

Simulation of the electron cloud in the Fermilab Main Injector using VORPAL

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We present results from a precision simulation of the electron cloud (EC) problem in the Fermilab Main Injector using the code VORPAL. Fully3d and self consistent that include both distributions of electrons in 6D phase-space and E.M. field maps. Various configurations of the magnetic fields found around the machine have been studied. Plasma waves associated to the fluctuation density of the cloud have been analyzed. Our results are compared with those obtained with the POSINST code. It is shown that the 3D effects are important. The response of a Retarding Field Analyzer (RFA) to the EC has been simulated, as well as the more challenging microwave absorption experiment. Definite predictions of their exact response are difficult to compute, mostly because of the uncertainties in the secondary emission yield and, in the case of the RFA, because of the sensitivity of the electron collection efficiency to unknown stray magnetic fields. Nonetheless, our simulations do ! provide guidance to the experimental program.

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