

Thesis Status

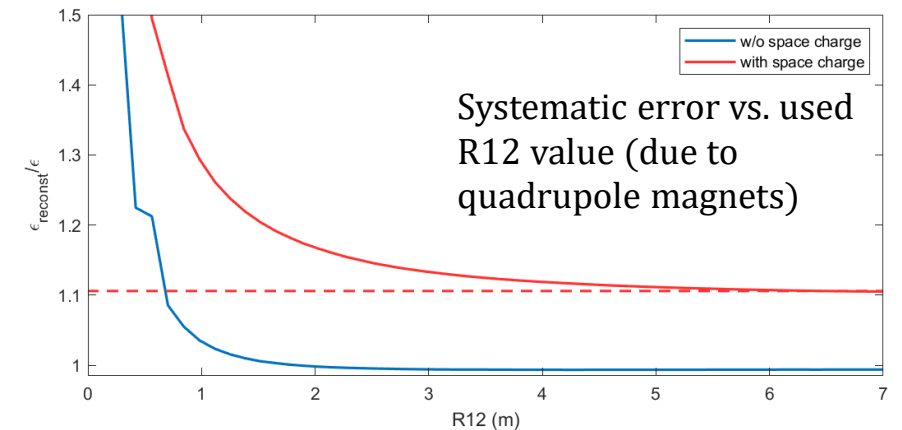
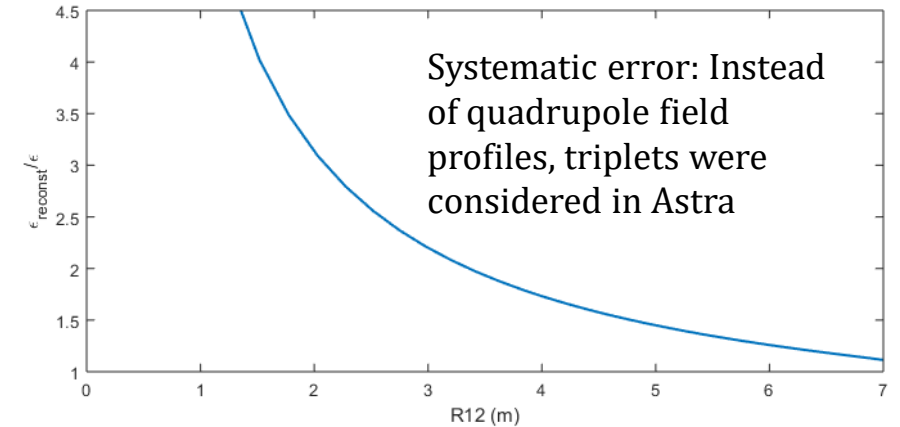
Progress in the last month

- > Raffael Niemczyk, Zeuthen, July 16th 2020

Simulation of Slit Scan Experiment

Estimation of Systematic Error from Slit Scan Measurement with Quadrupole Magnets

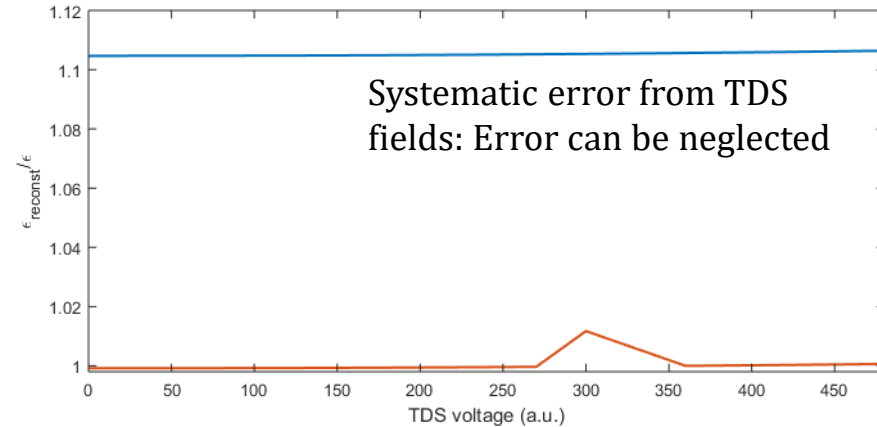
- > Tracking (Astra) until before slit mask
 - > Collimator in Astra emulates slit mask
 - > Further tracking to 12.28m (PST.Scr1)
 - > Scan strength of High1.Q09/Q10
- > Bug in Astra yielded wrong quadrupole profiles
 - > Error well above 100%
 - > Simulations redone with correct quadrupole strength
 - > Besides kink, result looks good
 - > Curve to be re-simulated around kink



Simulation of Slit Scan Experiment

Systematic Error from TDS shearing

- > Tracking (Astra) until before slit mask
 - > Collimator in Astra emulates slit mask
 - > Further tracking to 12.28m (PST.Scr1)
 - > Scan TDS deflection strength
- > Very small, rather quadratic dependence seen
 - > Simulations worked out relatively quickly (2 weeks total)
 - > ~~Again: Kink in one of the curves seen~~ **Solved**
 - > Net deflection observed: 2.45mm @ 600 TDS voltage



→ Simulated until 600, but resimulation from 450 needed

Intensity and Charge Cuts

PPS, further analysis and discussion with Mikhail

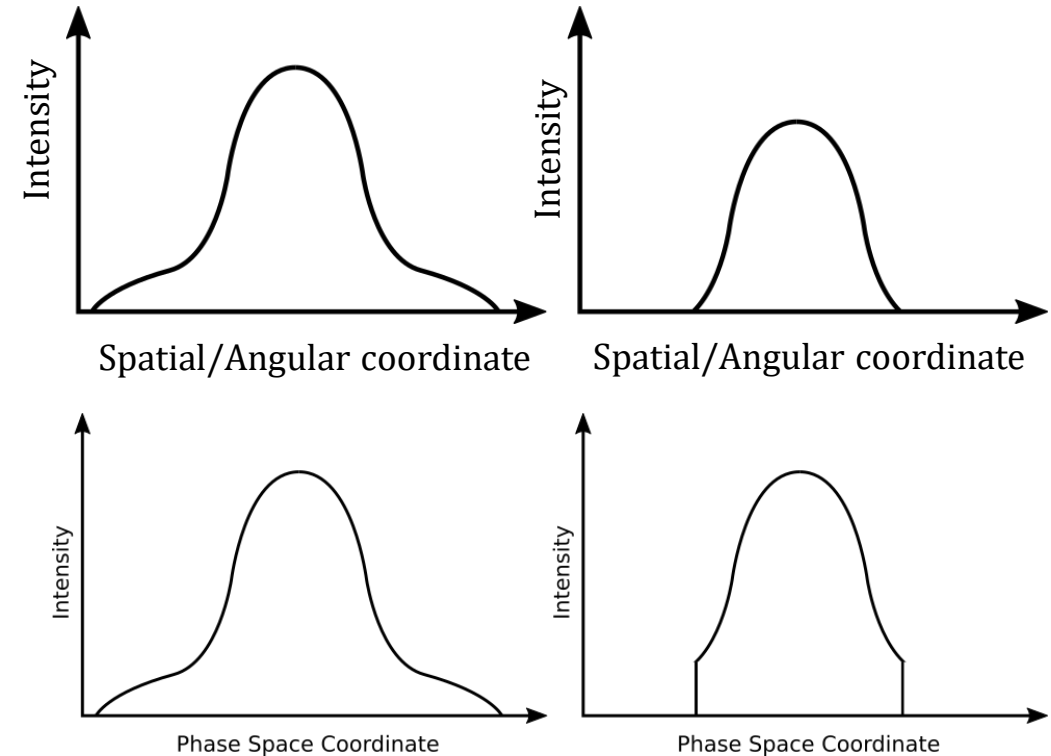
- > Intensity cut estimate measured emittance reduction
 - > Depend on strength of intensity cut (e.g. noise level)
 - > Depend on phase space shape/density
- > But: Different opinions on correct intensity/noise cut

- > Longer discussion resolved issue
 - > Intensity cut estimates emittance reduction due to noise
 - > Charge cut estimates **core slice emittance**

- > Simulation of ellipsoidal beam to EMSY1 for this
 - > Tweaked peak current to match other beams
 - > Emittance optimisation pending

```
11 Q_total = 0.25E0
12 Ref_zpos = 0.0E0
13 Ref_clock = 0.0E0
14 Ref_Ekin = 0.0E0
15 Dist_z = 'ue',
16 sig_clock = 2.65E-3,
17 Dist_pz = 'i',
```

```
! nC
! ellipsoidal
! 2.65ps rms length = ?? ps FWHM
```



Emittance measurements

Slice emittance of a longitudinal flattop profile, slice emittance solenoid scan

- > Slice emittance of long. Flattop laser profile
 - > 250 pC/500 pC with different BSA's were planned
 - > 250 pC slice emittance measured

- > Slice emittance vs. solenoid scan measured