GTS gun study
Shifted vs tilted anode for compensating beam kick

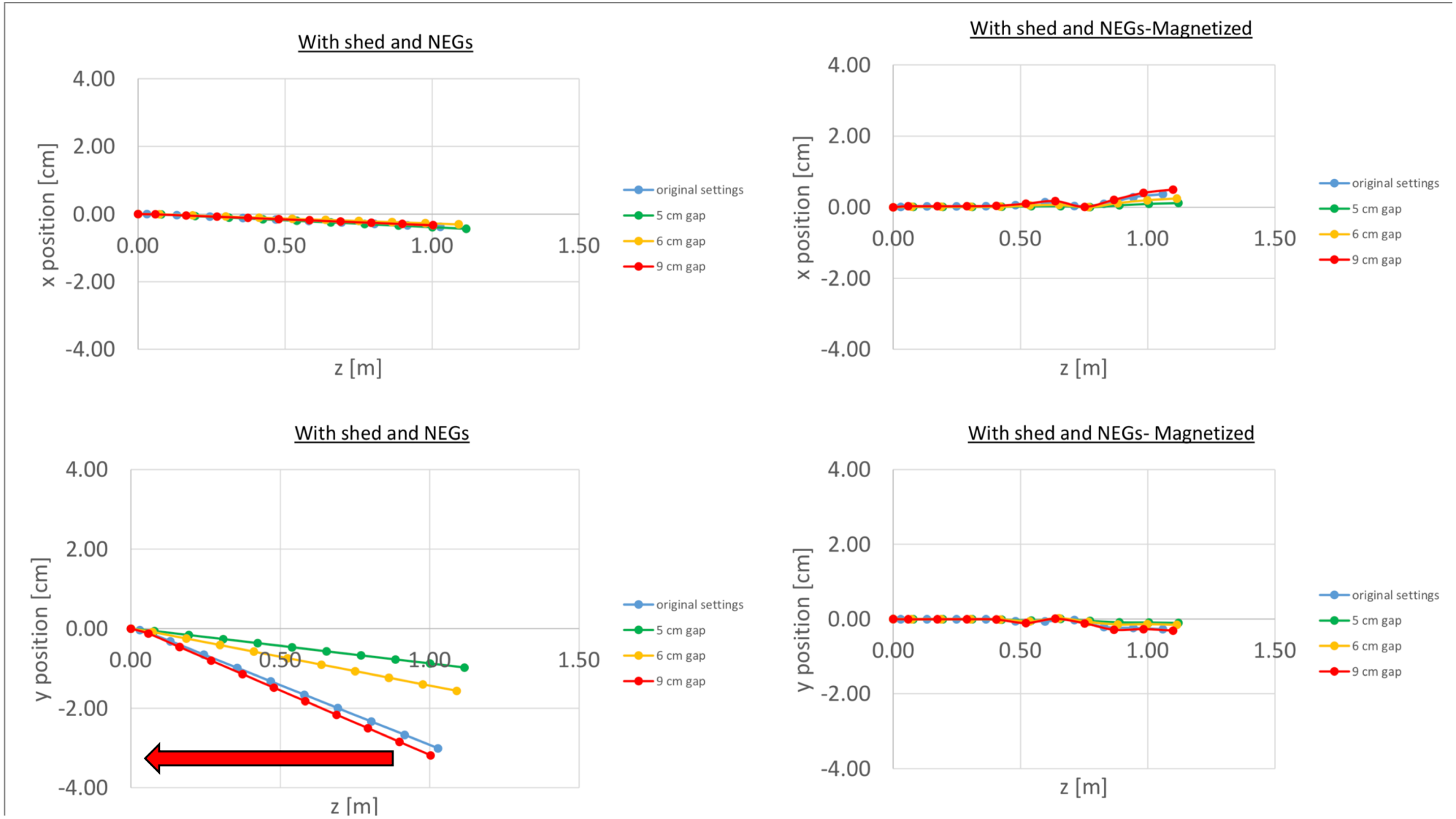
Simulations by: Sajini Wijethunga

6/17/2020

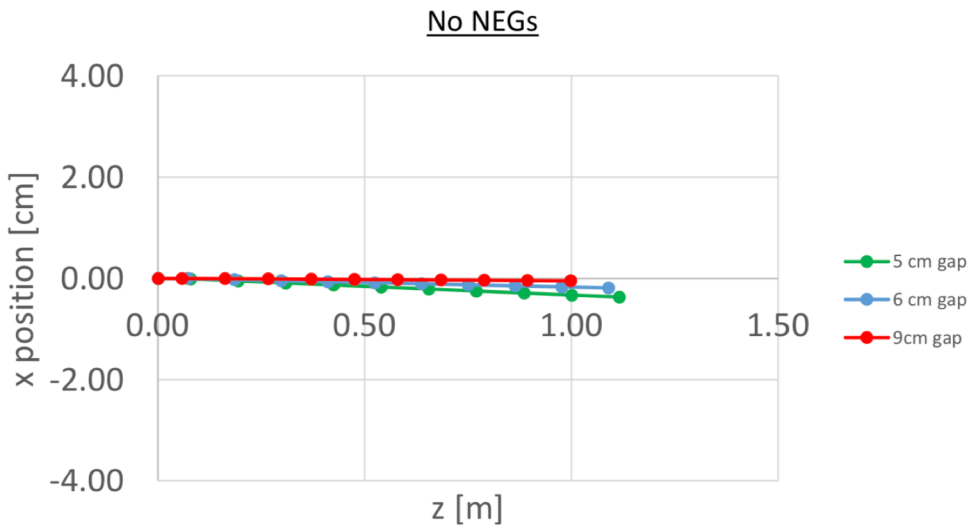
Summary by Carlos Hernandez-Garcia

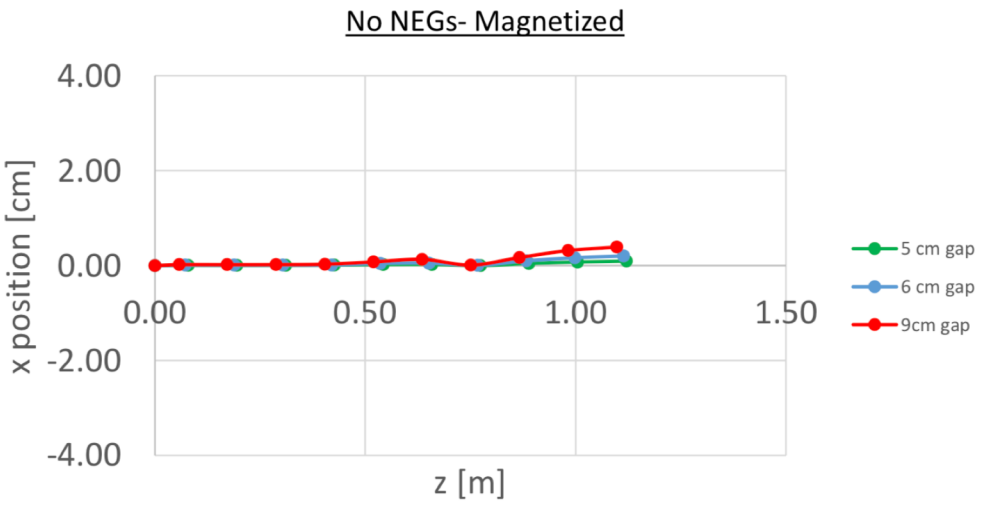
11/16/2021

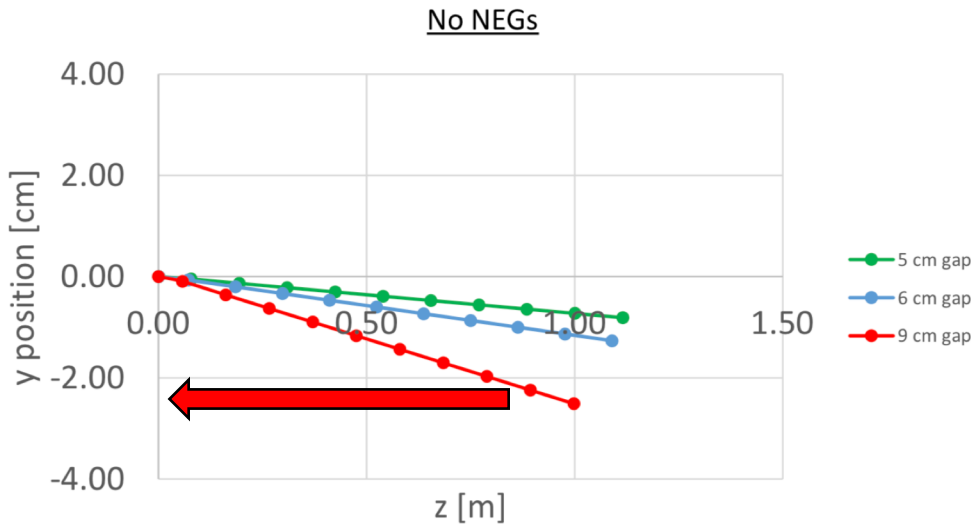
This is the beam kick with original 9 cm anode-cathode gap, including NEGs and shed

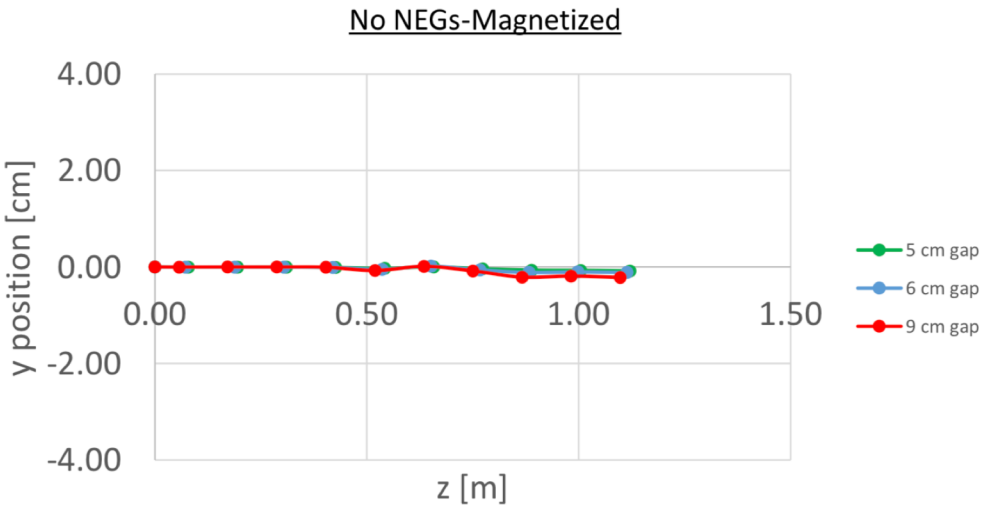


The NEGS contribute to the beam kick

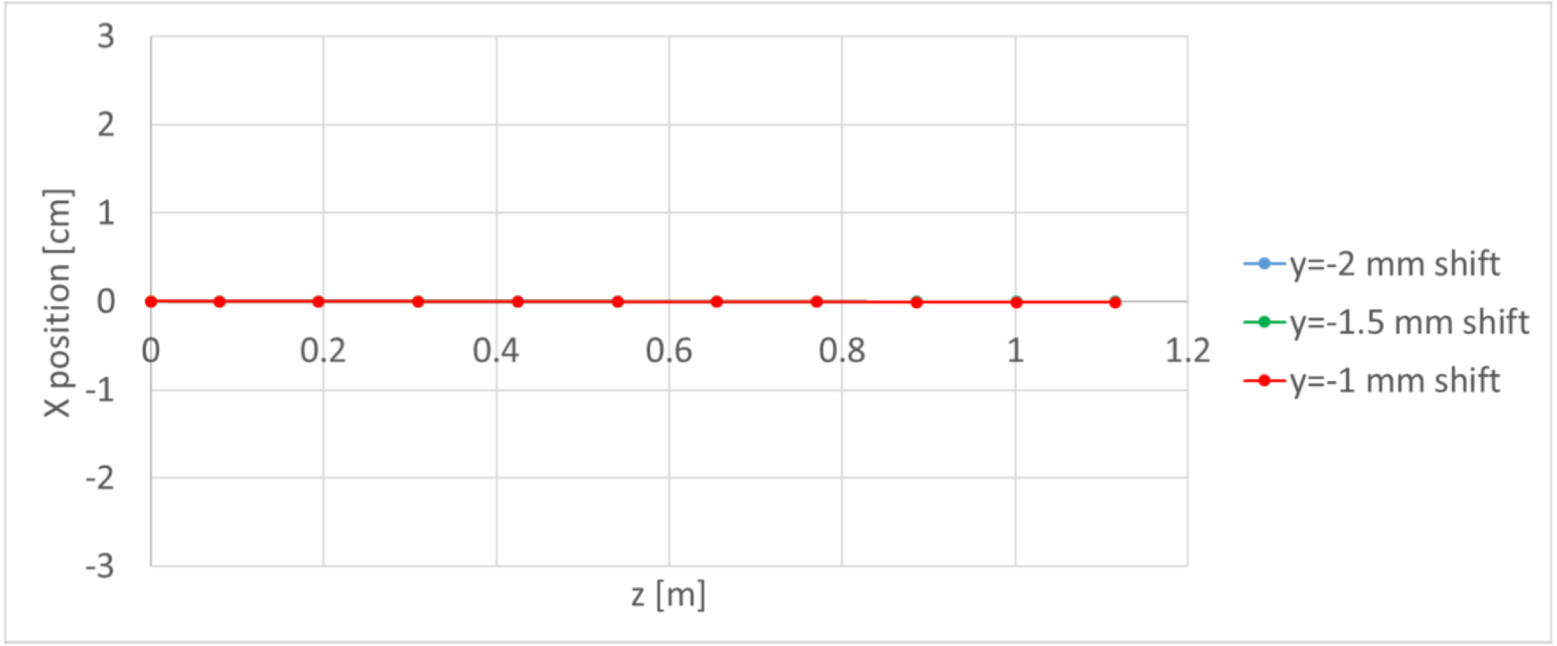


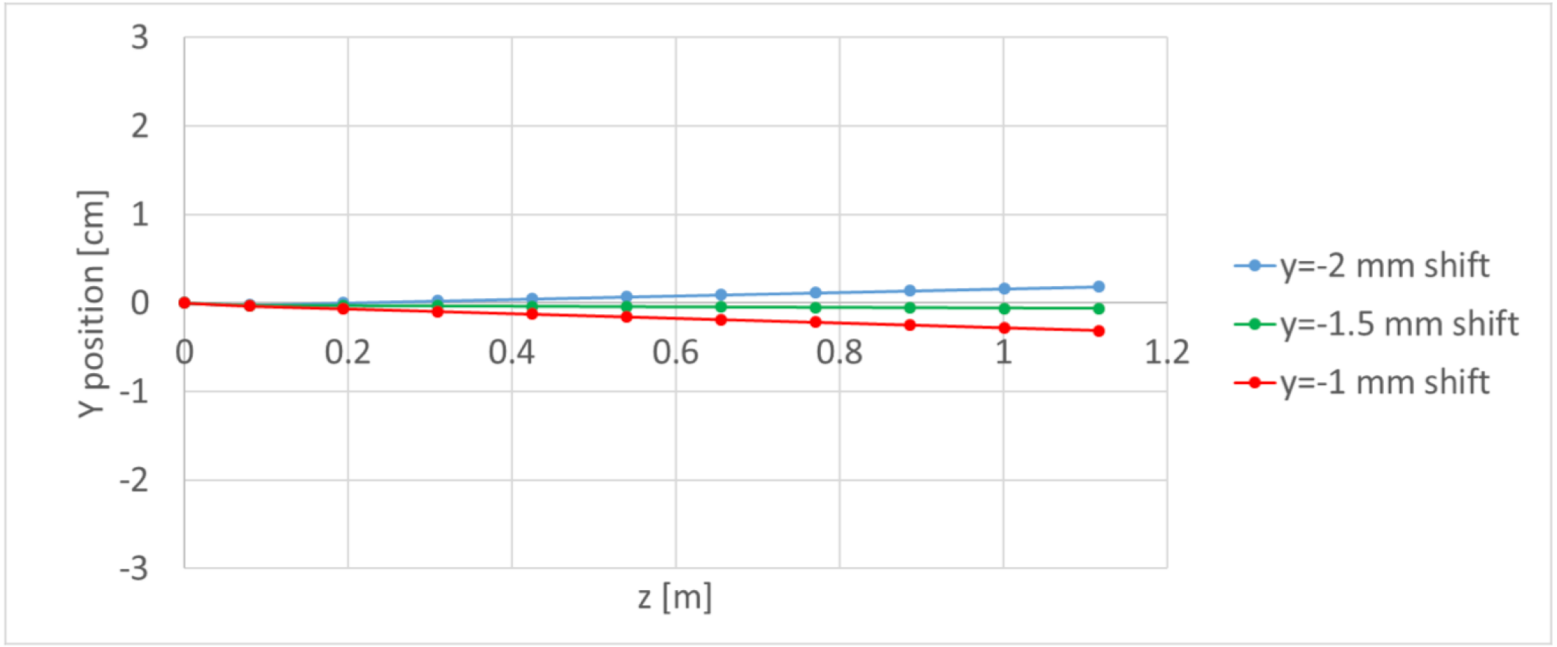






Sajini started by studying anode shift WITH NO NEGs to compensate beam kick

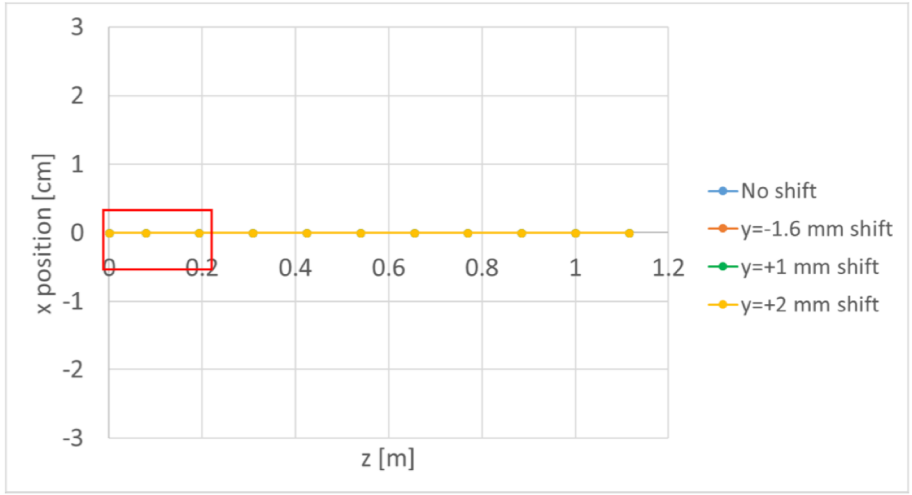


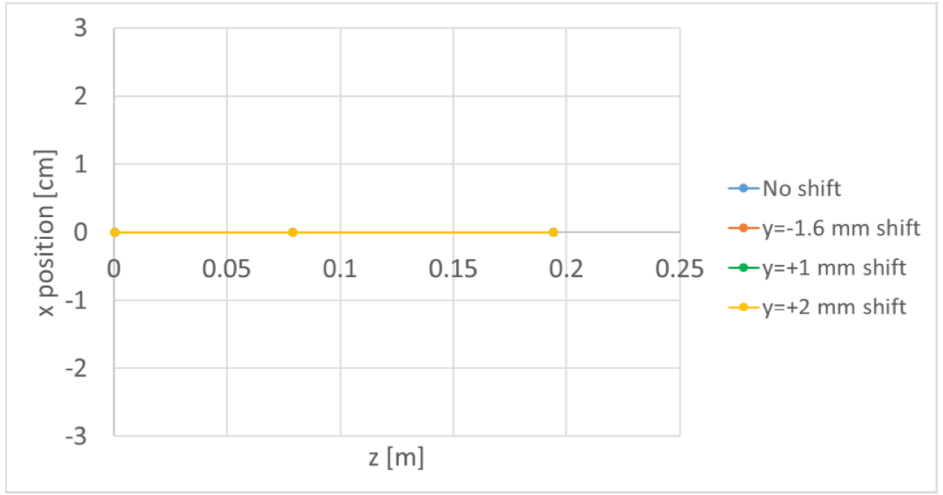


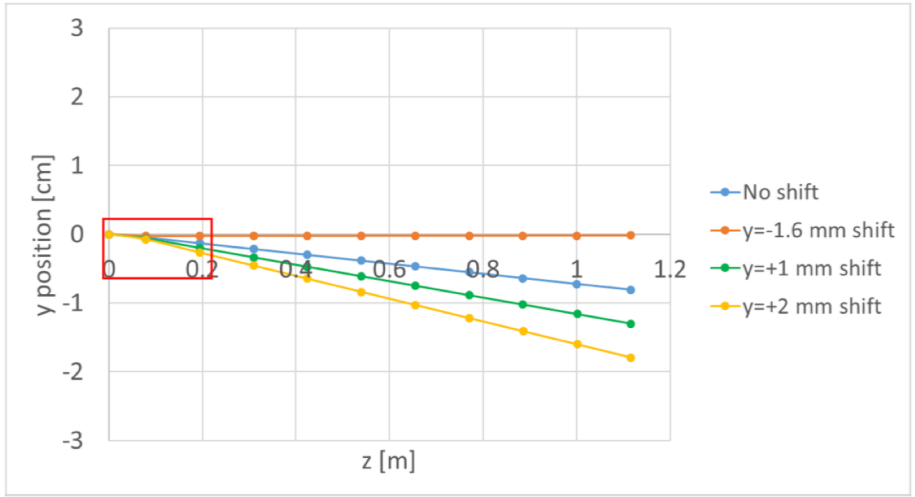
Shifting the anode -1.6 mm compensates the beam kick

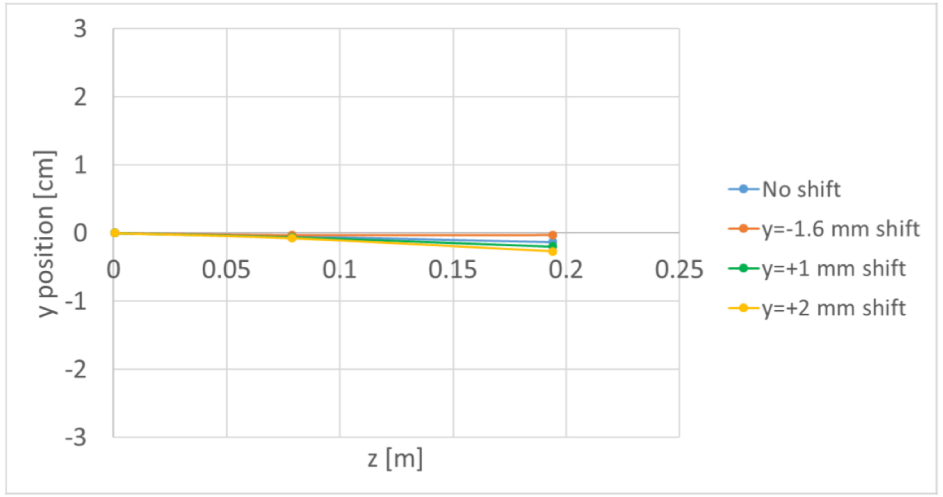
New anode

Beam positions







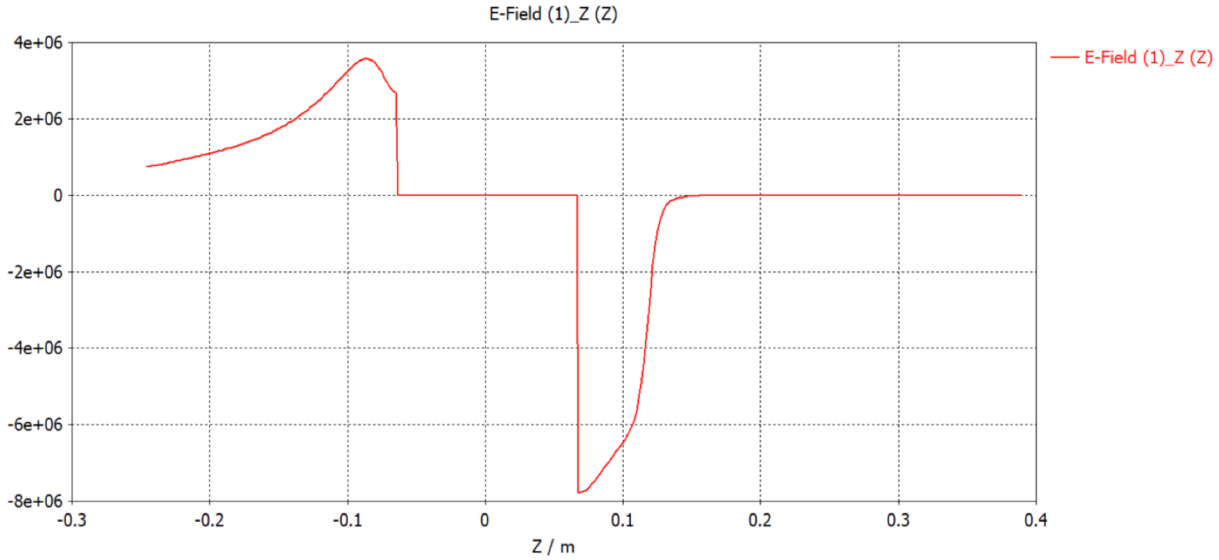


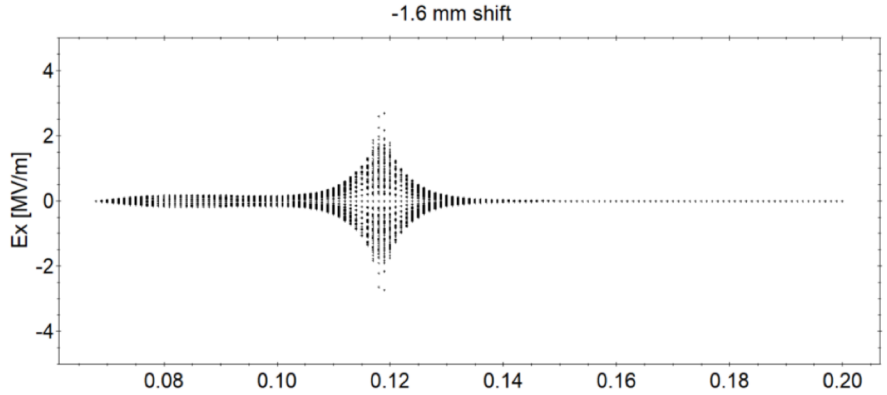
Anode shift…

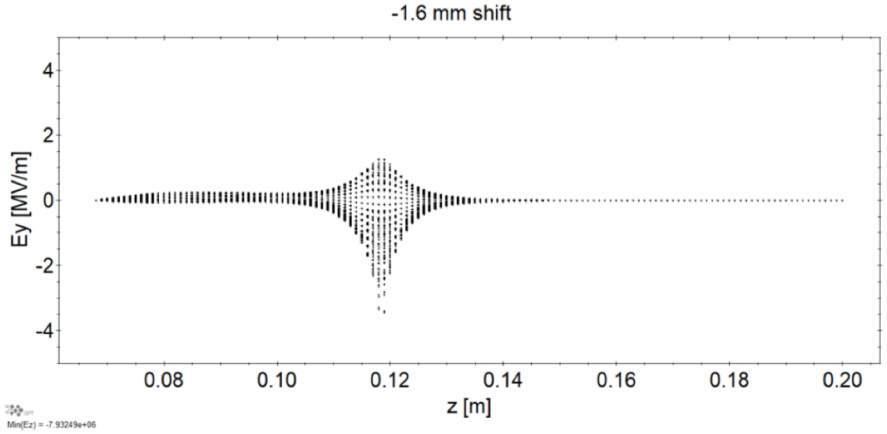
Flat cathode front and flat anode – no NEGs – cathode anode gap 5 cm

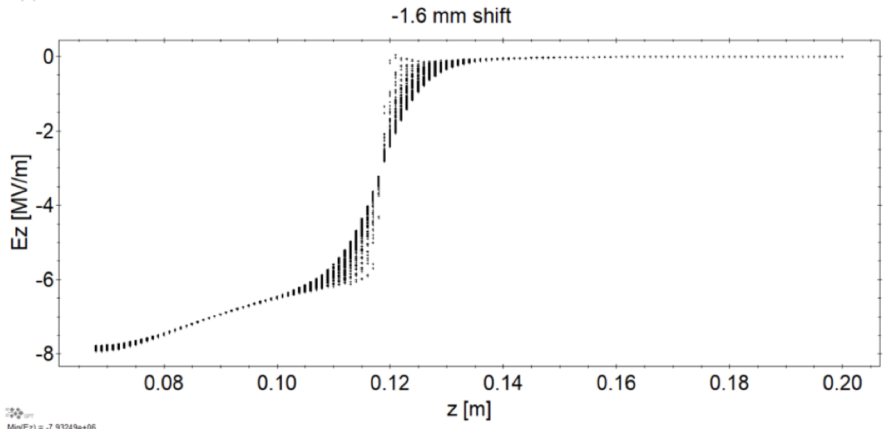
New anode -1.6 mm shift

-350 kV at the cathode, 0 V at the anode







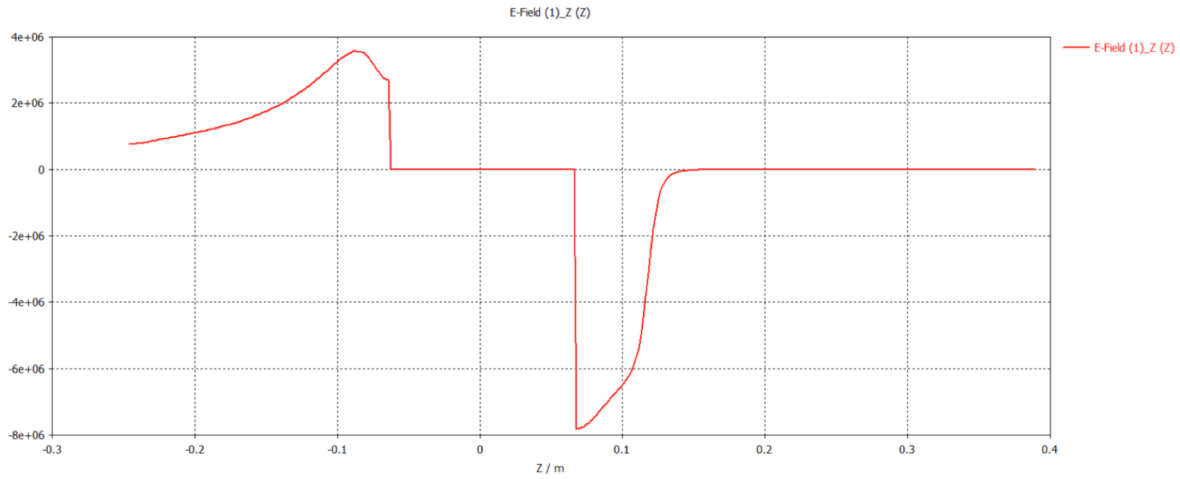


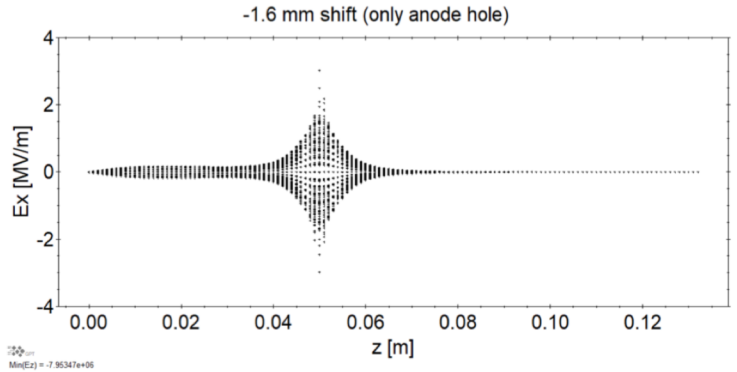
…has same effect on compensating beam kick as shifting only the anode aperture

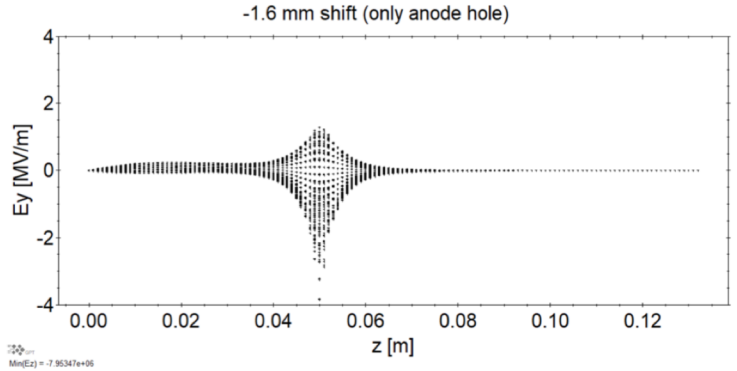
Flat cathode front and flat anode – no NEGs – cathode anode gap 5 cm

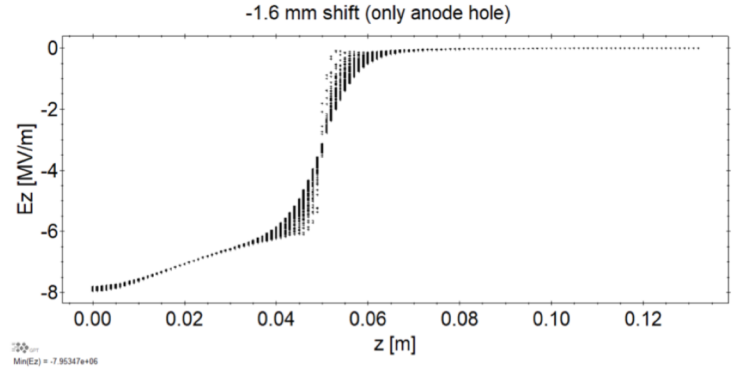
New anode - only anode hole shifted -1.6 mm

-350 kV at the cathode, 0 V at the anode

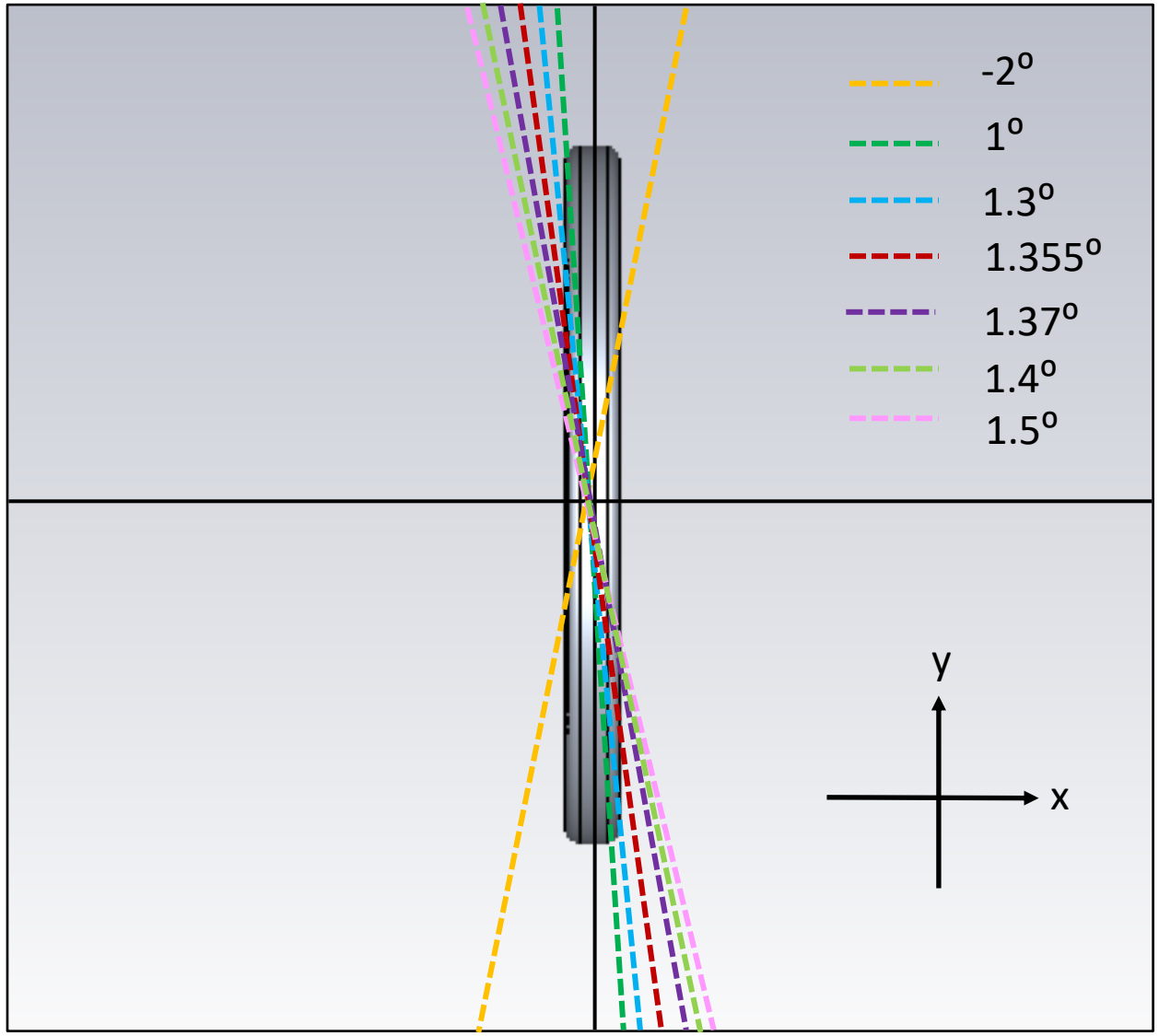






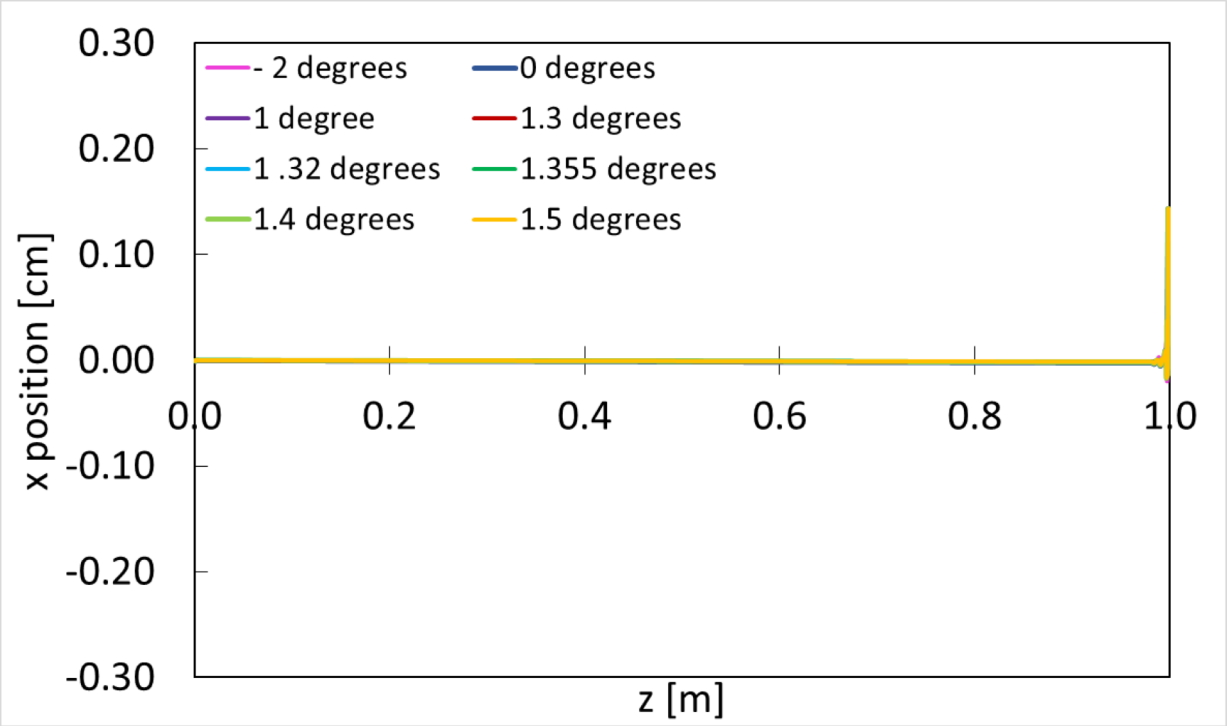


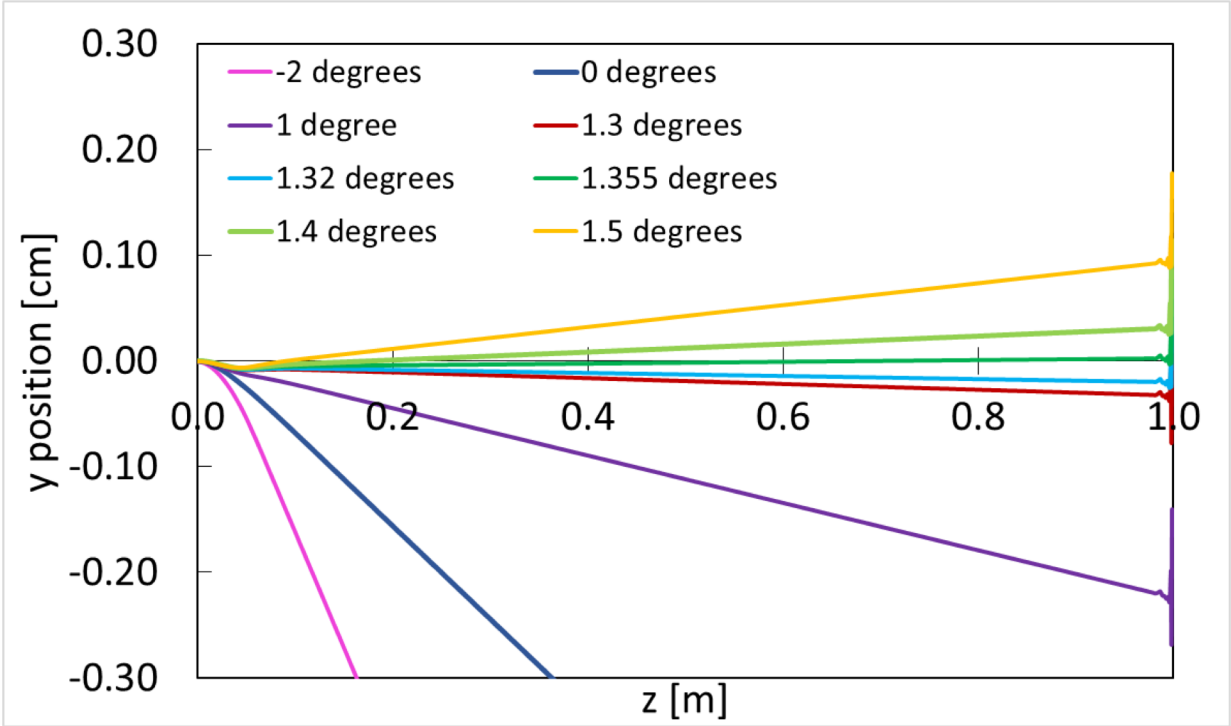
Anode angle



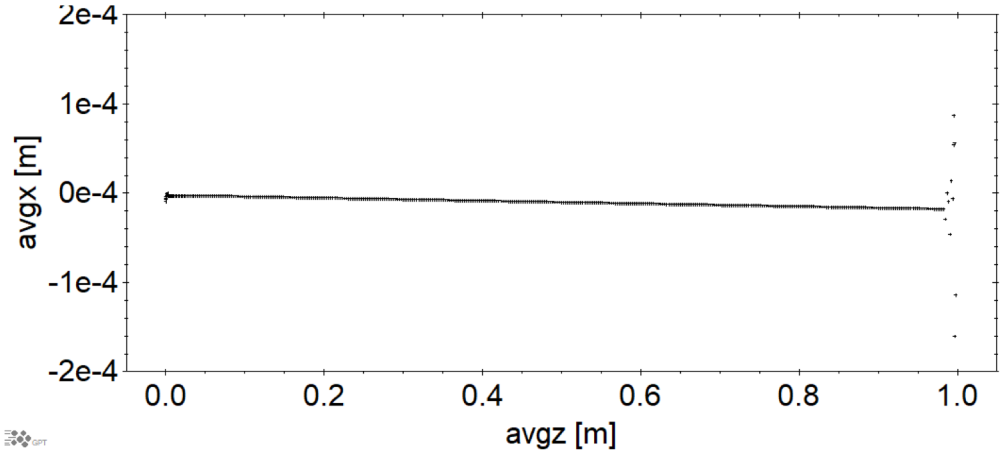
1.355° : x=0.1675 cm
1.3 °: x=0.1607 cm

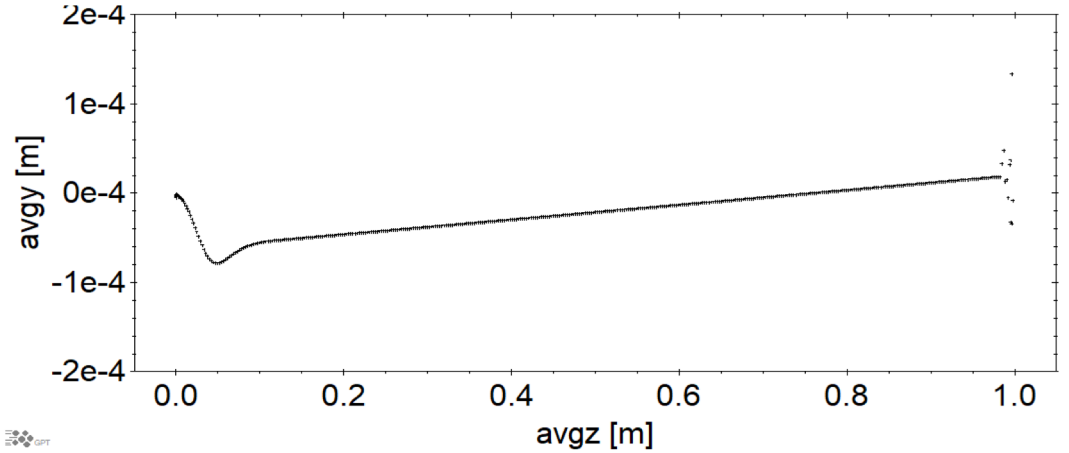
Beam position



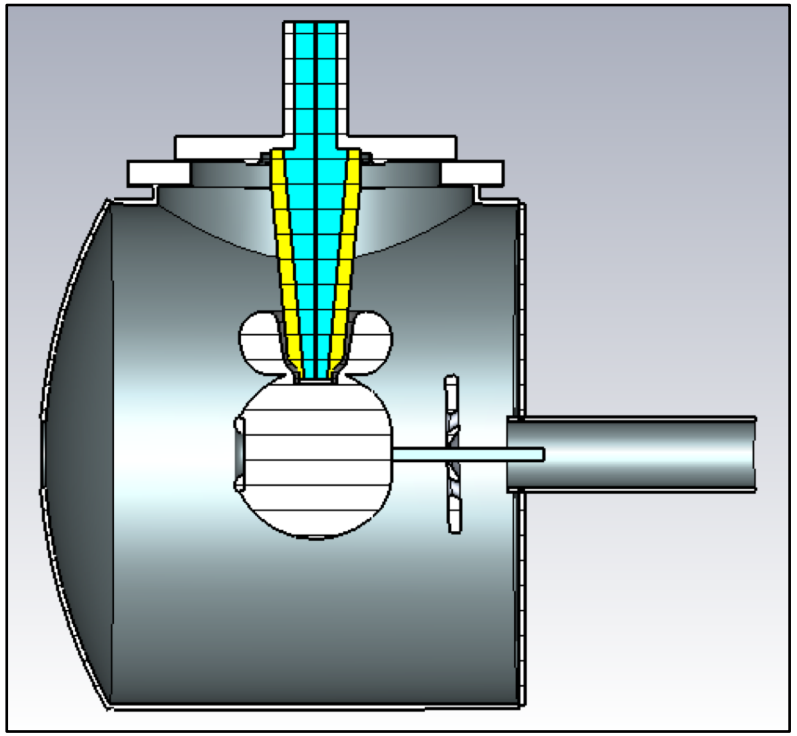


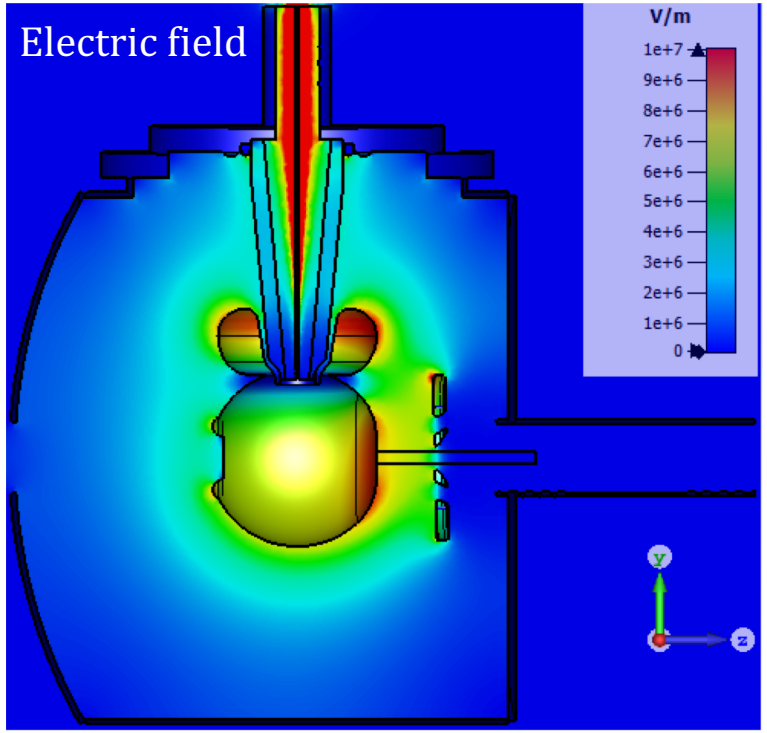
Beam position for 1.355 ^{0}

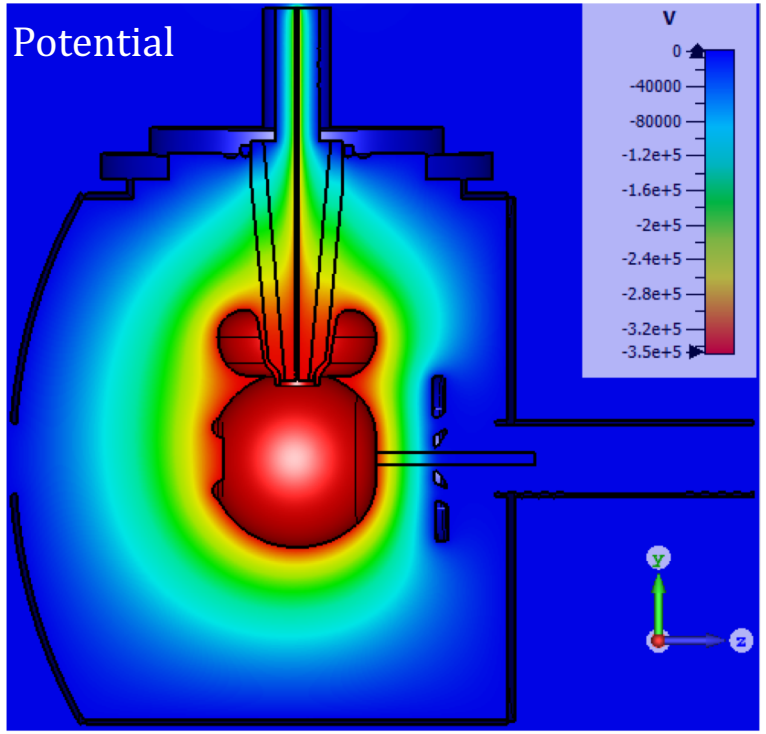


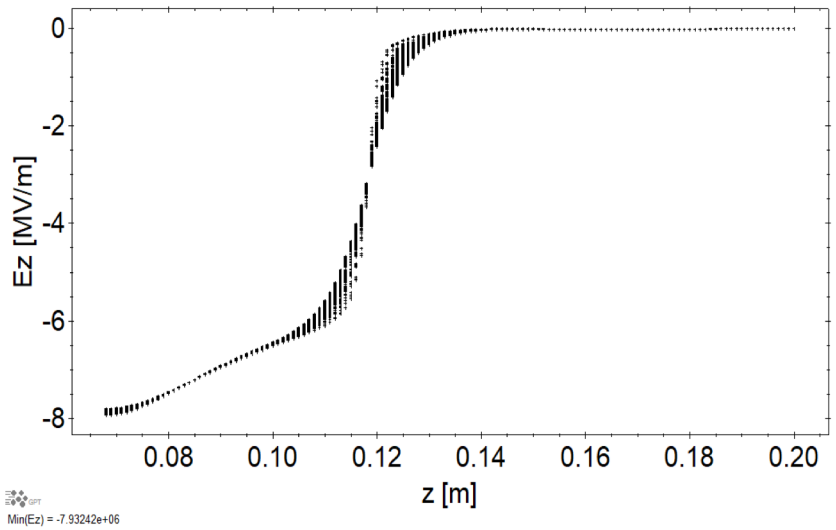


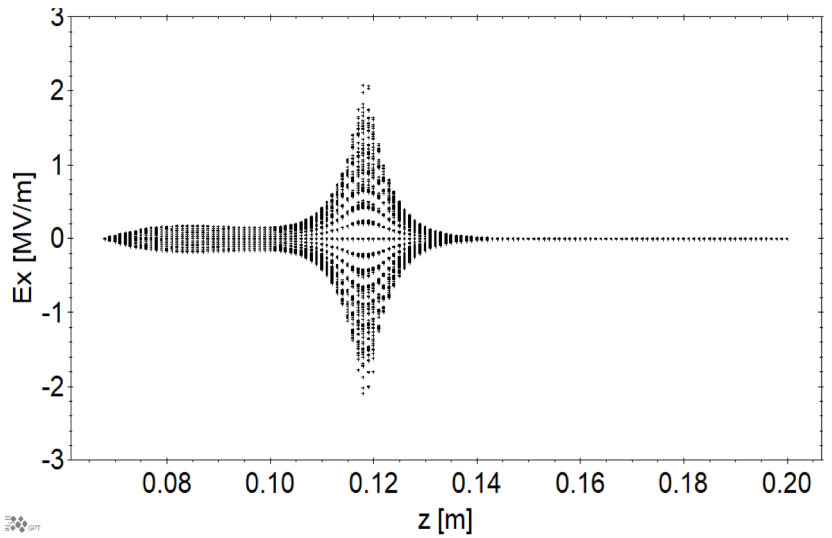
1.355^{o} angle electrostatic design

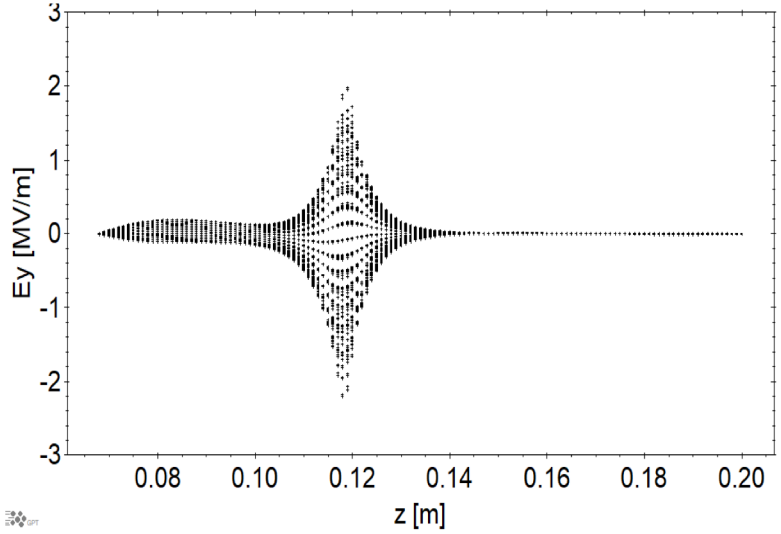






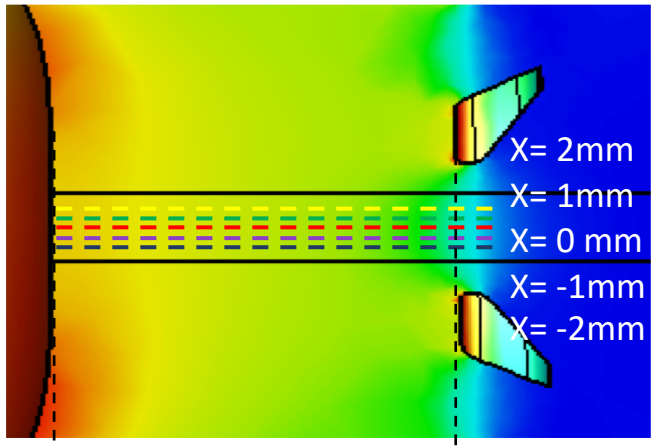


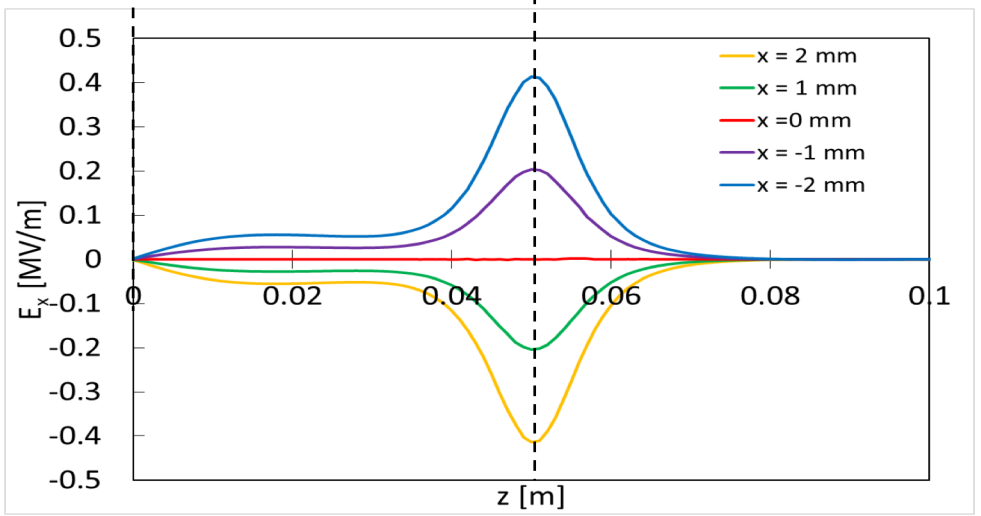


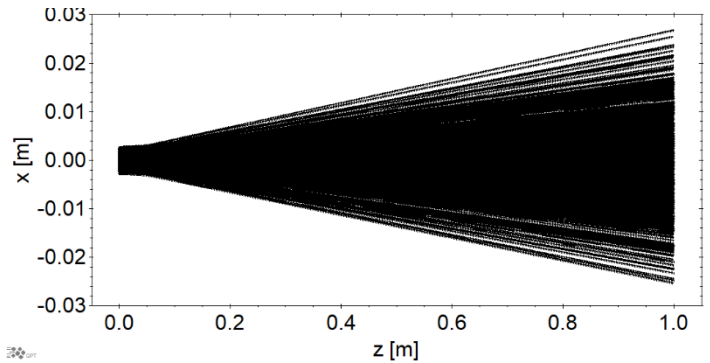


1.355^0 angle electrostatic design

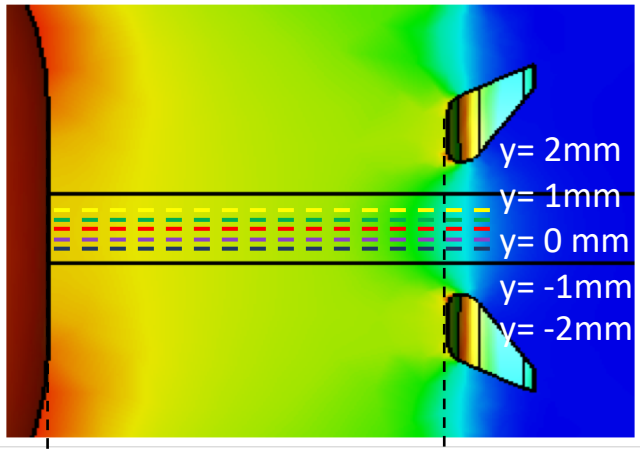
Horizontal electric field

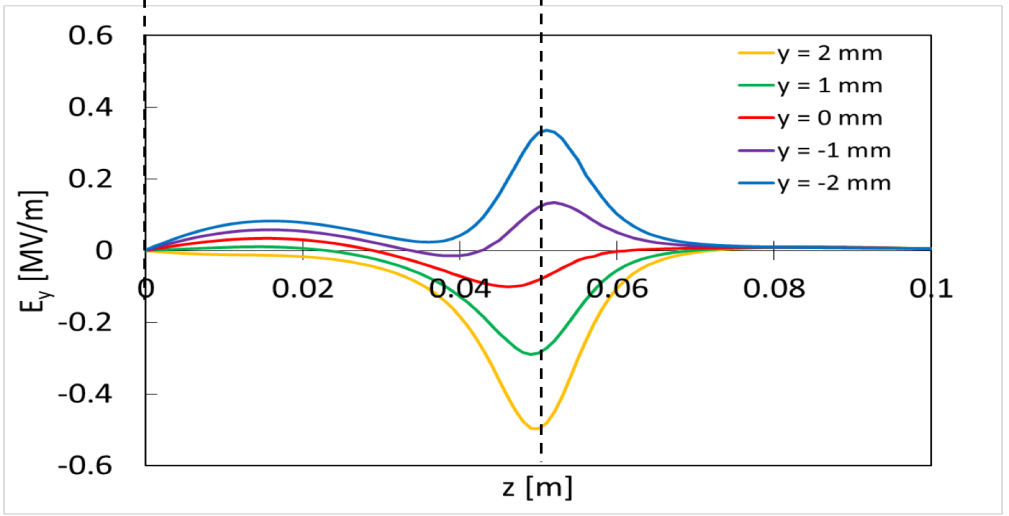


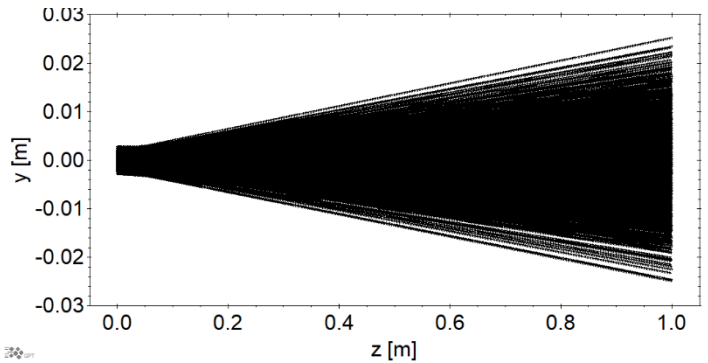




Vertical electric field

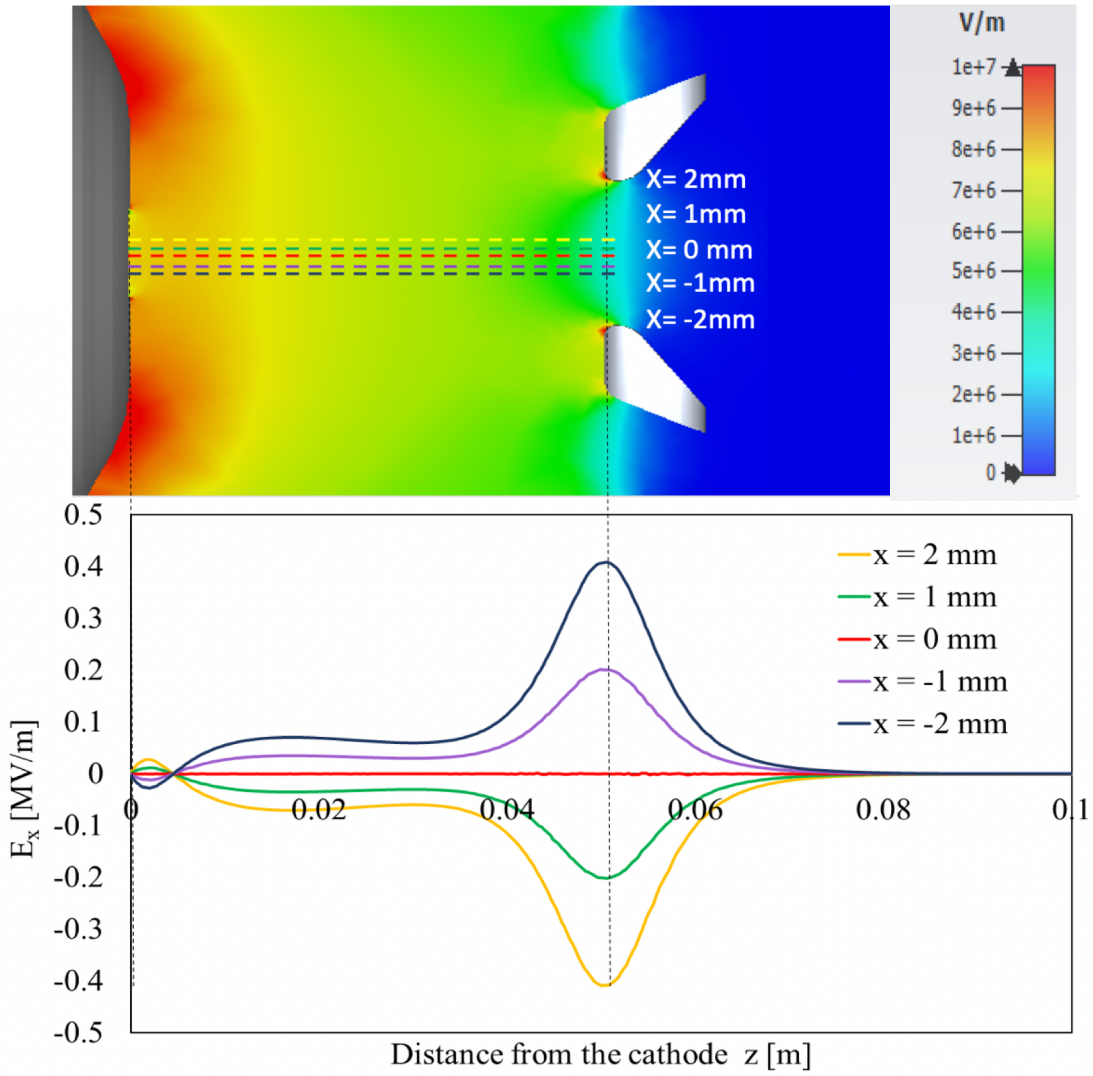




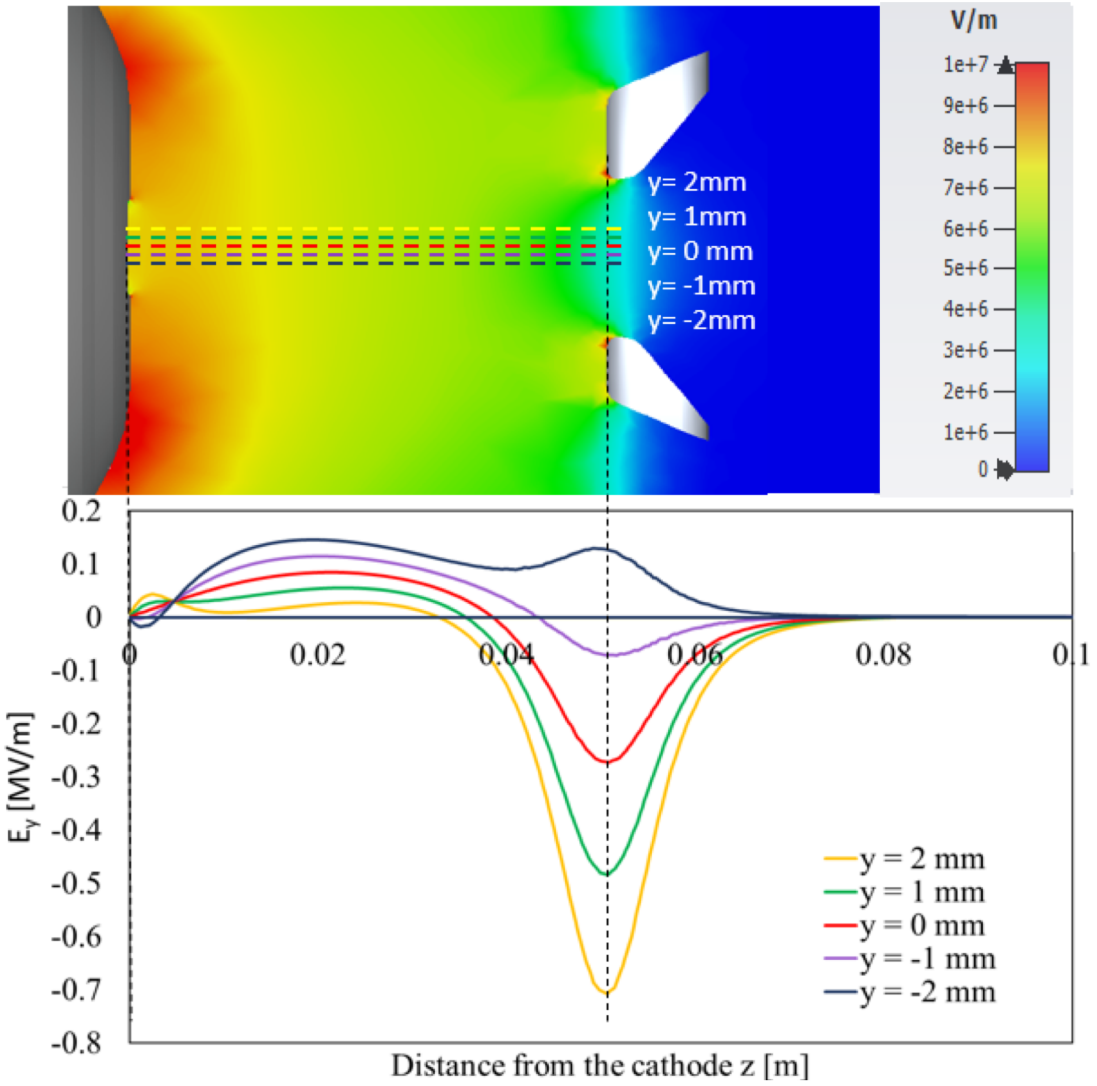


For -1.6 mm shifted anode hole

Horizontal electric field

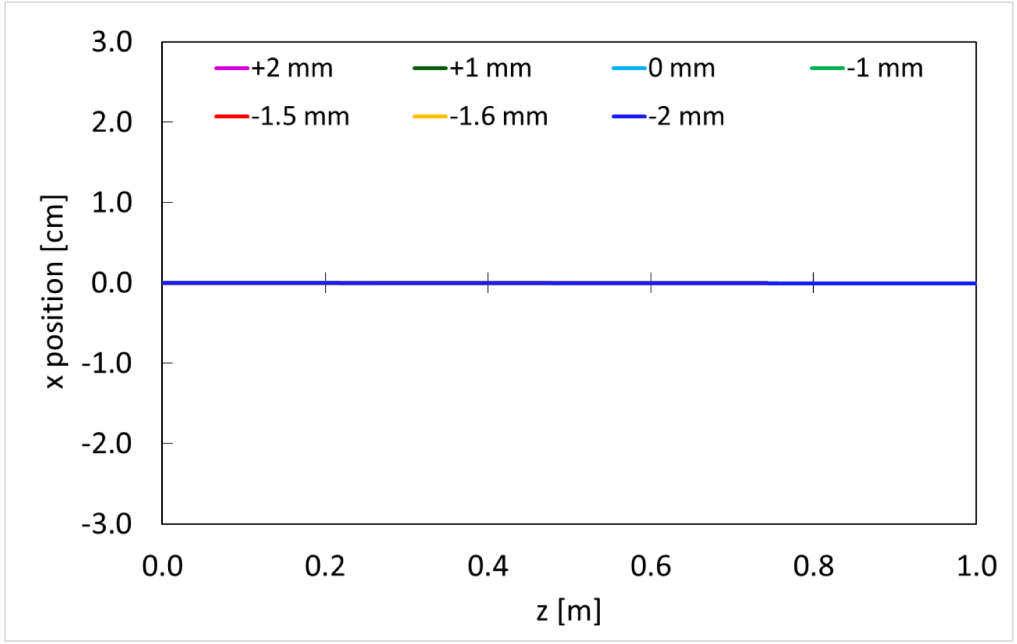


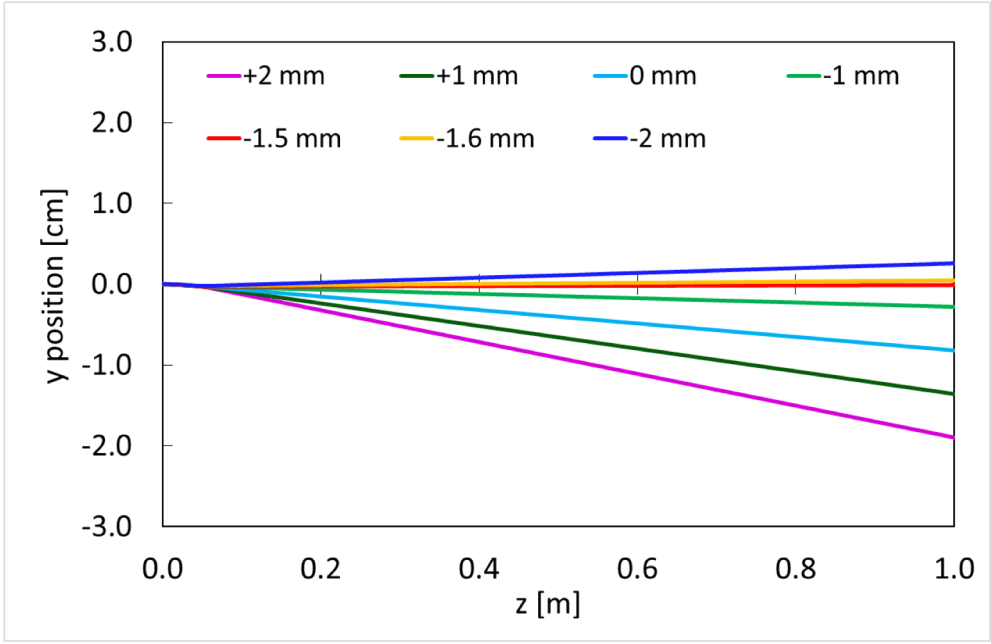
Vertical electric field



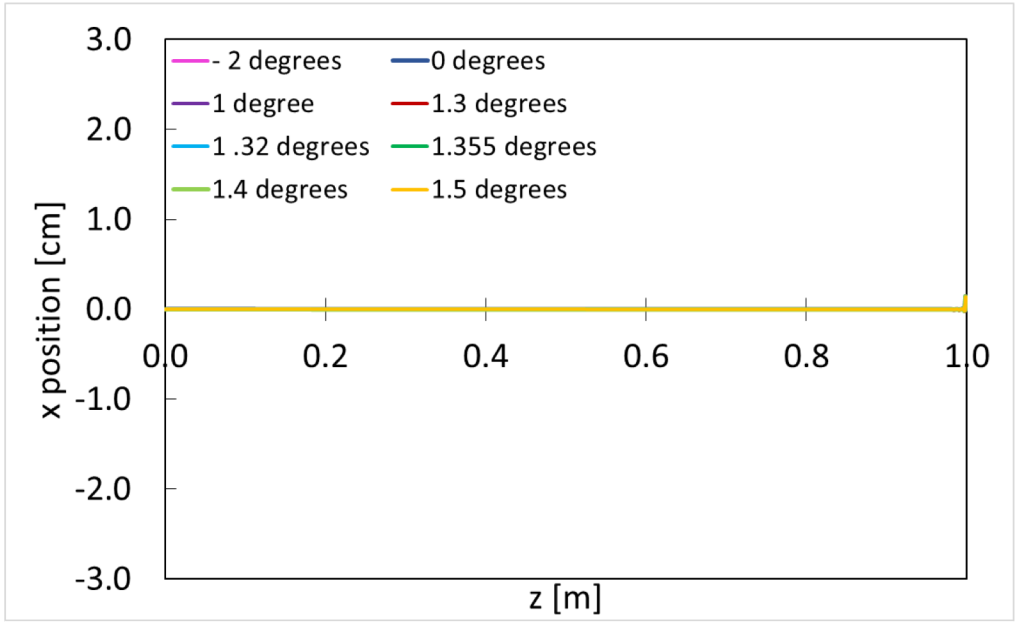
Beam position comparison between anode shift and tilt

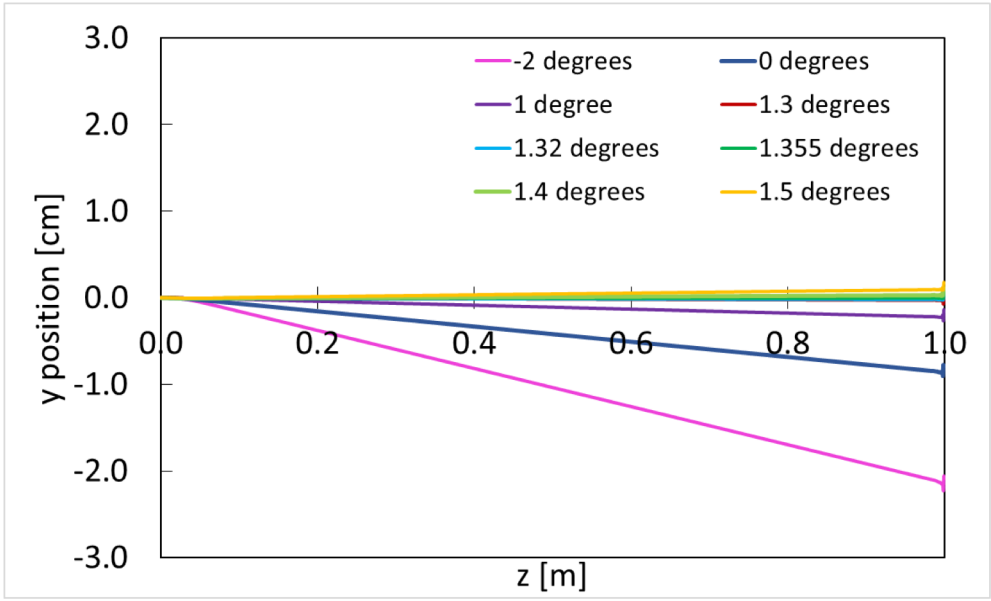
shift





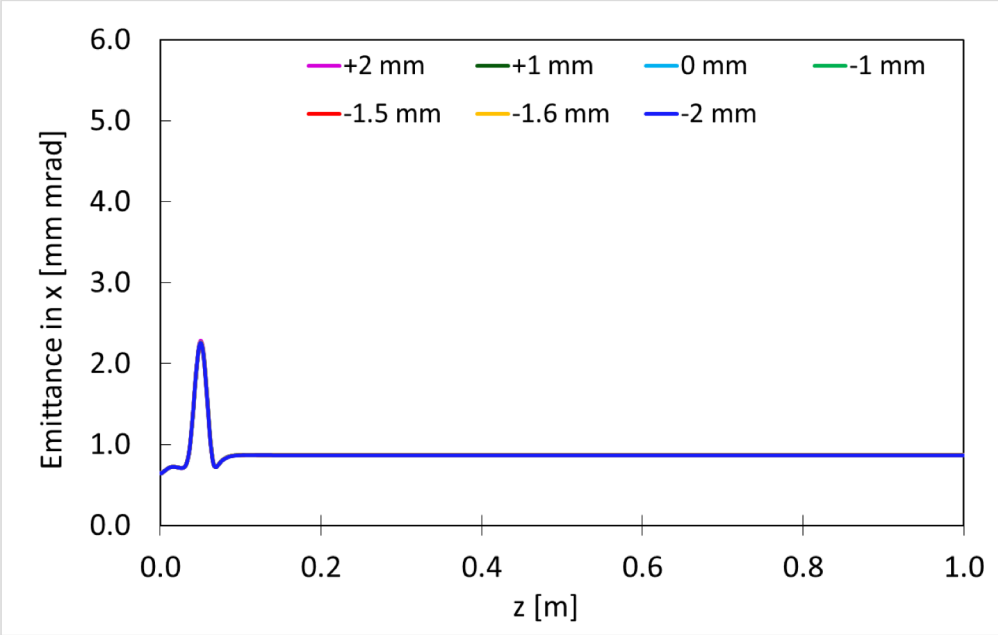
tilt

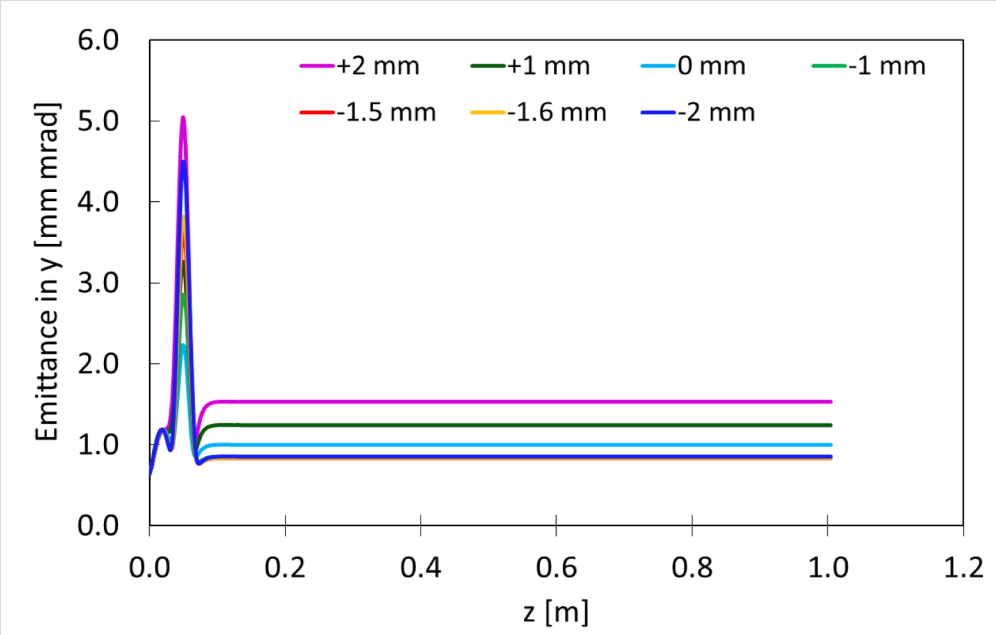




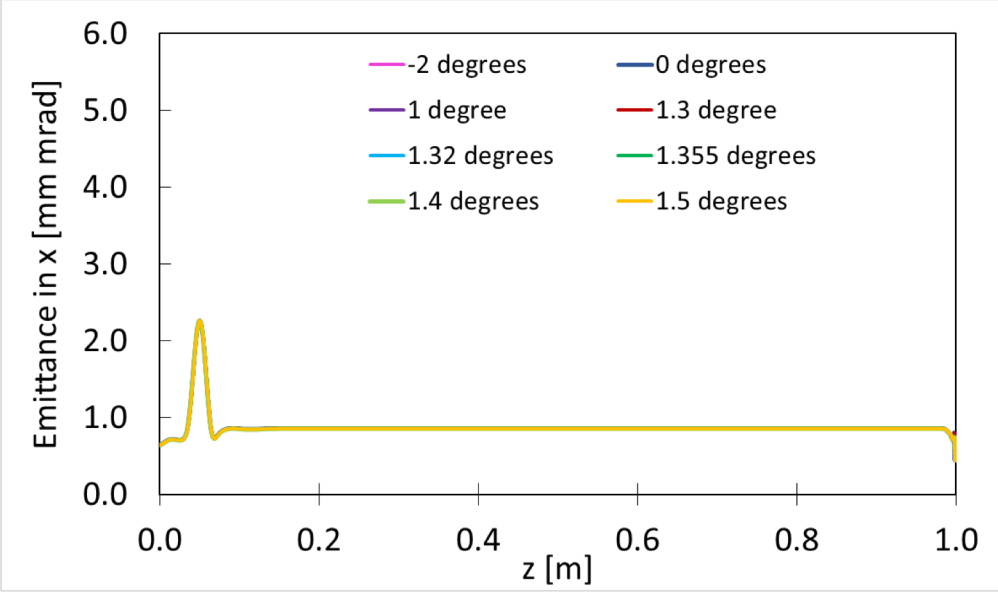
Emittance variations between anode shift and tilt

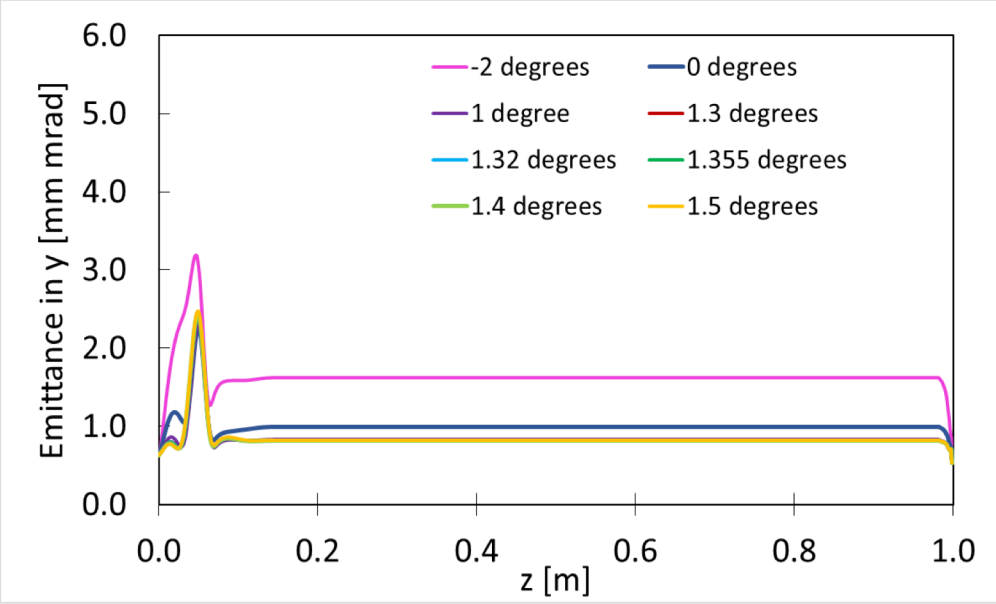
shift





tilt

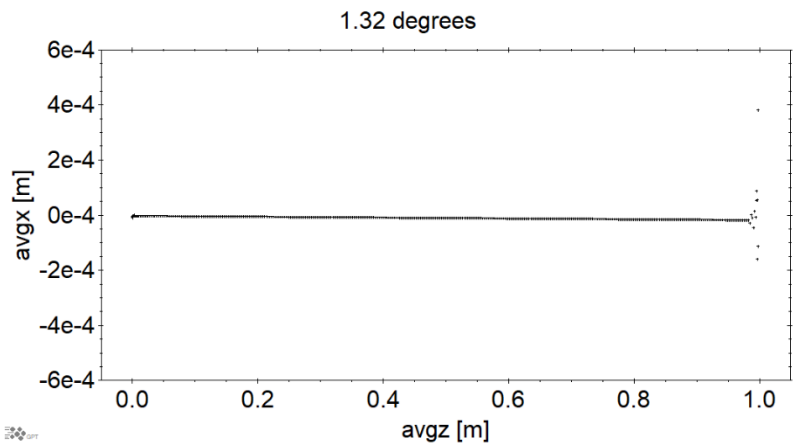


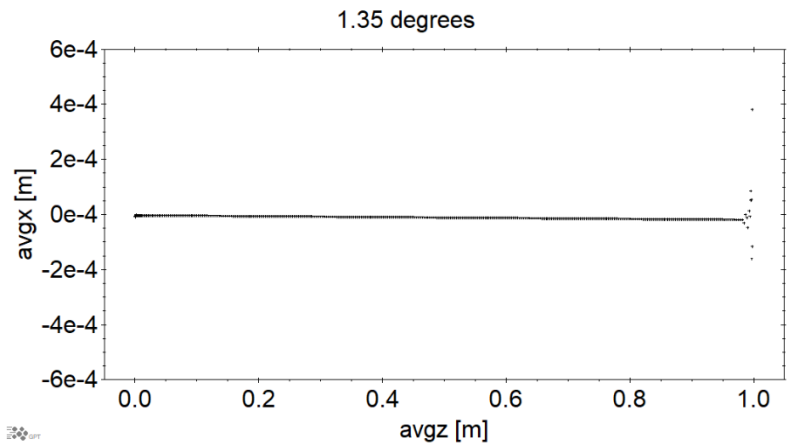


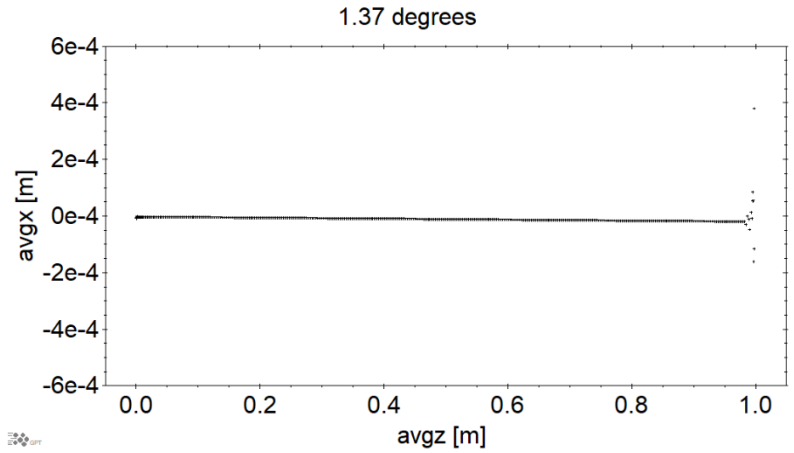
Simulation parameters

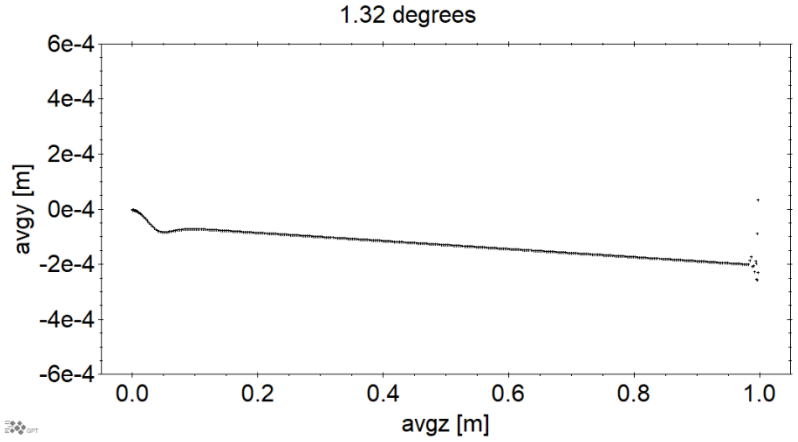
- Gun HV -350 kV (3D E Field map CST)
- Charge 1 pC
- Gun solenoid off
- Pulse width 25 ps (rms)
- Laser spot size 1 mm (rms)
- Accuracy 6.5
- Space charge calculation off
- Focusing solenoids are off
- Correctors are off

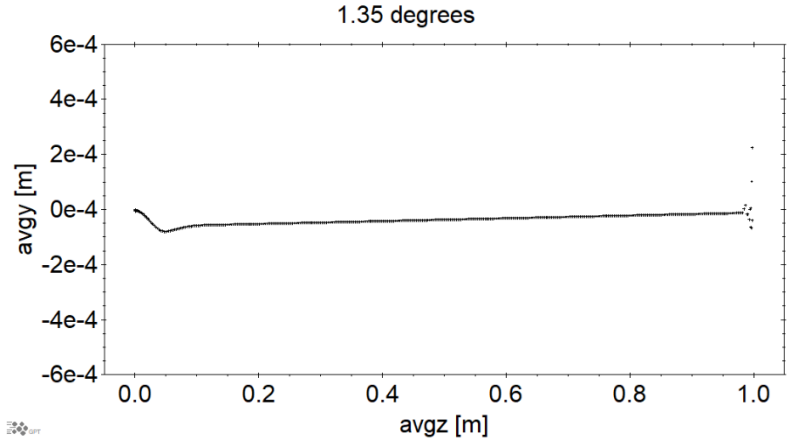
Beam position in x and y for 1.32^0, 1.35^0, 1.37^0

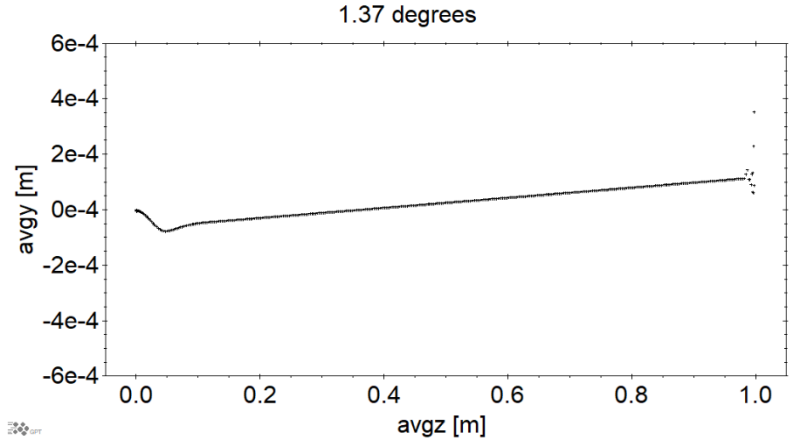












Emittance variations