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Self-Consistent Monte Carlo Model for ECRIS Plasma Simulation

A self-consistent Monte Carlo model to simulate electron cyclotron resonance ion source (ECRIS) plasma is presented. It computes the species' spatial and energy distribution in the whole chamber in a three-dimensional mesh. A number of electrons and ions are propagated independently considering the static magnetic field and injected microwave field. The species trajectories populate the mesh allowing to compute their local density and velocity. Each species is pushed until it undergoes a destructive collision or after a fixed time limit. After each propagation phase, the local plasma potential and the heating electromagnetic microwave field are updated. This process is then iterated until convergence of species distributions and fields is reached. This method is intended to be a faster alternative to other methods to characterize the species distributions in the plasma for a specified ECRIS design and aid with their conception. The model and software development status are presented.

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