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Isolated attosecond pulses from ionization-gated high harmonics for molecular spectroscopy MARK ABEL, PHILLIP NAGEL, JUSTINE BELL, HIROKI MASHIKO, DANIEL NEUMARK, STEPHEN LEONE, UC Berkeley — Ionization gating of high harmonic emission on the leading edge of the driver pulse affords a convenient route to isolated attosecond pulses. The gating technique is based on a sub-femtosecond loss of phase matching for the high-harmonic generation process due to the rising plasma density during the driver pulse. Several techniques of attosecond spectroscopy are used to characterize the harmonic emission, including half-cycle cutoff analysis (Haworth et al., *Nat. Phys.* **3**, 52), CEP-scanning (Pfeifer et al., *Opt. Lett.*, **34**,1819), and time-resolved photoelectron streaking (Kienberger et al., *Nature*, **427**, 817). Ionization gating can generate a cleanly isolated attosecond pulse with 430 ± 15 as duration, limited here by the bandwidth of the reflective x-ray optic employed. We discuss the advantages of ionization gating, including driver pulse duration scalability, and wavelength tunability, and increased x-ray bandwidth over the traditional technique. Further, the ionization gated harmonic radiation can be used to initiate ultrafast molecular electronic dynamics.

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