Abstract Submitted
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Quantum origin of plateau structures in strong laser-atom processes[1] M.V. FROLOV, N.L. MANAKOV, Voronezh State University, Russia, A.A. KHUSKIVADZE, ANTHONY F. STARACE, The University of Nebraska-Lincoln — The characteristic plateau structures in the high-energy spectra of strong laser-atom phenomena (such as ATI and HHG) are shown to originate from the properties of the exact wave function of an initially bound electron subjected to a strong monochromatic laser field of frequency ω. Using time-dependent effective range theory [1], we obtain the spatial dependence of the Fourier-harmonic components (for frequencies $n\omega$) of the quasistationary, quasienergy state (QQES) corresponding to the initial bound state. This dependence reveals a remarkable plateau-like behavior over spatial distances up to the amplitude of free-electron oscillations in the laser field. This behavior is typical for Fourier-harmonics with energies $n\hbar\omega$ up to $3.17U_p$ (where U_p is the ponderomotive energy). Our numerical analysis of ATI and HHG spectra demonstrates that the high-energy plateaus in these spectra (which have been interpreted in terms of the semiclassical rescattering scenario) originate from the above-mentioned plateau features of the Fourier-harmonics of the QQES wave function. [1] M.V. Frolov et al., *Phys. Rev. Lett.* **91**, 053003 (2003).

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Anthony F. Starace
The University of Nebraska-Lincoln

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