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The effect of space-charge neutralization on charge breeding performance

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The recently introduced non-adiabatic electron gun at the REXEBIS has shown excellent charge breeding results for a very low number of injected stable and radioactive ions. When increasing the number of ions, the effective electron current density is immediately affected. We have studied these effects and tried to mitigate the performance loss by the use of ion-ion cooling evaporation, although with limited success. The measurements from this semi-immersed electron gun have been correlated with similar tests performed with a Brillouin gun at the TwinEBIS setup. In this paper, both experimental results and simulations will be presented, with a discussion about the observed discrepancies and possible reasons.

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