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Effects of streaking laser intensity on the characterization of isolated attosecond pulses HE WANG, SABIH KHAN, MICHAEL CHINI, SHOUYUAN CHEN, ZENGHU CHANG, Kansas State University — Single isolated attosecond extreme ultraviolet (XUV) pulses can be characterized by streaking photoelectrons using a near infrared (NIR) laser field. Classically, the streaking resolution is determined by the Rayleigh criterion, which requires the minimum NIR intensity of 5.5×10^{13} W/cm^2 to resolve 90 as XUV pulses. Under such high NIR intensity, the electrons generated from multi-photon processes overlap with the streaked electrons in the spectrogram, which unavoidably introduces errors in the final XUV reconstruction. When the FROG-CRAB (Frequency-Resolved Optical Gating for Complete Reconstruction of Attosecond Bursts) technique is used to reconstruct the XUV pulses from the spectrogram, it was found that the minimum streaking intensity needed to resolve single attosecond pulses is dependent on the maximum count of the spectrogram. With a peak count of 100 in the spectrogram, chirped attosecond pulses with spectral bandwidth supporting 90-as transform limited pulse durations can be retrieved from the spectrogram with streaking intensity two orders of magnitude smaller than that derived from the Rayleigh criterion. Such low streaking field intensity is desirable to suppress the ATI background, which is important for the characterization of even shorter XUV attosecond pulses because it significantly reduces the intensity constraints on the experiments.

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