Ultrabright synchrotron radiation generated during the propagation of multipetawatt laser pulse in the self-trapping regime

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Laser-plasma electron accelerators based on the mechanisms of laser wake field acceleration or direct laser acceleration are promising sources of ultrashort synchrotron radiation with low divergence and small size. Here we consider the generation of synchrotron radiation during the laser pulse propagation through a plasma target in the regime of relativistic self-trapping. This mode provides a huge charge (up to tens of nanocoulombs) of high-energy electrons that leads to a high brightness of the emitted radiation. Based on the Lienard-Wiechert potentials applied to the electron trajectories from the 3D PIC simulation, we investigated the spatiotemporal and angular-spectral characteristics of the secondary radiation for a 15 PW laser pulse. It has been shown that the brightness of this radiation source exceeds 10^{23} ph./c/mm^2/mrad^2/0.1%b.w.
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