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How to emit a high-power electron beam from a magnetospheric spacecraft? FEDERICO LUCCO CASTELLO, GIAN LUCA DELZANNO, Los Alamos National Laboratory, JOSEPH BOROVSKY, Space Science Institute, GRANT MIARS, OMAR LEON, BRIAN GILCHRIST, University of Michigan — The idea of using high-power electron beams to actively probe magnetic-field-line connectivity in space has been discussed since the 1970s. It could solve longstanding questions in magnetospheric/ionospheric physics by establishing connectivity and causality between phenomena occurring in the magnetosphere and their image in the ionosphere [1]. However, this idea has never been realized onboard a magnetospheric spacecraft because the tenuous magnetospheric plasma cannot provide the return current necessary to keep the spacecraft charging under control. Recently, we have used Particle-In-Cell simulations to propose a spacecraft-charging mitigation scheme that would enable the emission of a high-power electron beam from a magnetospheric spacecraft [2]. In this work, we will present an overview of the concept and of our theoretical, computational and experimental effort to establish this idea conclusively. [1] G.L. Delzanno, J.E. Borovsky, M.F. Thomsen, B.E. Gilchrist, and E. Sanchez, J. Geophys. Res. Space Physics 121, 6769, 2016. [2] G.L. Delzanno, J.E. Borovsky, M.F. Thomsen, J.D. Moulton, and E.A. MacDonald, J. Geophys. Res. Space Physics 120, 3647, 2015.

Gian Luca Delzanno
Los Alamos National Laboratory

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