

Formation of ultrashort pulses from quasimonochromatic XUV radiation via infrared-field-controlled forward scattering

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Abstract

© 2016 American Physical Society. We suggest a highly efficient method of ultrashort pulse formation from resonant XUV radiation due to sub-laser-cycle modulation of the excited state of non-hydrogen-like atoms by a nonionizing IR laser field. This modulation results in formation of the Raman-Stokes and anti-Stokes sidebands in coherently forward-scattered radiation, which, in turn, leads to formation of short pulses, when the phases of the sidebands are matched. This method is a generalization of a recently suggested technique [V. A. Antonov, Phys. Rev. A 88, 053849 (2013)10.1103/PhysRevA.88.053849] for a non-hydrogen-like medium. The possibility to form 2-fs XUV pulses in the gas of helium atoms and 990-as XUV pulses in the plasma of Li⁺ ions with efficiencies over 80% is shown.

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