

Abstract Submitted
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Instabilities of a relativistic electron beam in the Earth's magnetosphere¹ SIERRA JUBIN, ANDREW POWIS, Princeton University and Princeton Plasma Physics Laboratory, DANIEL BAVER, Rutgers University and Princeton Plasma Physics Laboratory, IGOR KAGANOVICH, Princeton Plasma Physics Laboratory — A relativistic electron beam emitted from an orbiting satellite along the Earth's magnetic field lines may be used for mapping of magnetic field lines [1,2]. Previous work has shown that the impact location of such a beam will shift hundreds of kilometers during different phases of a magnetospheric storm, and this impact will be detectable by ground stations provided that instabilities do not cause the beam to spread [2]. In this work we investigate the interaction of a relativistic electron beam pulse with the magnetospheric and ionospheric background plasma through which it propagates using particle-in-cell simulations. We analyze the influence of a variety of instabilities on beam scattering in the background plasma, examining whether or not the instabilities will have deleterious effects on the proposed scheme of magnetic field mapping.

1.Ennio R. Sanchez *et al.* 2019, Particle beams as a resource to solve outstanding problems in space physics, submitted for publication in *Frontiers in Astronomy and Space Sciences*.

2.Andrew T. Powis *et al.* 2019, Evolution of a relativistic electron beam for tracing magnetospheric field lines, submitted for publication in *Frontiers in Astronomy and Space Sciences*.

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