Simulations and theory of the interaction of a relativistic electron-positron neutral beam with a plasma

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The interaction of a relativistic electron-positron neutral beam with a background electron-ion plasma is studied numerically and theoretically for conditions that soon will be available at SLAC. This study is centered on the onset of the current filamentation instability (CFI) in its different regimes. Using PIC simulations and a spatio-temporal theory for the beam-plasma instability we explore the transition from a purely transverse mode to the mixed mode, as a function of the beam/plasma parameters. The simulations also allow us to explore relevant experimental conditions and possible signatures for the different regimes demonstrating the possibility to study the CFI with multi-GeV e- e+ neutral beams.

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