLE, University of Colorado - JILA, PREDRAG RANITOVIC, Lawrence Berkeley National Laboratory, WILLIAM PETERS, AUSTIN SPENCER, University of Colorado - Chemistry, LEIGH MARTIN, University of Colorado - JILA, DAVID JONAS, University of Colorado - Chemistry, XIAO-MIN TONG, University of Tsukuba, Japan, MARGARET MURNANE, HENRY KAPTEYN, University of Colorado - JILA — By irradiating ozone molecules with few-femtosecond soft x-ray pulses and probing the fragmentation pathways, we find that any excess energy is rapidly and efficiently transferred into internal excitation of the triatomic molecule. We explore the Coulomb explosion of O_3 when irradiated with soft x-rays above the double ionization threshold, at photon energies in the XUV (43 eV) range. The super-excited states are then probed using a femtosecond infrared (IR) pulse in combination with 3D coincidence momentum imaging (COLTRIMS). By comparing the O_3^+ and O_2^+ ion fragmentation yields and their kinetic energies as a function of time delay between the XUV pump and IR probe, we find that the triatomic ozone molecule shows an ability to absorb any excess energy internally rather than emerging as kinetic energy released by the Coulomb exploding fragments. This internal conversion of energy in a triatomic molecule before explosion is very different from the case of diatomic molecular oxygen.

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