

On radiative damping in plasma-based accelerators

I.Yu. Kostyukov, E.N. Nerush, A.G. Litvak

(Submitted on 11 May 2012)

Radiative damping in plasma-based electron accelerators is analyzed. The electron dynamics under combined influence of the constant accelerating force and the classical radiation reaction force is studied. It is shown that electron acceleration cannot be limited by radiation reaction. If initially the accelerating force was stronger than the radiation reaction force then the electron acceleration is unlimited. Otherwise the electron is decelerated by radiative damping up to a certain instant of time and then accelerated without limits. Regardless of the initial conditions the infinite-time asymptotic behavior of an electron is governed by self-similar solution providing unlimited acceleration. The relative energy spread induced by the radiative damping decreases with time in the infinite-time limit.

Subjects: **Plasma Physics (physics.plasm-ph)**; Accelerator Physics (physics.acc-ph)

Cite as: **arXiv:1205.2436 [physics.plasm-ph]**

(or **arXiv:1205.2436v1 [physics.plasm-ph]** for this version)

Submission history

From: Igor Kostyukov [[view email](#)]

[v1] Fri, 11 May 2012 06:02:37 GMT (140kb)

[Which authors of this paper are endorsers?](#)

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

[physics.plasm-ph](#)

[< prev](#) | [next >](#)

[new](#) | [recent](#) | [1205](#)

Change to browse by:

[physics](#)

[physics.acc-ph](#)

References & Citations:

- [NASA ADS](#)

Bookmark ([what is this?](#))



Science
WISE