

PIC Modeling of Penning Trap

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The Penning Ion Gauge or the Penning Trap that uses a combination of electric and magnetic fields to trap ions has applications in accelerator physics. Such Ion Sources are used to inject ions into accelerators which are extracted after acceleration for various purposes. The Particle in Cell Algorithm has been a popular tool for plasma simulations for the past few decades and has been gaining popularity as computational abilities of today's machines increase. An attempt was made to simulate a simplified 1 dimensional voltage mirror of a penning trap by ignoring the magnetic field using the 1-D Electrostatic Particle in Cell Algorithm and include certain boundary conditions which can be later improved upon to model behavior like sputtering and ionization events. Simulation results in phase space indicate the oscillation of ions around an equilibrium saddle point. This paper discusses further attempts at modeling the Penning Ion Gauge behavior.

References

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