

P1.2018 High-order harmonic generation from the relativistic plasma resonance in an inhomogeneous plasma

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See the full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P1.2018.pdf>

Analytical theory of harmonic generation in an inhomogeneous laser-produced plasma based on the relativistic plasma resonance mechanism [1] is presented. This theory applies renormgroup symmetries method and advances known approaches beyond their applicability conditions. Relativistically strong electric fields and electron velocities in the vicinity of the critical plasma density are found. Nonlinear current, considered as a source of radiation in a vacuum, is calculated. The spectral and angular characteristics of the radiation field, which includes highorder harmonics are revealed. It is shown that relativistic nonlinearity of the plasma wave leads to a phase modulation of the electron oscillations that determines a flattening and modulation of the spectral curve. The applicability condition of our theory is given by the plasma wave breaking condition in the vicinity of the critical plasma, that enables higher laser intensities than all previous theories. A comparison with the perturbation theory [2, 3] is performed. Smooth power-law emission spectra of high-order harmonics is demonstrated.

References

- [1] I.I. Metelskii, V.F. Kovalev, V.Yu. Bychenkov, Plasma Physics Reports 43, (2017)
- [2] N.S. Erochin, S.S. Moiseev, V.V. Mukhin, Nuclear Fusion 14, 3, (1974)
- [3] A.B. Vladimirkii and V.P. Silin, Sov. J. Plasma Phys. 6, (1980)

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