

Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Electron-ion collision operator in strong electromagnetic fields

GENNADIY FRAIMAN, ALEXEY BALAKIN, Institute of Applied Physics RAS, Russia — The pair electron-ion collision operator is found for the kinetic equation describing the one-particle drift distribution in strong electromagnetic fields [1]. The pair collisions are studied under the conditions when the oscillation velocity of an electron driven by an external electromagnetic wave is much larger than the electron drift velocity. The operator is presented in the Boltzmann form and describes collisions with both small and large changes of the particle momentum. In contrast with the Landau collision operator, which describes diffusion in the momentum space, the collision operator that we propose describes a new and very important effect, namely, Coulomb attraction of a wave-driven oscillating electron to an ion due to multiple returns of the electron to the same ion. This effect leads to a large increase of the collision cross-section of electron-ion collisions in strong laser fields, to increased efficiency of the Joule heating in plasma, to the generation of fast electrons through $e-i$ collisions, etc.

[1] A. A. Balakin and G. M. Fraiman, Electron-ion collision operator in strong electromagnetic fields, EPL **93**, 35001 (2011).

Nathaniel Fisch
Princeton University

Date submitted: 21 Aug 2012

Electronic form version 1.4