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Enhancement of synchrotron photon emission in a strongly nonuniform magnetic field[1] FELIX MACKENROTH, Max Planck Institute, ZHENG GONG, UT Austin, ALEXEY AREFIEV, UCSD — It has been previously shown that efficient multi-MeV photon emission can be achieved by accelerating an electron beam in a laser-generated magnetic field [PRL116, 185003]. However, it is not feasible to simulate the emission process using a conventional field solver of a particle-in-cell code because of the extremely short wavelength of the electromagnetic radiation representing multi-MeV photons. A Monte-Carlo algorithm [PPCF 53(2011)015009] has been developed to address this problem, where photons are emitted as individual particles based on a synchrotron spectrum for a uniform magnetic field. We found that this approach is not adequate for the entire photon spectrum, with the lower frequency part of the spectrum being significantly enhanced in the presence of a strong magnetic field gradient that is characteristic of laser-driven magnetic fields. We have derived the corresponding frequency and the enhancement factor.

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