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**Computational Methods for Simulating the Generation Synchrotron Radiation Generation in Laser Wakefield Acceleration Experiments** PAUL CUMMINGS, ALEC THOMAS, University of Michigan, Center for Ultrafast Optical Sciences — A promising application of laser-wakefield acceleration (LWFA) technology is as a tunable source of x-ray and gamma radiation via synchrotron radiation. Such a source could serve as a valuable tool for detecting hidden nuclear material, radiation-based cancer therapy, and microscopic imaging of advanced materials. Consequently, the generation of synchrotron radiation in LWFA experiments is investigated computationally using the particle-in-cell simulation code OSIRIS 2.0. A novel computational algorithm for explicitly simulating synchrotron radiation, involving the generation of particle-like "macrophotons," is derived. A skeleton particle tracking code is developed to validate this model, and the results of this validation are presented and discussed. Results from simulations of Thomson scattering using this code are presented and discussed. Potential applications for integrating this algorithm into OSIRIS 2.0 are presented and discussed. Specifically, the utilization of this algorithm, in conjunction with earlier work implementing the explicit simulation of optical aberrations, to study the experimentally-observed relationship between the comatic aberration and the synchrotron spectrum critical frequency, is discussed.

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