

Simulation Updates

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WP6 Meeting

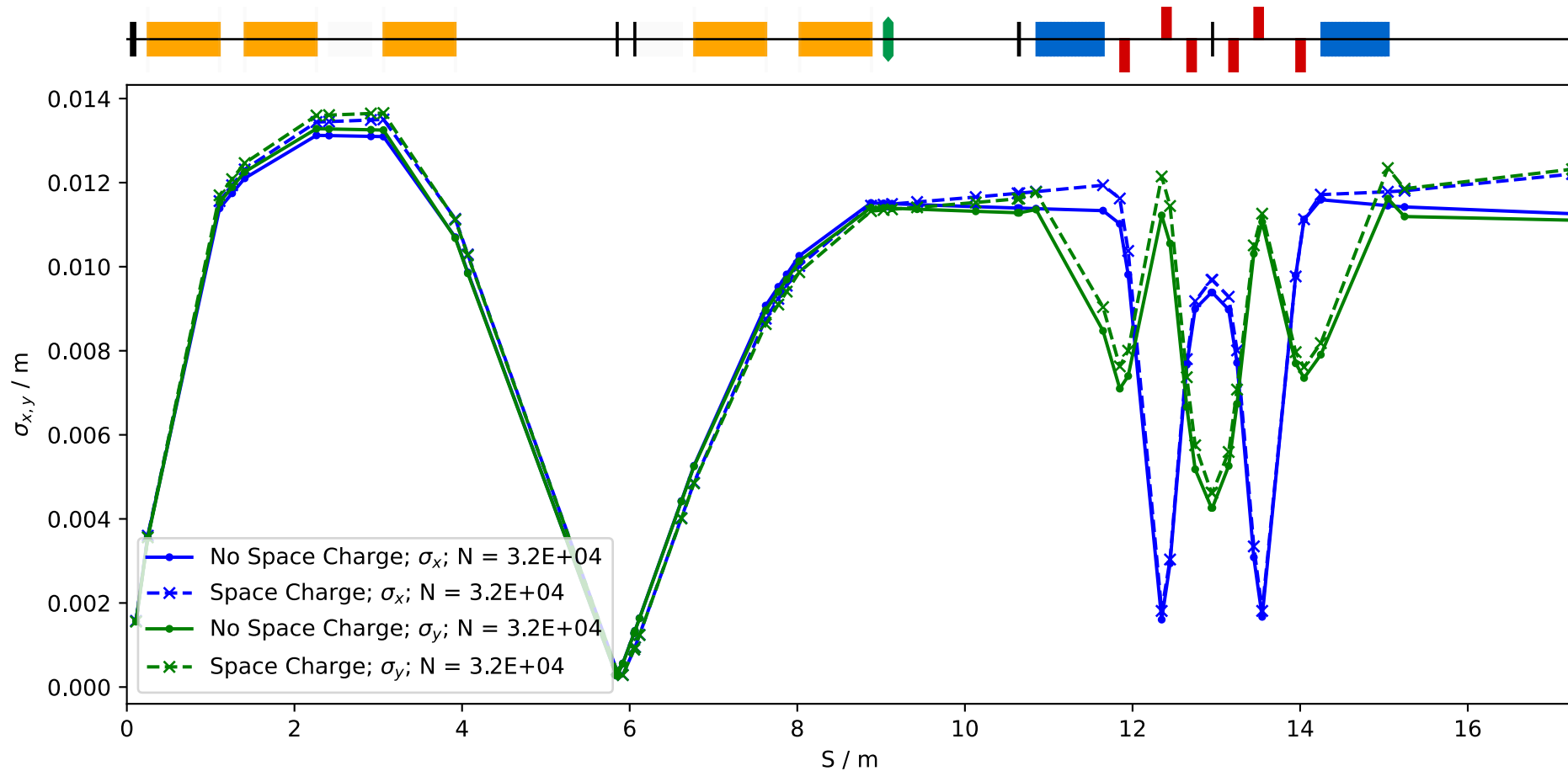
6th December 2022



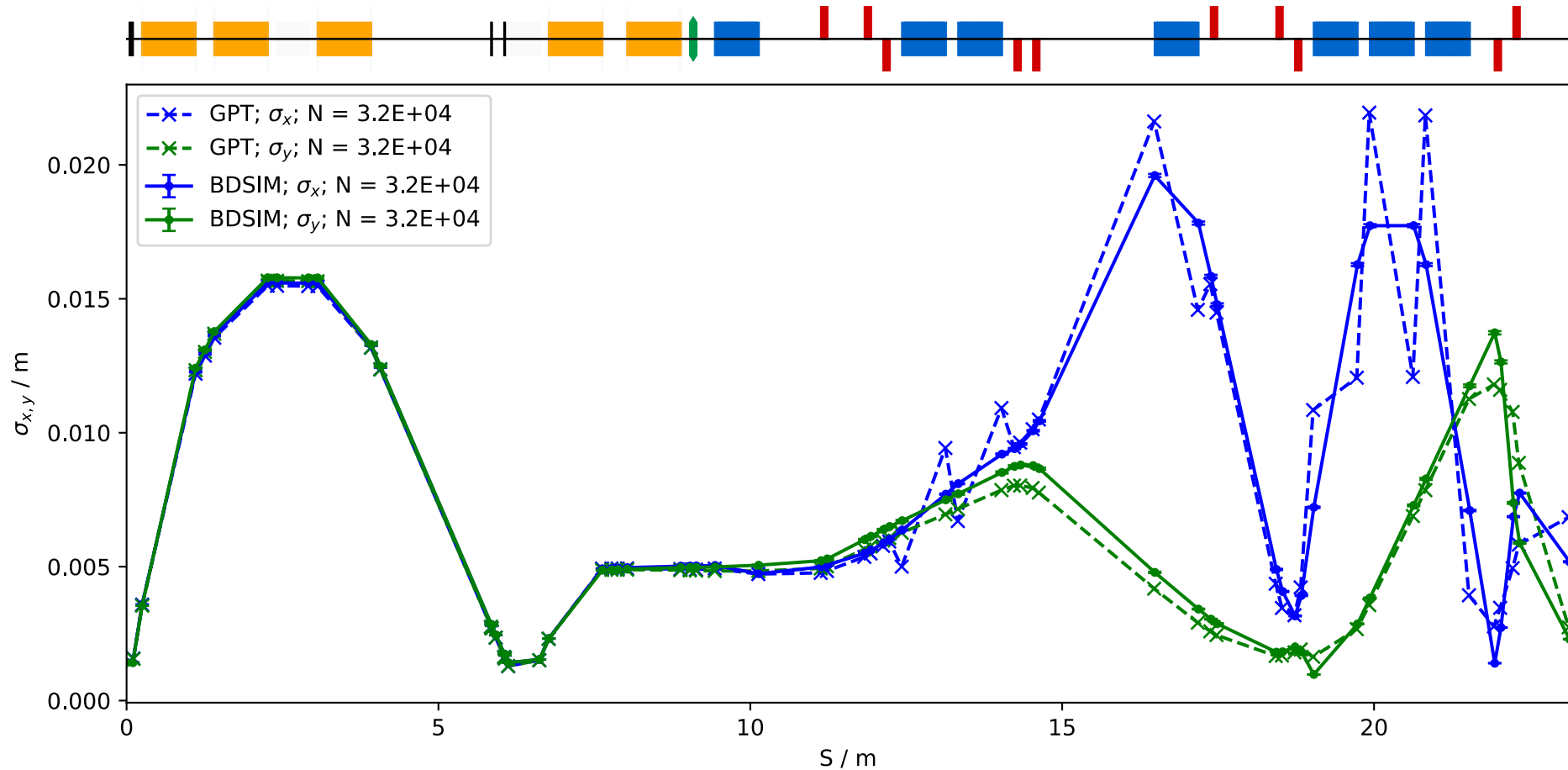
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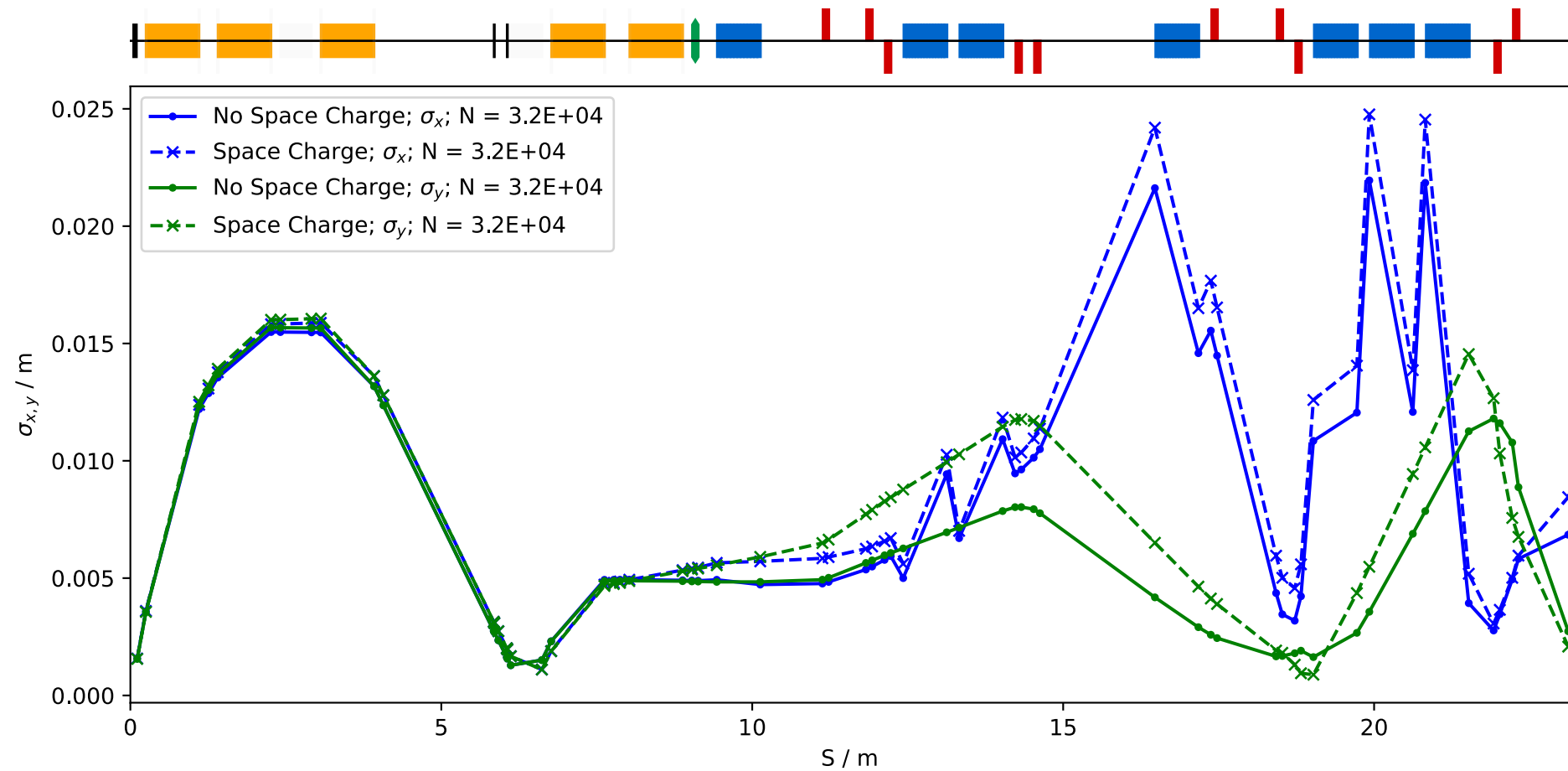
S1 Invitro Line: Re-run



- HT's beam (vacuum collimated)

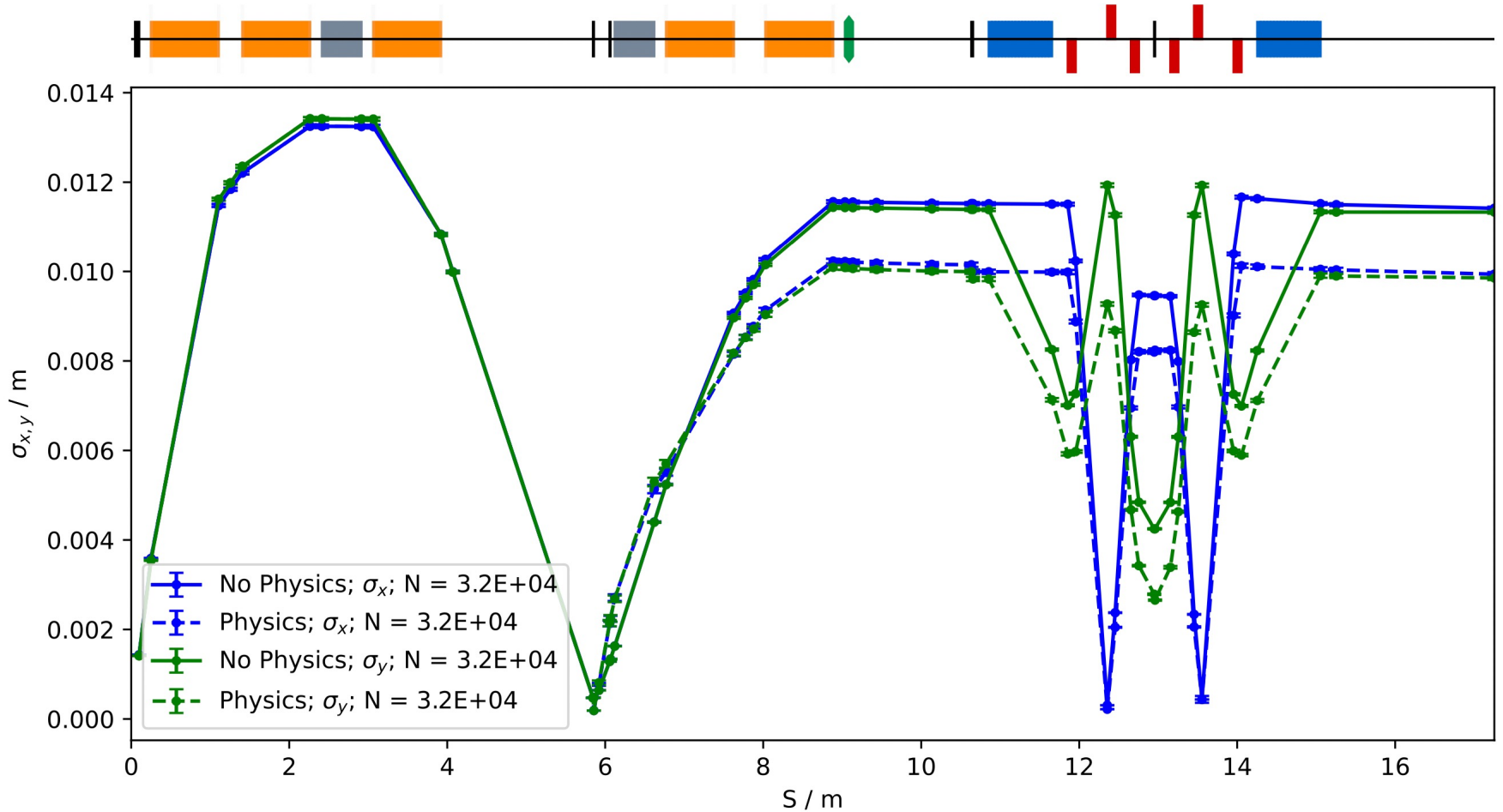


- No space charge
- Beam size jumping due to beam within dipole coordinate systems



- Beam size jumping confirmed as model artefacts

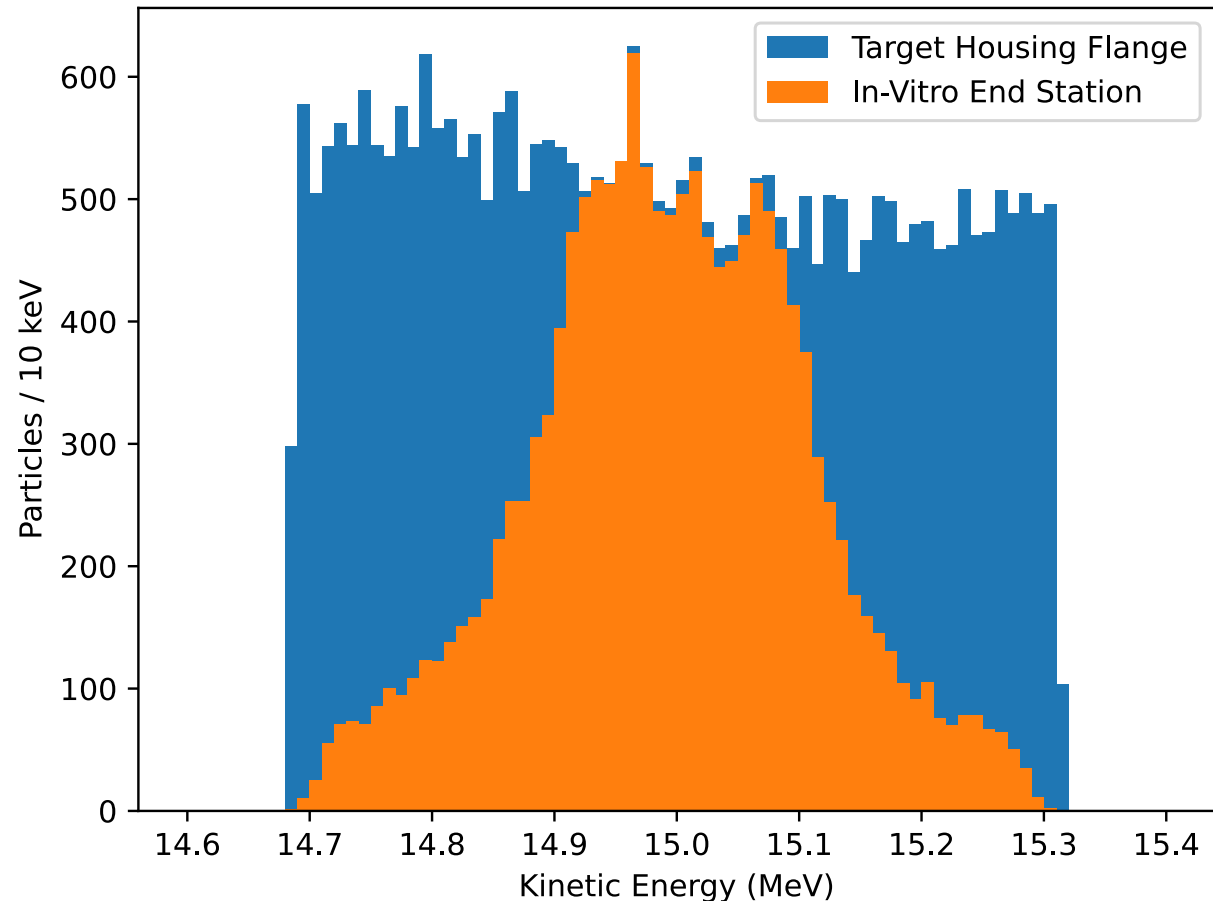
Stage 1 Collimation: Optics



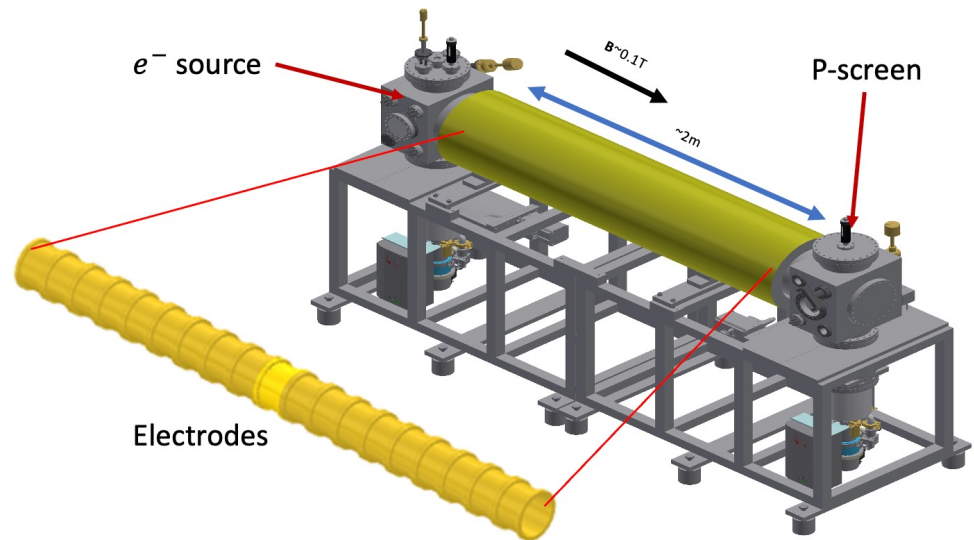
- BDSIM (Geant4) physicsList on/off
- ~ 14 % decrease in beam size

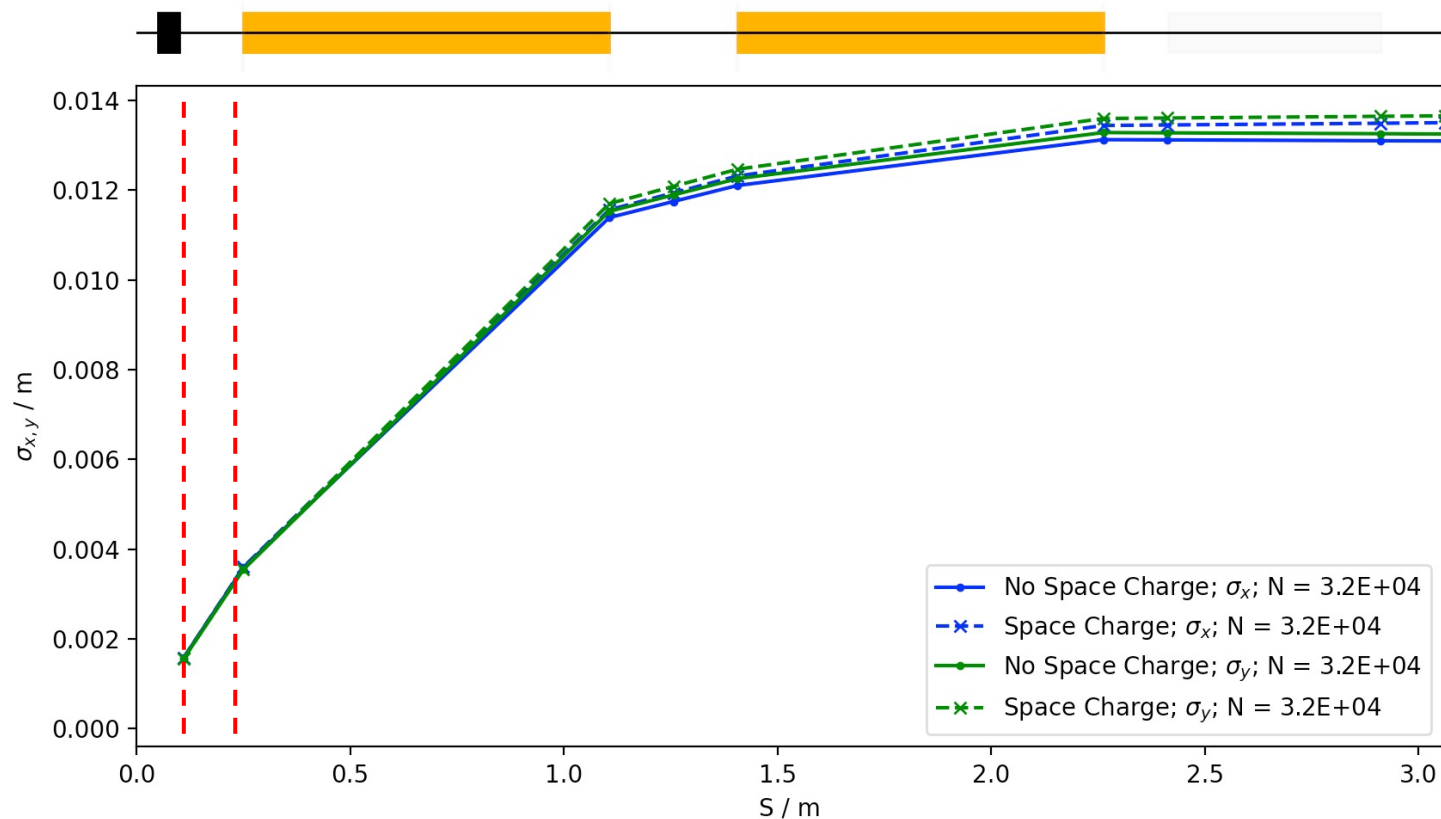
Stage 1 Collimation: Energy Spread

- Beam through vacuum nozzle in target housing already 'collimated'
 - Unsure if collimation or user cuts
- +/- 2% at target housing exit.
- HT collimator settings reducing energy spread further
 - ~ Factor 2 drop in transmission
 - Tails remain
- Collimator optimisation difficult without broader beam.



- Time step issue caused by specified t_{\max}
 - Removed – issue resolved
- Unable to find solution with 1.44 T solenoid limit that mitigates emittance growth.
 - 1.3cm wide parallel beam
- Uncertainty over optimisation algorithm.
- Routes of investigation:
 - Manually scan – constant GL1 strength, vary GL2.
 - Larger beam size after capture section?
 - Investigate single long Gabor Lens solution?
 - C. Baker slides, LhARA collab meeting (10/22)
 - Parameters & limits?





- 15cm of GL physical length (not field length)
- Potentially:
 - GPT for short distance until SC forces minimal
 - Parameterise beam – MADX optimisation

- Question: is 15cm needed between the target housing & the field edge of the first solenoid?

- Done:
 - Revisit models with HT's beam
- Ongoing:
 - **AP:** GPT optimisation of capture section – gdfsolve.
- Todo:
 - Follow up on Gabor Lens optimisation solutions
 - Identify locations for non-beam transport systems + add to model
 - Develop OPAL model of FFA – need JP input.