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Ultrashort-Pulse-Duration Laser and Charged-Particle Beams from High-Intensity Laser-Plasma Interactions[1]

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Discussed are novel approaches to using high-intensity laser-plasma interactions to generate ultrashort duration (femtosecond or attosecond) pulses of energetic (keV—MeV) x-ray and charged-particle beams. These include (1) Thomson scattering of laser-accelerated electron beam by a laser wiggler, (2) Ultrashort-duration betatron emission from electron beams by a laser-driven plasma wiggler, (3) pulse-compression of laser light in plasmas via laser-induced index-of-refraction modification, (4) ponderomotive deflection of a laser-accelerated electron beam by a short-pulse high-intensity laser pulse, (5) laser-driven ion acceleration. Comparisons between theoretical predictions and experimental results will also be discussed.

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