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Runaway Electron Suppression via Material Injection[1] CHRISTOPHER MCDEVITT, University of Florida, XIANZHU TANG, Los Alamos National Laboratory — The generation and evolution of relativistic electrons in tokamak plasmas has been the subject of extensive research due to their intrinsic interest as well as the threat they pose to reactor-scale tokamak devices. In this work we explore the efficiency through which a beam of runaway electrons can be suppressed via the injection of plasma impurities. It is found that the injection of a large quantity of impurities drastically modifies the underlying runaway electron phase space distribution. This modification is due in part to the strength of the knock-on collision term being drastically enhanced due to the increase in the number of target electrons, as well as the response of the inductive electric field to the sudden increase in runaway dissipation. The increase in the rate of secondary generation leads to an increase in the total number of runaway electrons, but with a substantially modified average energy and pitch. The final runaway distribution is ultimately determined by the interplay between enhanced dissipation/scattering of primary electrons, enhanced secondary generation, and the self-consistently evolving inductive electric field. Ongoing work is focused on evaluating the efficiency of a range of runaway termination schemes.

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