Progress Report

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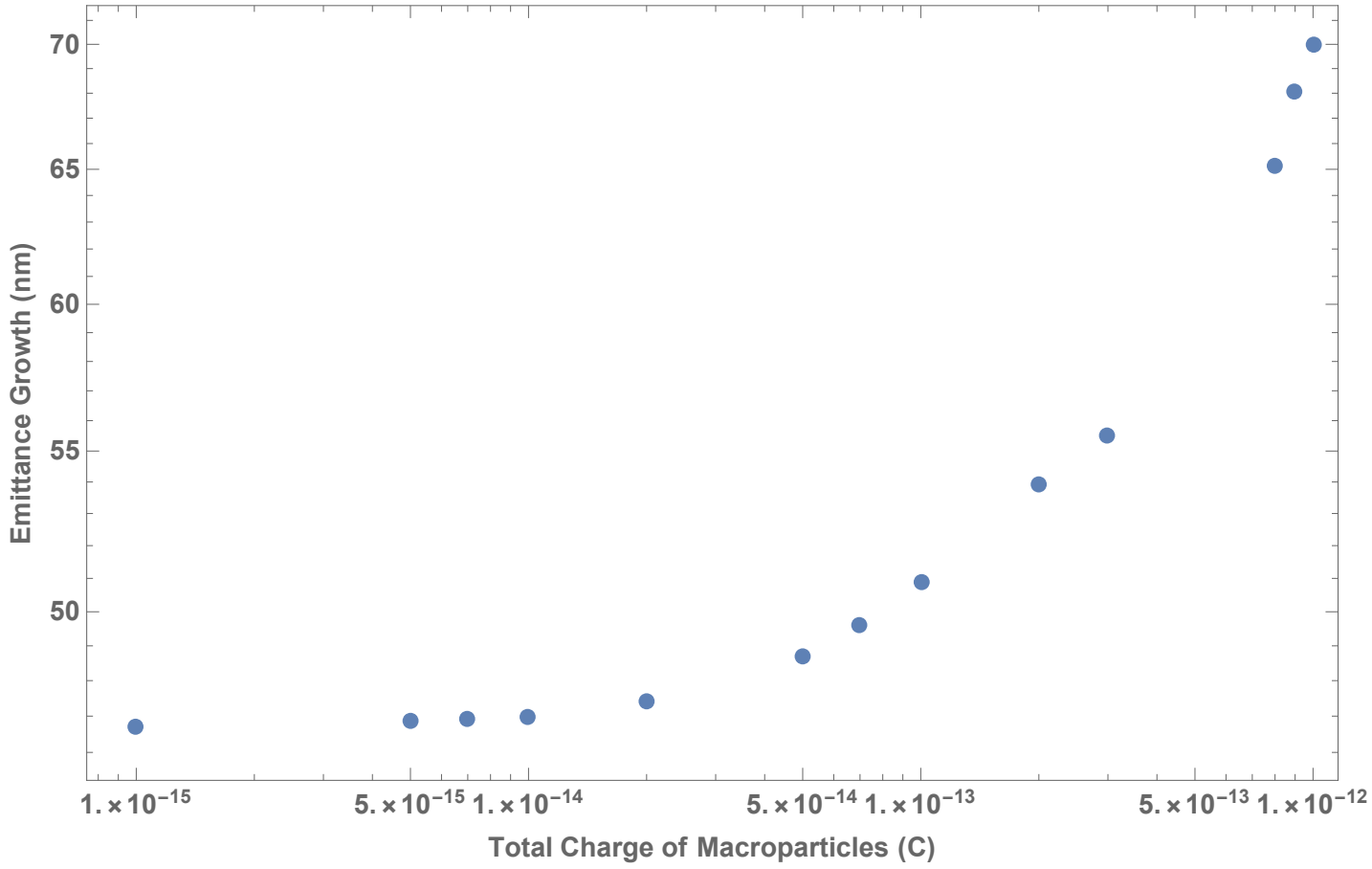
September 21, 2018

Geometric Aberration + Spacecharge Study

- Simple Test Case: Use emittance component tool to identify geometric aberration emittance growth from a current loop in simulation
- Emittance growth due to spherical aberration agrees within 1%
- Saw when space charge was added, geometric emittance changed
- Try to understand where this comes from

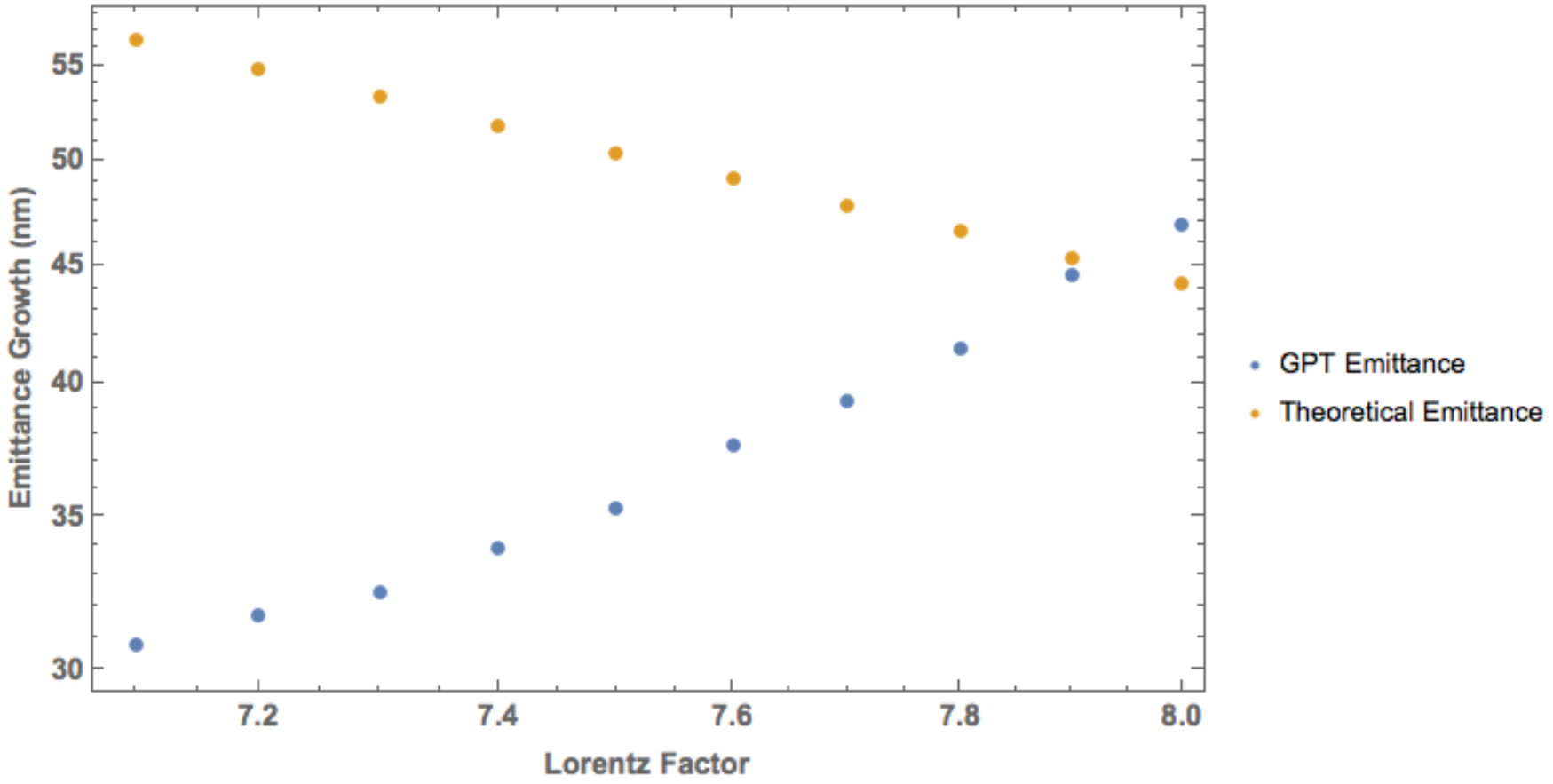
Varying Spacecharge

- GPT converged emittance growth (46.7 nm)
- Theoretical growth (44.2 nm)
- Algorithm converges to correct value within time step error (~5%)



Varying Gamma

- Emittance trend from simulation opposite that of theory
- This was seen before when the beam was over compressed at focus
- Printing RMS Size at focus is difficult, need another metric



Energy Conservation

- To separate issues of emittance component algorithm from issues in GPT, I need a metric to check on GPT
- GPT not a symplectic integrator, so lack of energy conservation may be a a metric that can explain the incorrect emittance while not needing to know the details at the focus
- Made a program to calculate kinetic and potential energy of beam through simulation and check for conservation