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A semi-classical approach for solving the time-dependent Schrödinger equation in inhomogeneous electromagnetic fields[1] JIANXIONG LI, UWE THUMM, Kansas State University — During the IR-streaked XUV photoemission from nanoparticles, the net IR electric field varies over the spatial extension of the target, an effect that for metallic particles is further enhanced by strong induced plasmonic polarization. This spatial dependence prevents the convenient use of "Volkov states" [solutions of the time-dependent Schrödinger equation for a free electron in a spatially homogeneous (cw) electromagnetic field] as approximate final states in quantum-mechanical photoemission calculations. To obtain the wave function of a free electron in a spatially inhomogeneous electromagnetic field, we propose a semi-classical approach based on time-dependent WKB theory. Generalizing ordinary Volkov states, this method provides a simple expression for modeling the final photoelectron state. We employ such generalized Volkov states to calculate the streaked photoelectron spectra from gold nanospheres and assess their accurary.

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