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Hybrid simulation of high intensity electron beam propagation through a low pressure gas cell[1] CHRISTOPHER MOORE, BRANDON MEDINA, SIDNEY SHIELDS, WILLIAM MCDONIEL, TROY POWELL, DANIEL JENSEN, MATTHEW BETTENCOURT, KEITH CARTWRIGHT, KATE BELL, Sandia National Laboratories , JACQUES GARDELLE, DAVID HEBERT, CEA/CESTA — As part of the validation effort for Sandia's new EM PIC-DSMC plasma code EMPIRE, we simulate high intensity electron beam propagation through low pressure gas cells. Specifically, we model the CESAR and RKA beam experiments [1]. We compare the accuracy and performance of a fully kinetic PIC-DSMC scheme [2] and a hybrid fluid-kinetic scheme for modeling the electron transport through the Ar background gas. The kinetic PIC-DSMC model represents charged and neutral species as computational particles allowing for self-consistent evolution of the neutrals as the beam interacts with the Ar gas. In the hybrid scheme PIC-MCC collisions generate mass, momentum, and energy source terms for the evolution of the neutral fluid. 1. 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. 2. Medina, B. et. al., "EMPIRE simulation of the RKA diode into the gas cell", PPPS 2019, June 23-28, 2019.

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