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High harmonic generation from ions in a capillary discharge
TENIO POPMINTCHEV, DAVID M. GAUDIOSI, OREN COHEN, MARGARET M. MURNANE, HENRY C. KAPTEYN, JILA, University of Colorado at Boulder and NIST, MICHAEL GRISHAM, BRENDAN REAGAN, MARK BERRILL, JORGE J. ROCCA, Department of Electrical and Computer Engineering, Colorado State University, BARRY C. WALKER, Department of Physics and Astronomy, University of Delaware, NSF ERC FOR EXTREME ULTRAVIOLET SCIENCE AND TECHNOLOGY TEAM — We demonstrated a significant extension of the high harmonic spectra from noble gases by generating harmonics from ions in a capillary discharge plasma. The discharge plasma eliminates ionization-induced defocusing and ionization loss, allowing photon energies of 160 eV, 170 eV and 275 eV to be generated from xenon, krypton and argon ions, respectively. In addition to extending the spectra, harmonic generation in a capillary discharge results in an enhancement of the flux of up to two orders of magnitude near the harmonic cutoff observed in a hollow waveguide. The use of a capillary discharge plasma as a new medium for high harmonic generation shows great promise for extending efficient harmonic generation to shorter wavelengths.

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