

Control of the Photon Energy and Polarization of Tabletop High-Order Harmonic Generation

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Recently, ultrafast, coherent X-ray science and technology has received a lot of attentions, especially with respect to tabletop X-rays produced by high harmonic generation (HHG). The femtosecond-to-attosecond X-ray pulse enables the dynamics of chemical reactions, nano-materials and bio-molecular systems to be studied with unprecedented temporal and spatial resolution. However, the bright HHG light source is limited to < 150 eV spectral region due to phase-mismatch issue and the lack of the right driving laser wavelength. In this talk, I will show you how we extend the bright harmonics using long wavelength lasers. Furthermore, the shortest attosecond pulses have been produced with only the linear polarization, which limits the range of physics that can be explored. I will also present how we experimentally demonstrated the full control of polarization states of isolated attosecond pulses for the first time. The generation of isolated, arbitrarily polarized attosecond EUV pulses makes major breakthroughs for the next attosecond frontiers, opening new perspectives from which to study ultrafast dynamics in chiral systems and magnetic materials with unprecedented temporal resolution.