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A Computational Investigation of 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 have many potential applications, including microscale imaging of advanced composite 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 model for explicitly simulating synchrotron radiation, involving the generation of particle-like "macrophotons," is derived. Results from the validation of this model, using a simple particle-tracking code "FXW," are discussed. Results from the integration of this model into OSIRIS 2.0 are presented and discussed. Preliminary results from simulations of recent LWFA experiments, which investigated the generation of synchrotron-like radiation, are presented and discussed. Finally, results from computational parameter sweeps over both the coma severity and electron plasma density, investigating the impact of these parameters on the production of synchrotron-like radiation in a LWFA experiment, are presented and discussed.

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