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Kinetic Simulation of Hight Intensity Vacuum Beam Propagation[1] BRANDON MEDINA, CHRIS MOORE, MATTHEW BETTENCOURT, KEITH CARTWRIGHT, TIMOTHY POINTON, EDWARD PHILLIPS, KATE BELL, Sandia Natl Labs, JACQUES GARDELLE, DAVID HEBERT, CEA/CESTA — As part of the validation effort for Sandia's new EM PIC-DSMC plasma code EMPIRE [1], we have begun to simulate high intensity vacuum beam propagation. Specifically, we are modeling the CESAR and RKA beam experiments [2], starting with vacuum propagation and proceeding to beam propagation through a low-pressure Ar background gas. EMPIRE models both charged particles and neutrals as computational particles that can move and collide with one another allowing for self-consistent evolution of the neutral gas as the e- beam propagates and interacts with the background gas. In the current work we will show comparisons for the current and beam radius to the CESEAR beam experiments. In addition, we will investigate EMPIRE's performance/scaling on multiple architectures (CPU's, MIC's, and GPU's) for the simulations. 1. Markosyan, A. et al, "Method of manufactured solutions for verification of particle-in-cell simulations", 45th ICOPS, June 24-28 2018. 2. Gardelle, J. et al., "Revisiting the propagation and focusing of a high intensity electron beam in a low-pressure gas cell", 44th ICOPS, May 21-25, 2017.

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