High-Order Harmonics from Relativistic Electron Spikes: Statistical Analysis

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High-order harmonics from relativistic electron spikes [1, 2] are generated by multi-terawatt femtosecond lasers focused onto gas jet targets up to irradiances exceeding 10^{18} W/cm^2. Possible applications of these harmonics range from plasma diagnostics to compact bright attosecond x-ray sources. These applications require stability and well understood generation processes. Here we present statistical analysis of the harmonic generation employing a dataset from a large number of shots with the J-KAREN laser [3] with the emphasis on the reproducibility, stability, and spectral shape properties. The latter include analysis of base harmonic frequencies with a typical separation of ~ eV and relatively slow spectral modulations with a period up to a few tens of eV, which may give a hint to the temporal structure of the XUV radiation.

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