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Self-modulated laser wakefield acceleration as a X-ray source[1]
NUNO LEMOS, FRANK TSUNG, JESSICA SHAW, KEN MARSH, UCLA, FELICIE ALBERT, BRAD POLLOCK, Livermore, CHAN JOSHI, UCLA — Understanding material properties under extreme conditions of temperature and pressure is critical for different fields of physics such as astrophysics and high energy density (HED) science. The HED science facilities such as OMEGA and the National Ignition Facility are now uniquely able to recreate in the laboratory conditions of temperature and pressure that were thought to be only attainable in the interiors of stars and planets. To diagnose such extreme states of matter, the development of efficient, versatile and fast (sub-picosecond scale) x-ray probes with energies larger than 50 kilo-electronvolts has become essential for HED science experiments on these specific facilities. In this work we explore the betatron radiation generated in self-modulated laser-wakefield accelerators to probe HED plasmas with unprecedented time resolution. Through Osiris 2D particle-in-cell simulations we we will show that this acceleration scheme can produce radiation with energies exceeding 50keV.

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