

# SIMULTANEOUS EXCITATION OF THE BUNEMAN AND WEIBEL INSTABILITES IN GRB AFTERGLOWS

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According to the accepted theory of GRB afterglows, the radiation emanates from charged particles moving in strong magnetic fields. Those strong magnetic fields are thought to be generated by the Weibel instability, which occurs after the collision of relativistic jets with the interstellar medium. The instability occurs in two stages: in the first, only the electrons respond to it while the protons are unaffected (owing to their mass), and in the second, the protons respond to it, while the electron instability have already saturated. In our research, we studied the relation between the densities and temperatures of the different species and the initial growth rates of the instabilities. One of the results is that under some circumstances, the growth rates of an electromagnetic Weibel instability and an electrostatic Buneman instability are almost equal, which means that they may develop simultaneously, and interfere with each other. This finding is in contrast to the ubiquitous paradigm that only a single instability develop in every scenario.