

Experimental Observation of a Current-Driven Instability in a Neutral Electron-Positron Beam

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The first experimental observation of a current-driven instability developing within a quasi-neutral matter-antimatter beam is reported herein. Using the proton radiography technique, strong remnant magnetic fields (≥ 1 T) are measured after the propagation of a quasi-neutral electron-positron beam through a background electron-ion plasma [1, 2]. The data, along with supporting particle-in-cell simulations and analytical estimations, implies that the generated magnetic fields persist for thousands of inverse plasma frequencies. The relation of this work with the dynamics of pair-dominated astrophysical jets will be discussed [1, 2].

References

- [1] Warwick, J., et al. "Experimental observation of a current-driven instability in a neutral electron-positron beam." *Physical Review Letters*, 119, 185002 (2017).
- [2] Warwick, J. R., et al. "General features of experiments on the dynamics of laser-driven electron-positron beams." *Nucl. Instrum. Meth. Phys. Res. A*, *in press*, (2018). arXiv:1802.01394v1 [physics.plasm-ph].