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Extreme nonlinear response in graphene

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High-order harmonic generation (HHG) is a remarkable process resulting from the interaction of physical systems with intense electromagnetic radiation. The generation of high-order harmonics is well-established in atomic and molecular gases. However, much progress have been done towards HHG in solids since the first experimental observation. HHG from solids has burgeoned a great interest, mainly motivated by the quadratic scaling of the harmonic conversion efficiency with the density of the target, as a result of the coherent nature of the process. While semiconductors materials have been well studied, it is not the case for two-dimensional materials as graphene. In this work we present a theoretical approach to describe the induced dynamics responsible for HHG in graphene. We predict the possibility to produce HHG with few-cycle mid-IR laser pulses.

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