

Abstract Submitted  
for the DPP08 Meeting of  
The American Physical Society

**Interplay of electrostatic and electromagnetic instabilities for relativistic electron beams in a plasma** D.D. RYUTOV, Lawrence Livermore National Laboratory, Livermore, CA 94551 — The physics of relativistic electron particle beams propagating through the plasma is of a significant interest for laboratory astrophysics, fast ignition, and Z-pinch research. Most attention has been directed towards the analysis of electromagnetic filamentation instabilities. On the other hand, there exists a broad class of very powerful electrostatic instabilities, e.g., the Buneman instability. The author considers in a unified fashion linear theory for both types of instabilities under conditions where there is no magnetic field in an unperturbed state (i.e., the beam current is fully neutralized by the plasma current). The following factors are taken into account: the beam energy and angular spread; plasma non-uniformity; particle collisions in the background plasma. The areas of the parameter domain where particular instability is prevalent are identified; the results are presented in the form of several easy-to-use diagrams. Prepared by LLNL under contract DE-AC52-07NA27344.

D. D. Ryutov  
Lawrence Livermore National Laboratory, Livermore, CA 94551

Date submitted: 19 Jul 2008

Electronic form version 1.4