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High-harmonic generation in gases and solids

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Attosecond and high-harmonic pulses are generated by electrons that are extracted from a quantum system by an intense light pulse and travel through the continuum under the influence of the electric field of the light. Portions of each electron wave packet are forced to re-collide with its parent ion after the field reverses direction. Upon re-collision, the electron and ion can recombine, emitting soft X-ray radiation that can be in the form of attosecond pulses. This highly nonlinear process occurs in atoms, molecules and solids and offers unique measurement opportunities for measuring the attosecond pulse itself; the orbital(s) from which it emerged; and the band structure of material in which the wave packets moved.