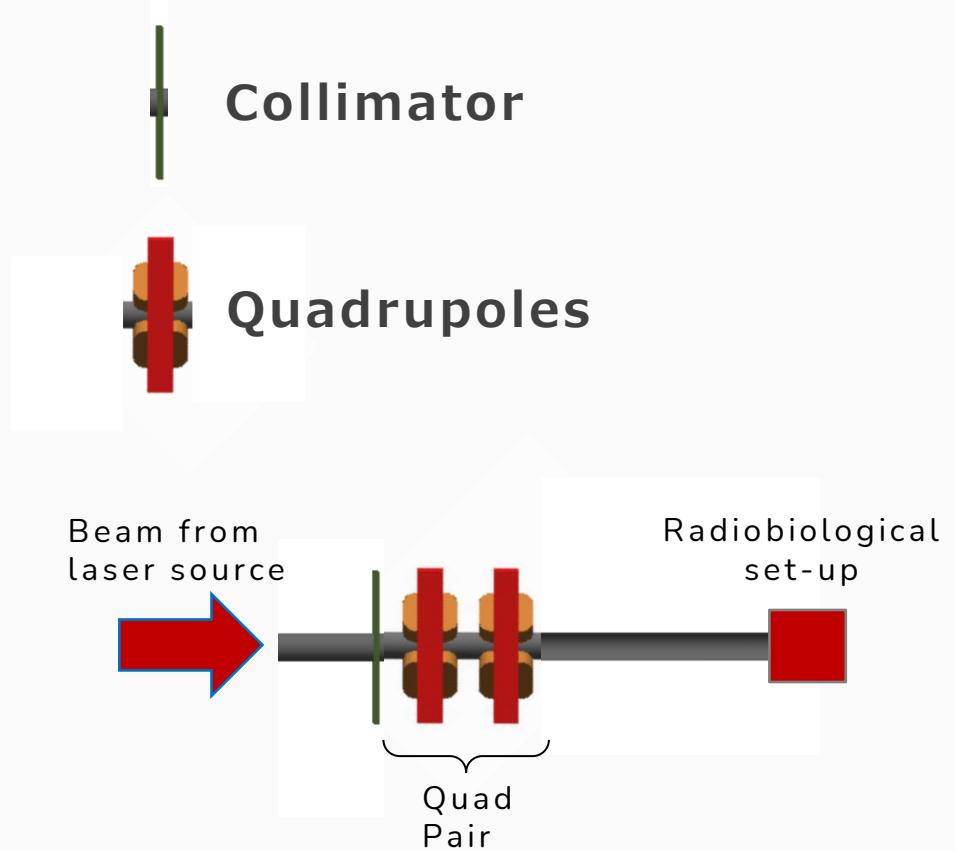


BEAMLINE OPTIMISATION UPDATES

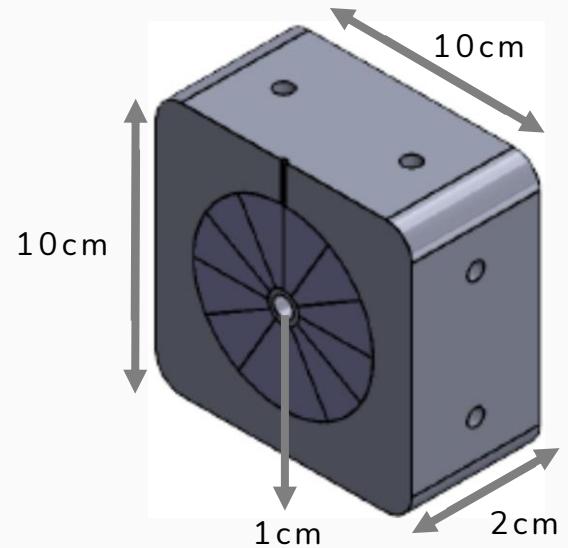
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Halbach Quadrupoles

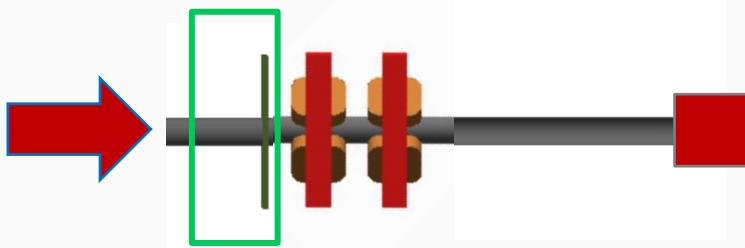


PoPLaR Components

Optimisation Step 1- Collimator 1

Mapping the positions of the particles with 10MeV (+/- 5%) at 3cm:

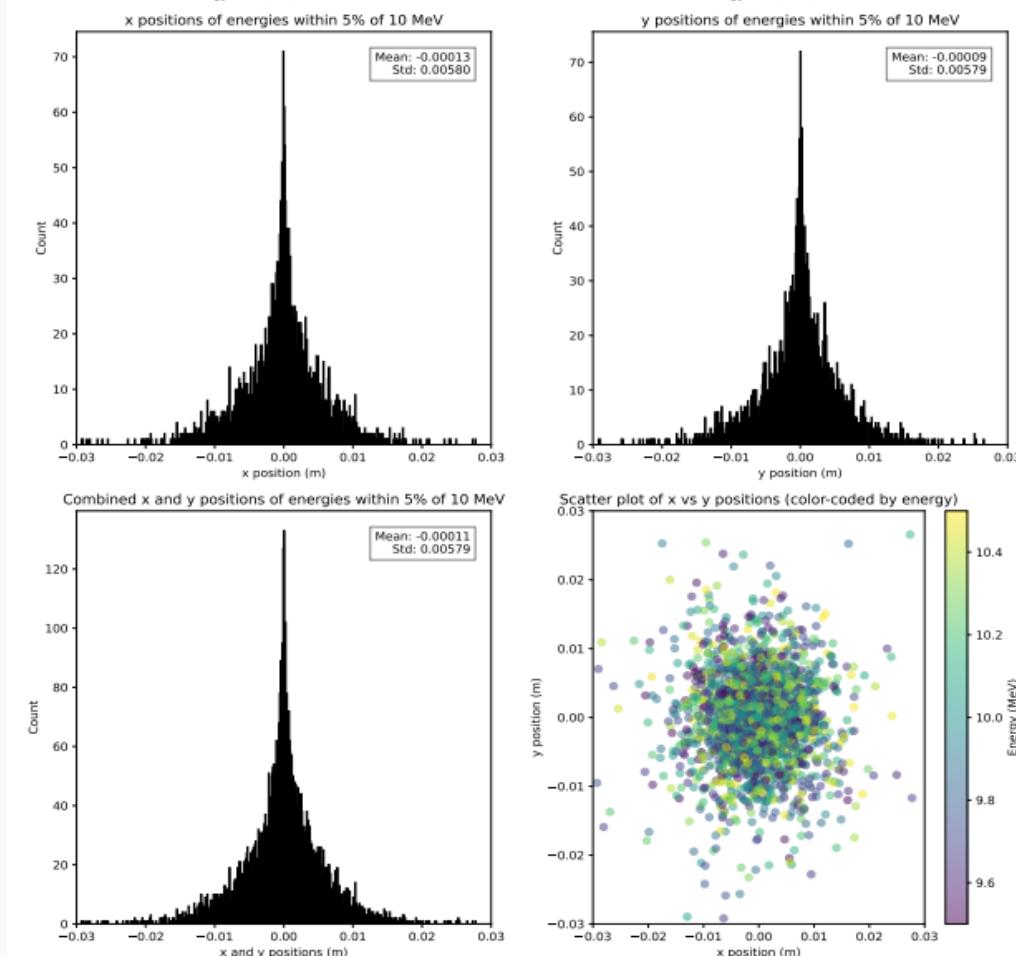
- Mean & std similar in x and y- use circular collimator
- 1cm radius circular aperture decided on



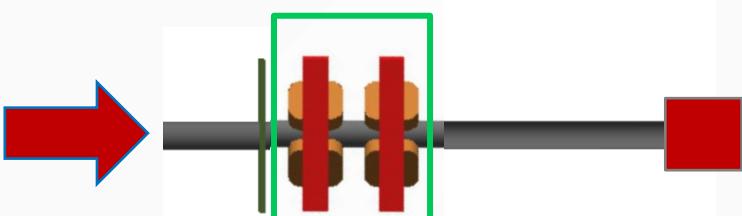
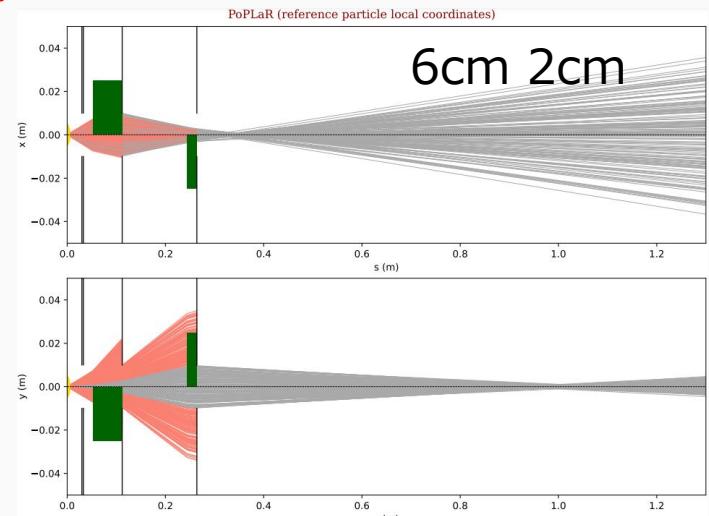
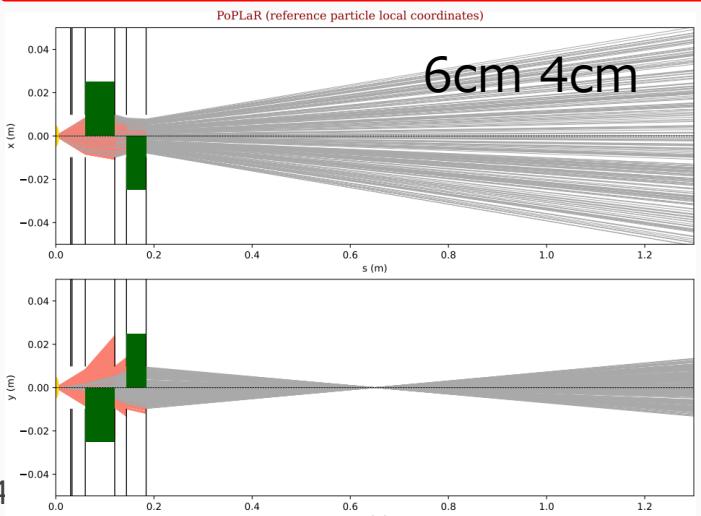
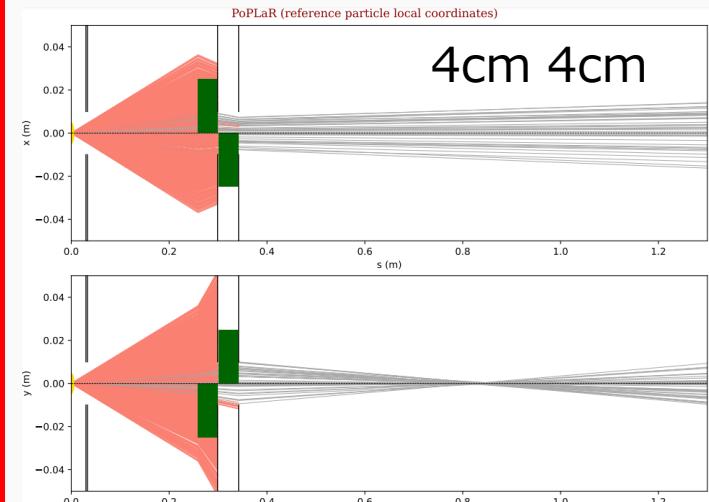
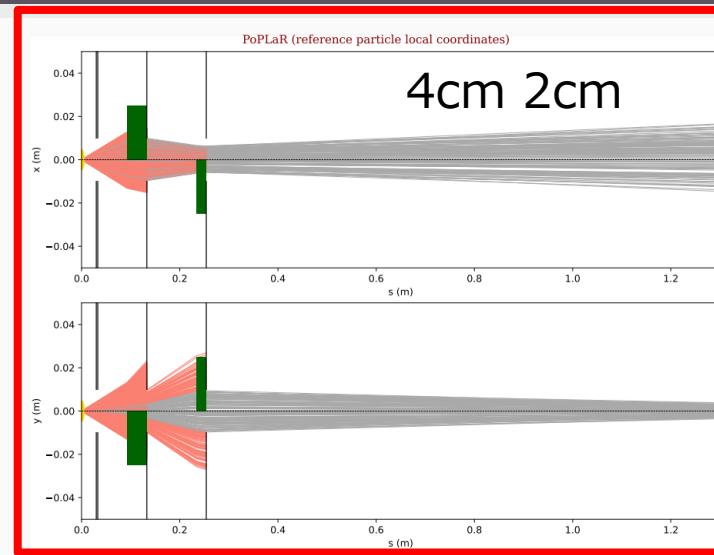
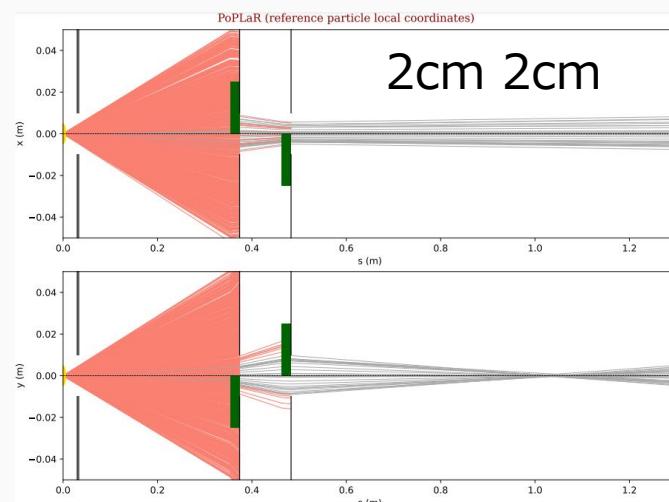
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PoPLaR: Source



Optimisation Step 2- Quad doublet

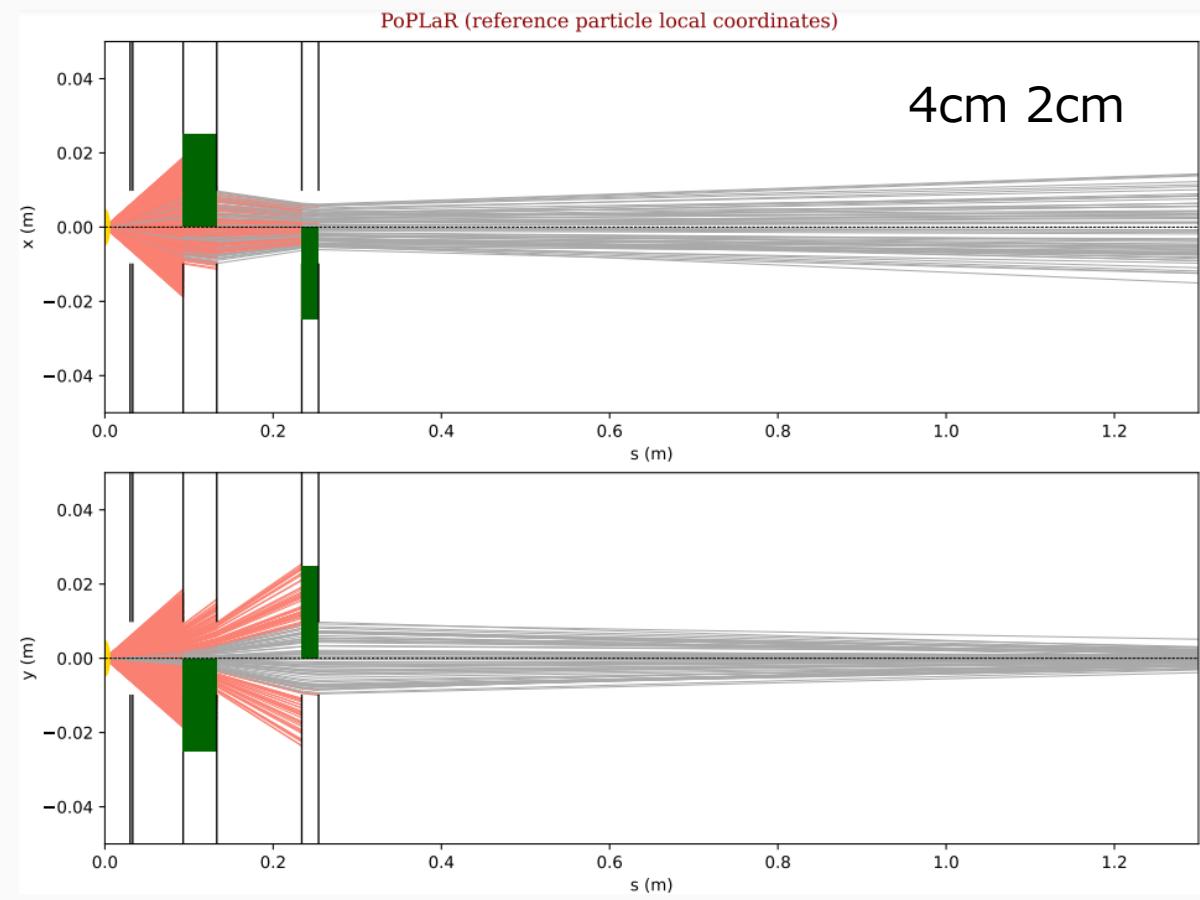
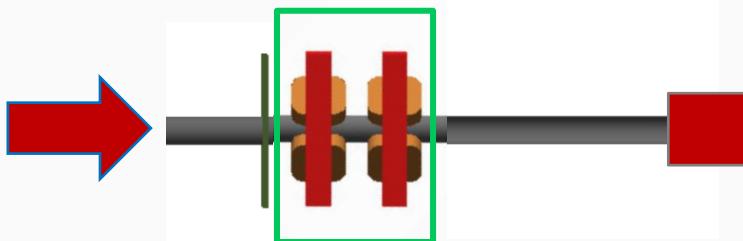


Optimisation Step 2- Quad doublet

Cost function for Bayesian to create circular aperture to create spot size between 1 and 3cm.

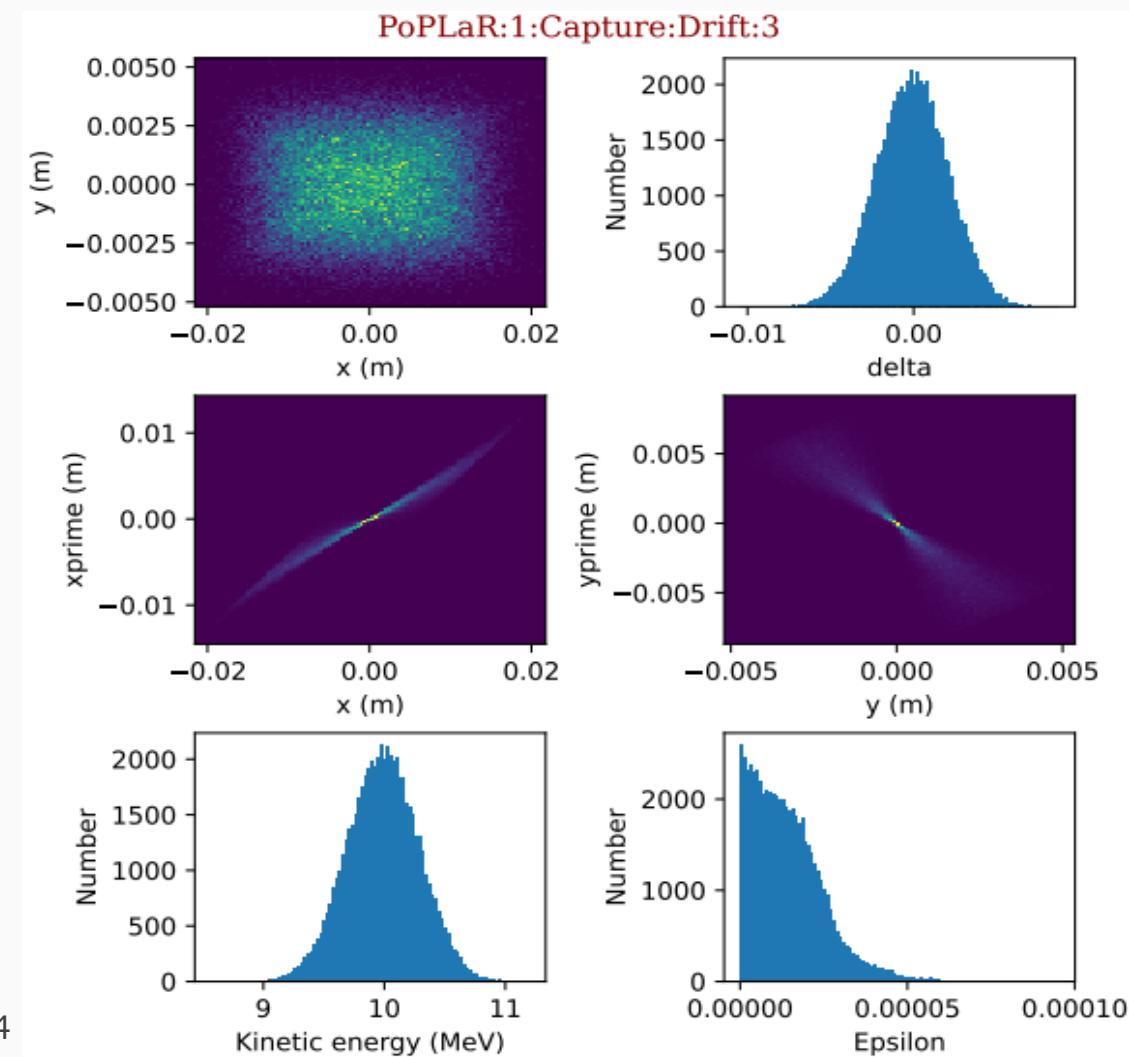
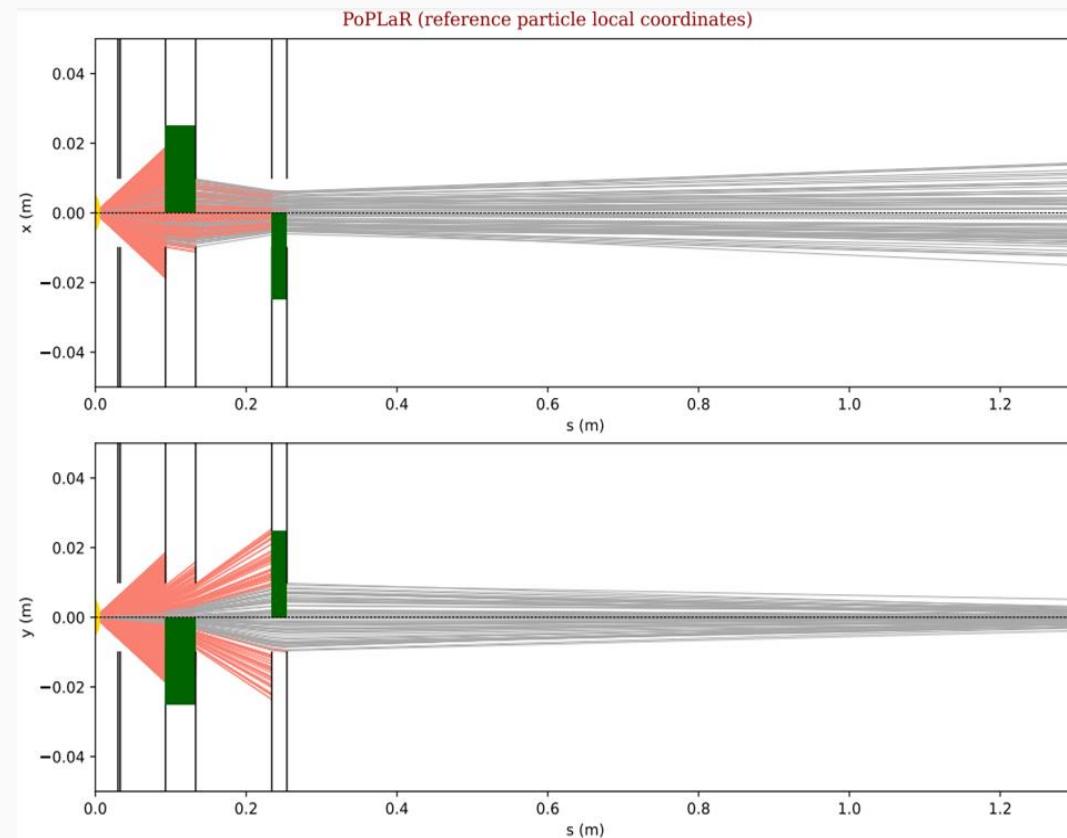
Bayesian Optimisation showed optimal positions of:

- Focus quad: 9.3cm from laser source
- Defocus quad: 23.4cm from laser source



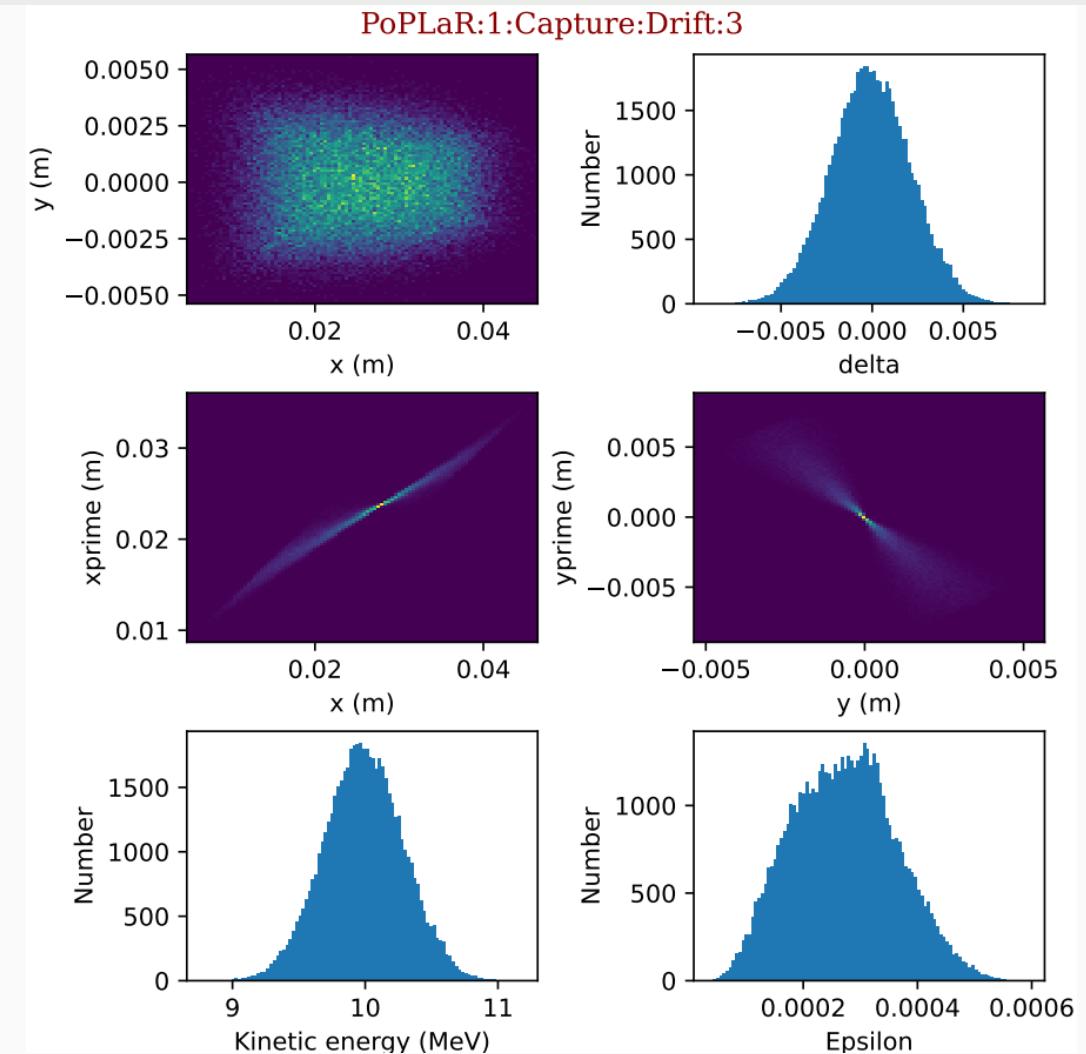
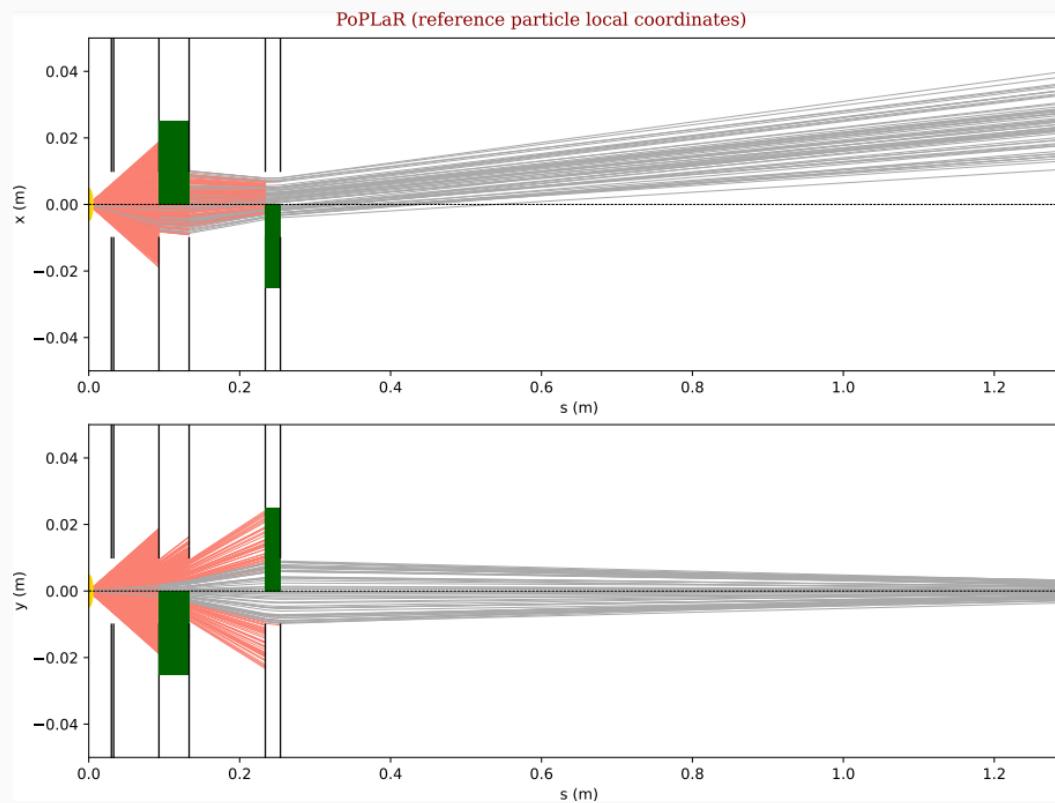
Sensitivity testing step 1- xy shifting

Reference: 4cm 2cm quad combination



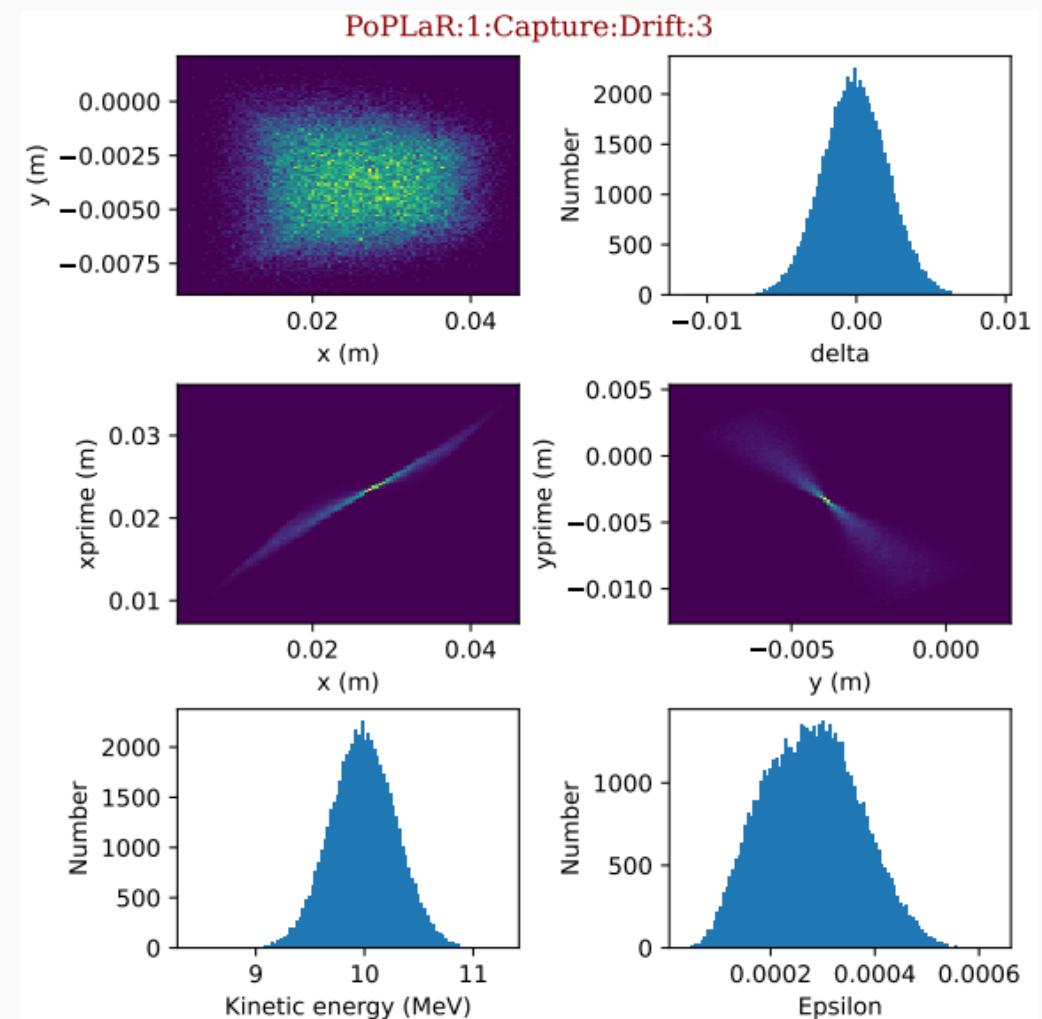
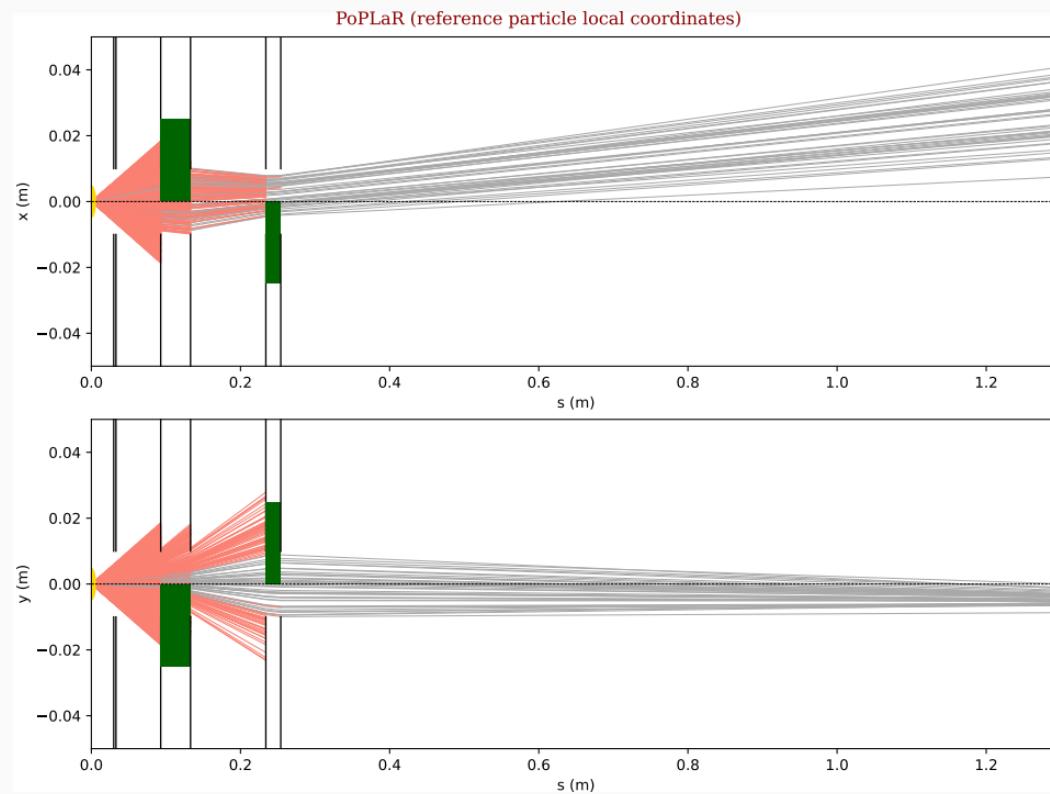
Sensitivity testing step 1- xy shifting

Quadrupole 1 shifted in x axis 1mm



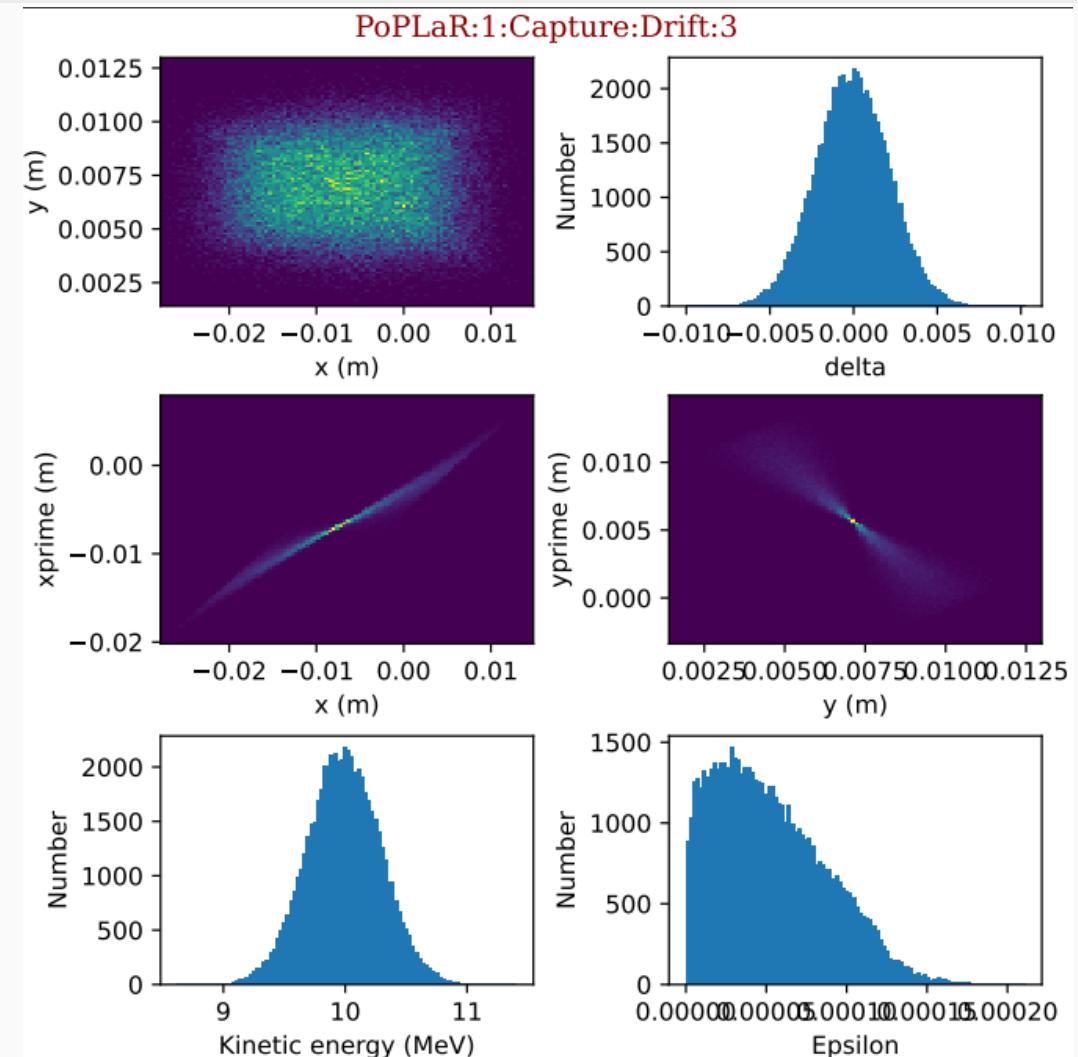
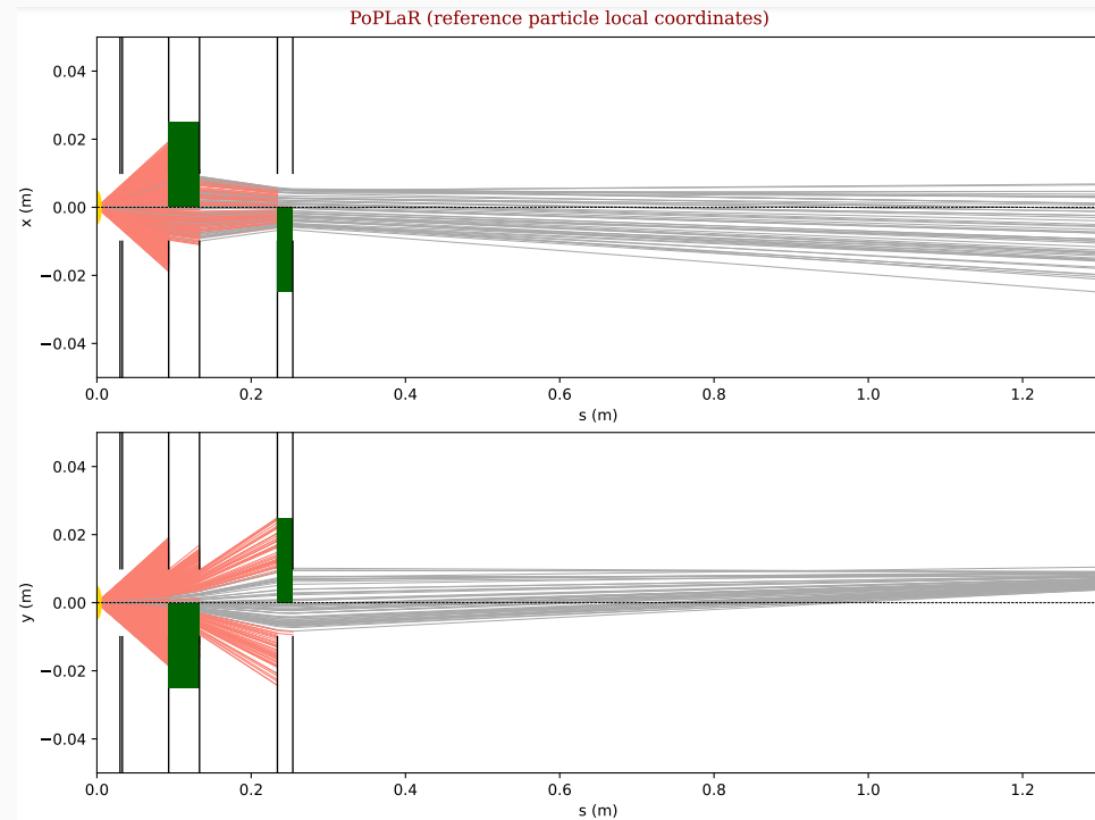
Sensitivity testing step 1- xy shifting

Quadrupole 1 shifted in x and y axis 1mm



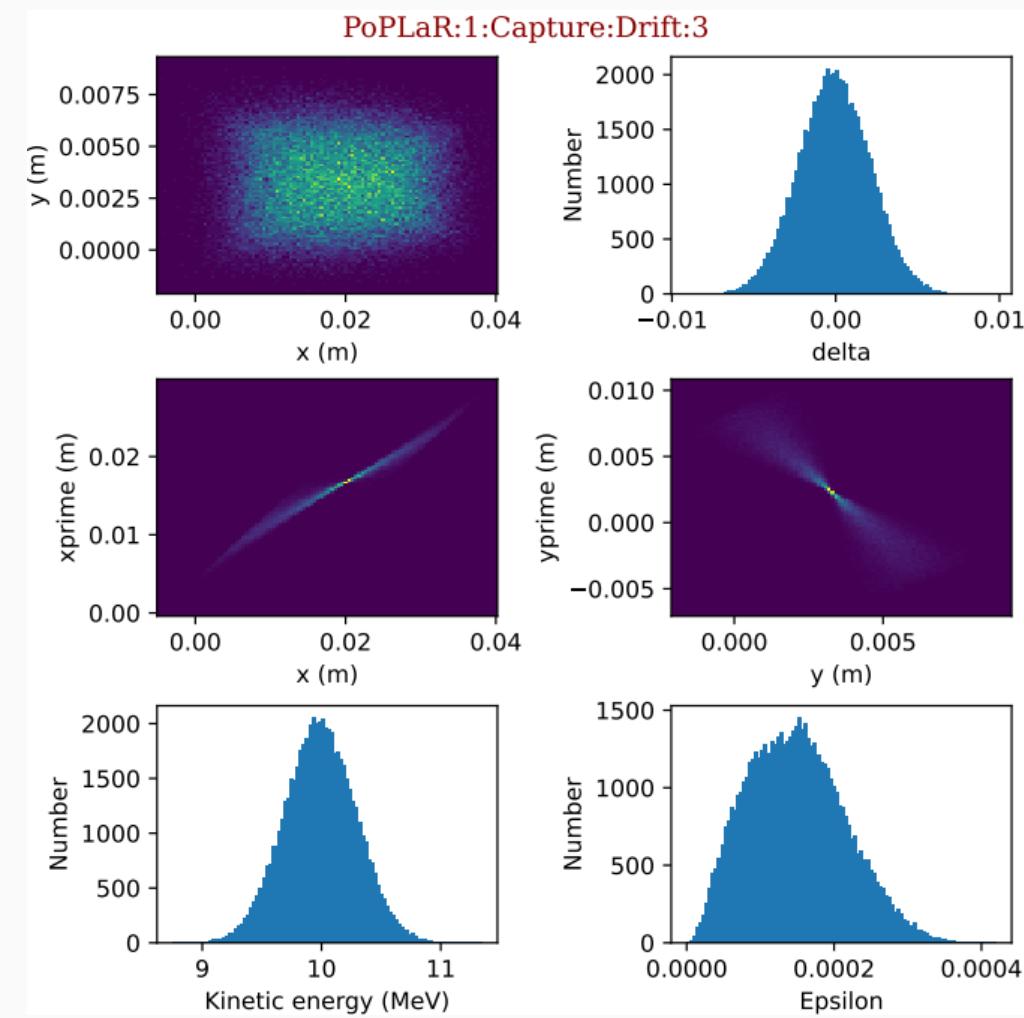
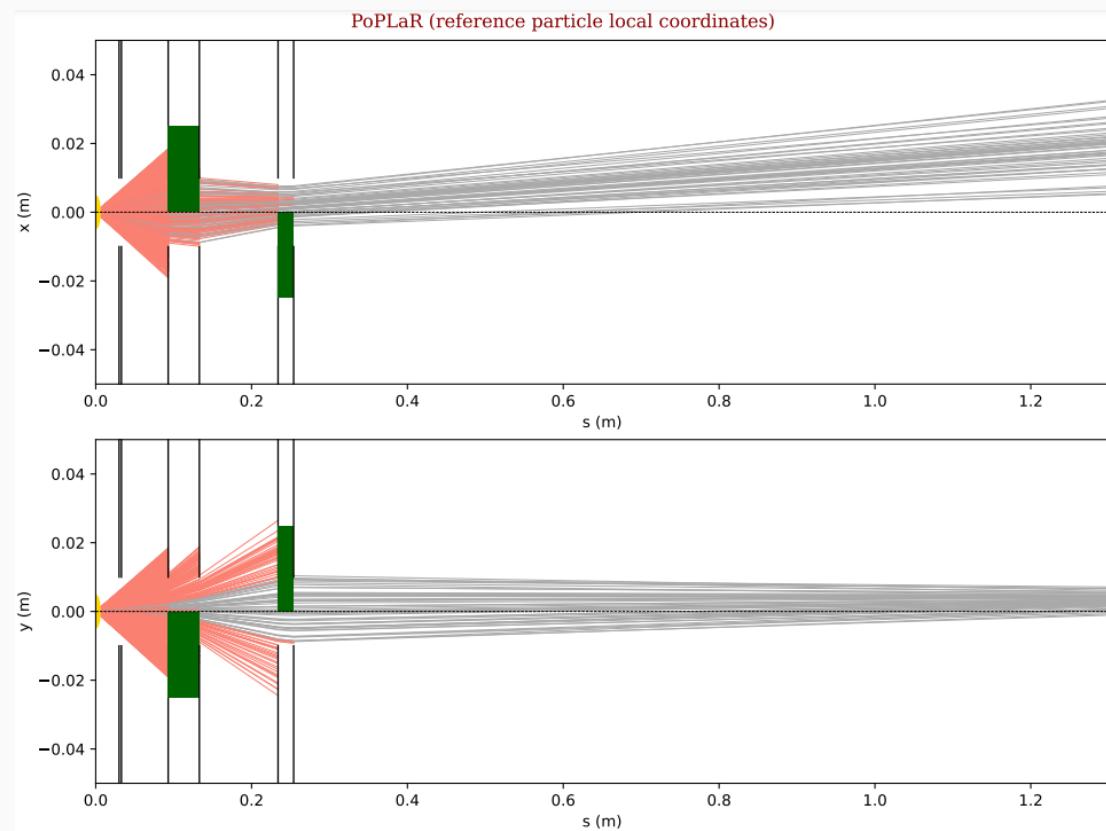
Sensitivity testing step 1- xy shifting

Quadrupole 2 shifted in x and y axis 1mm



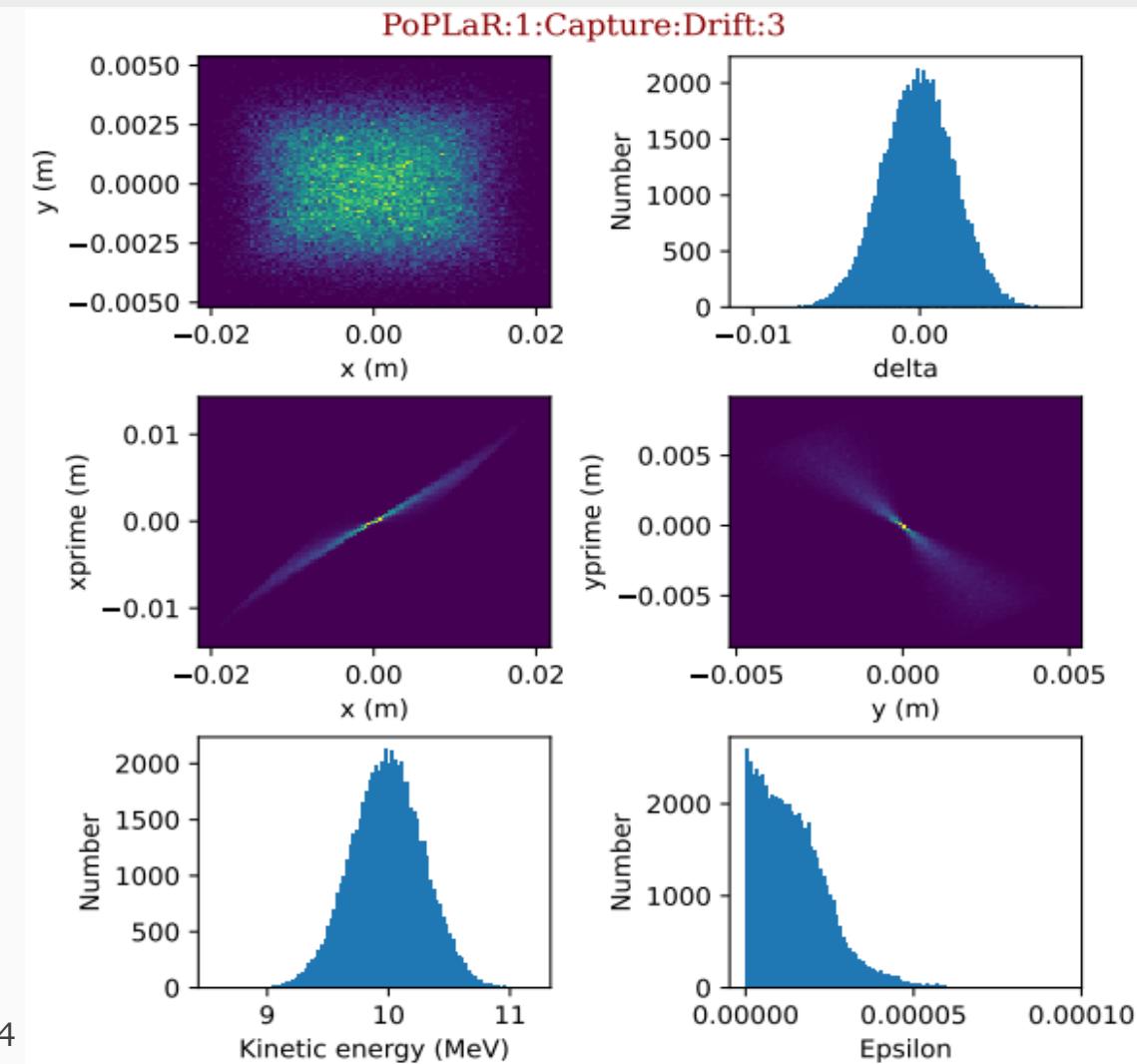
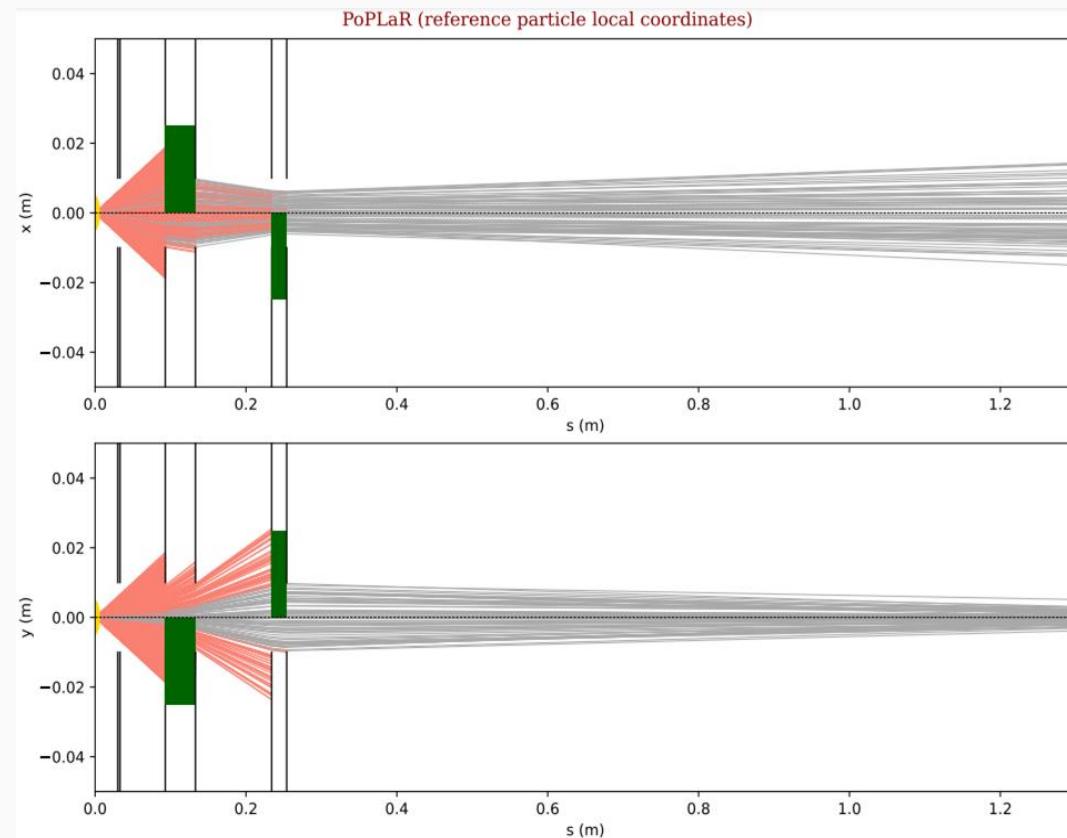
Sensitivity testing step 1- xy shifting

Quadrupole pair shifted in x and y axis 1mm



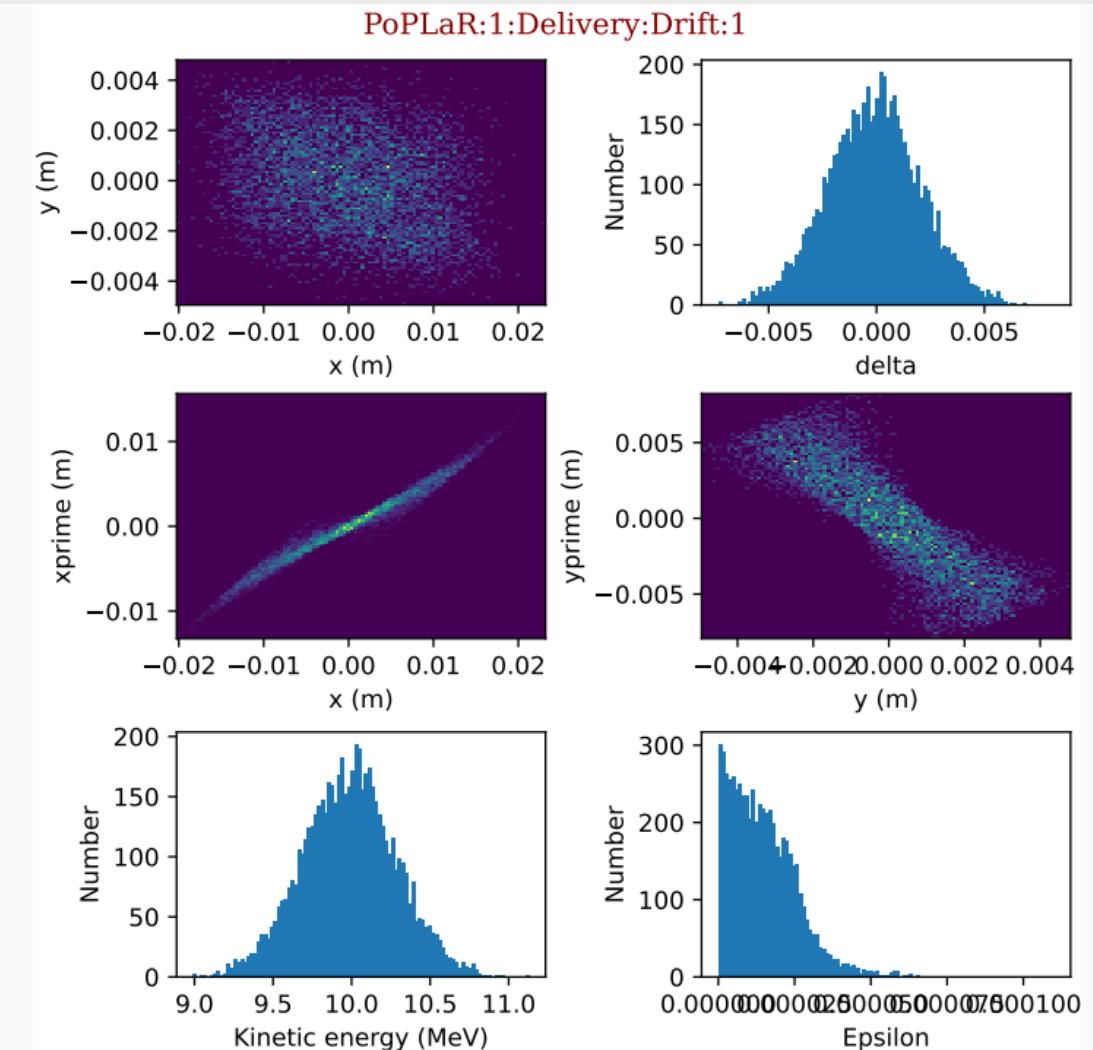
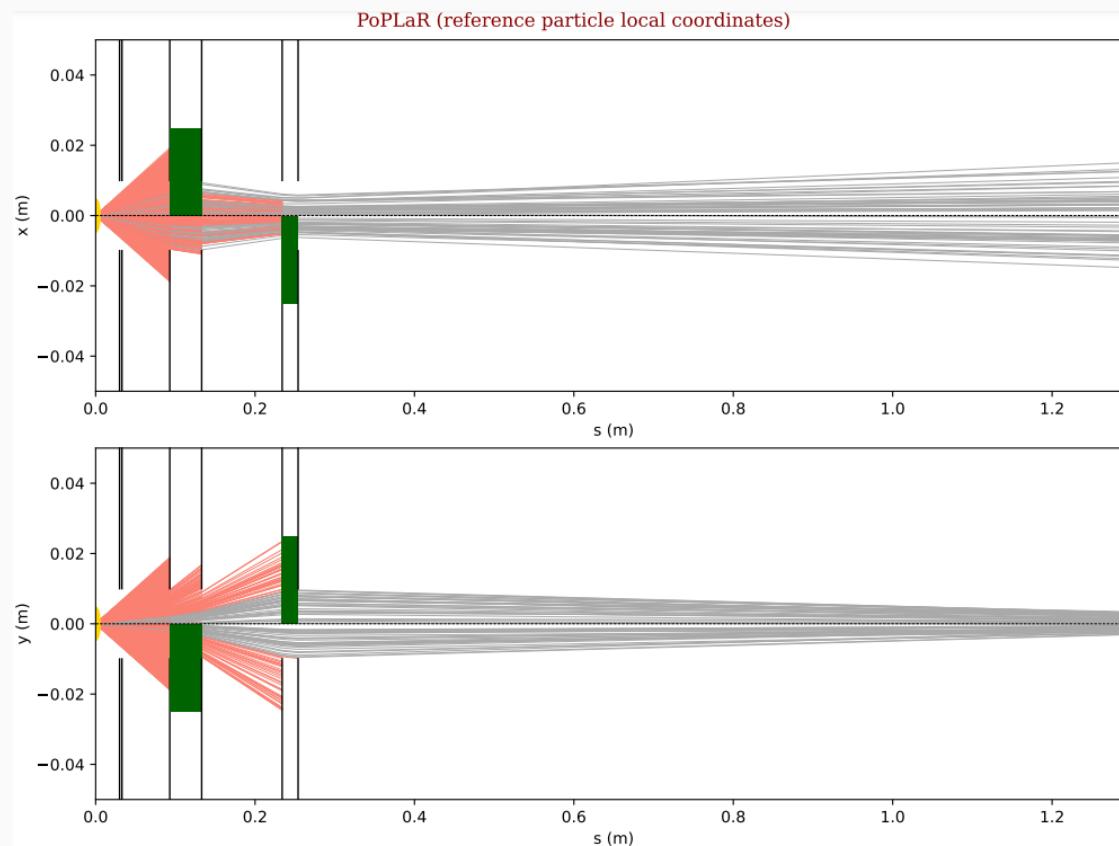
Sensitivity testing step 2- quad tilt

Reference: 4cm 2cm quad combination

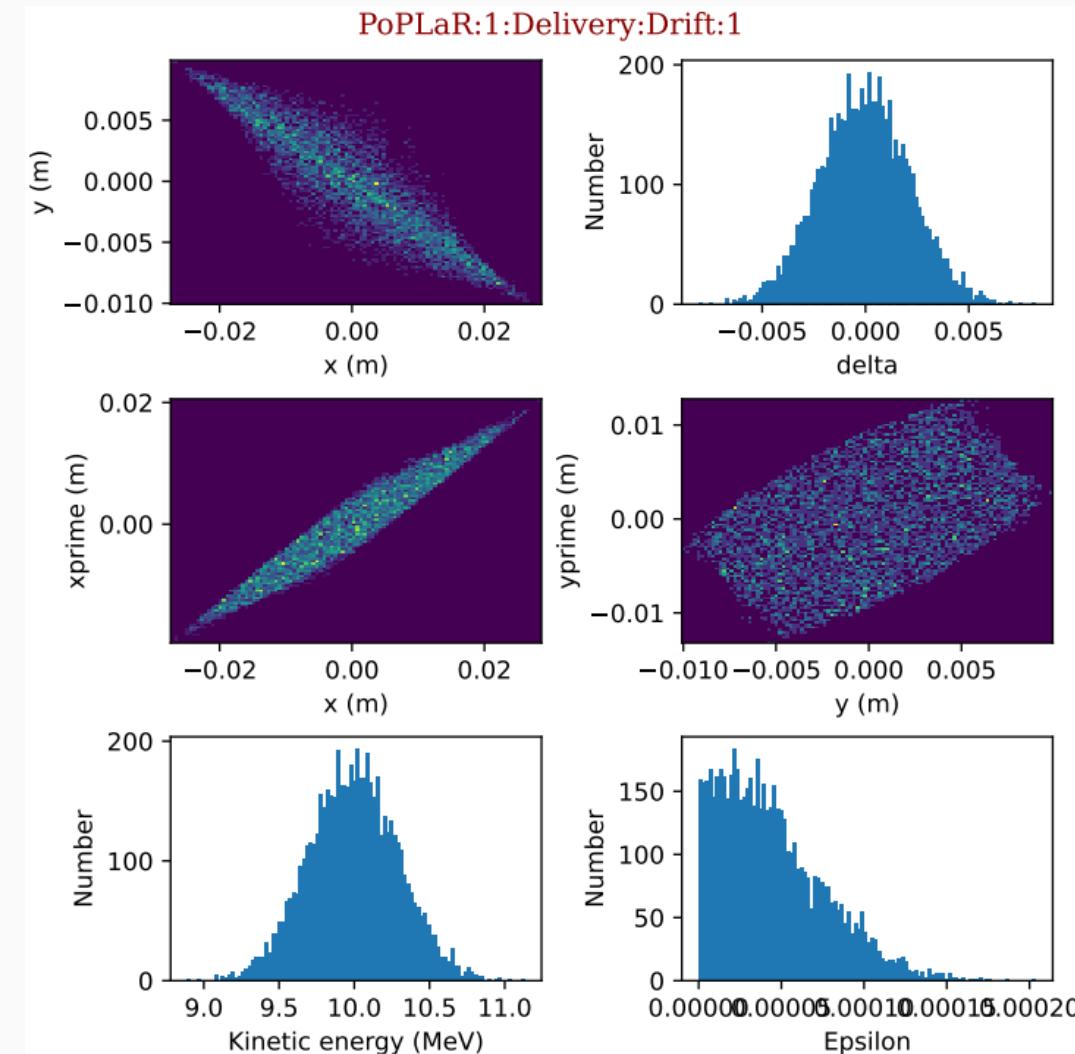
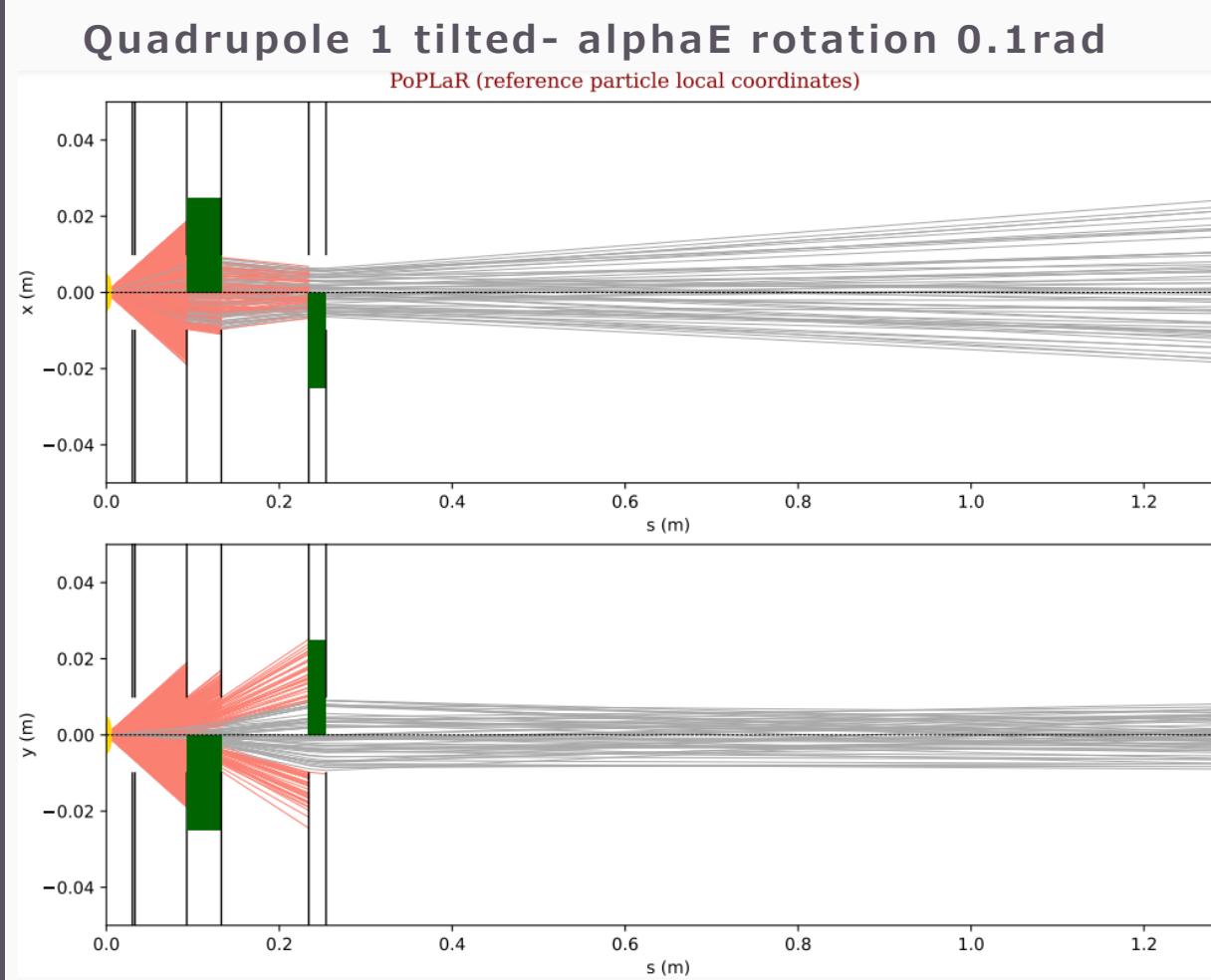


Sensitivity testing step 2- quad tilt

Quadrupole 1 tilted- alphaE rotation 0.01rad

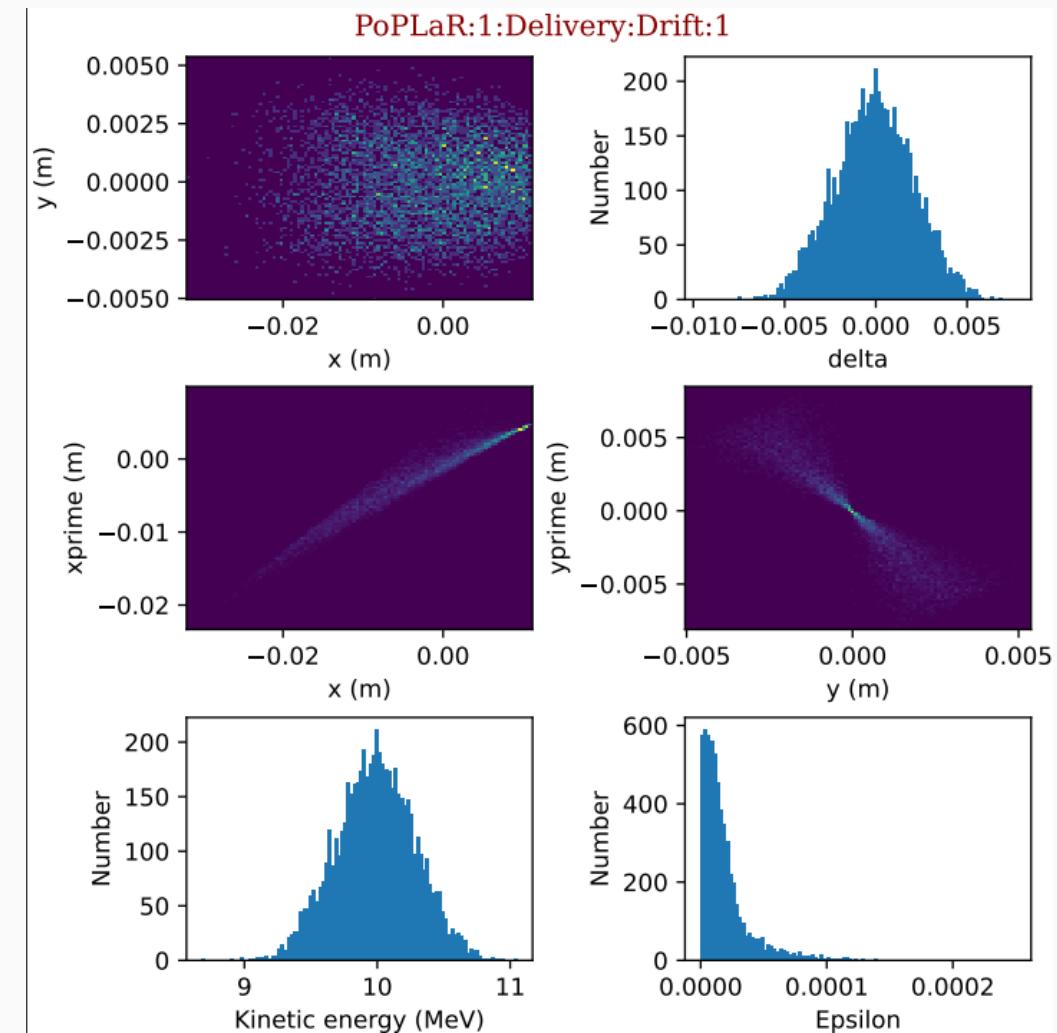
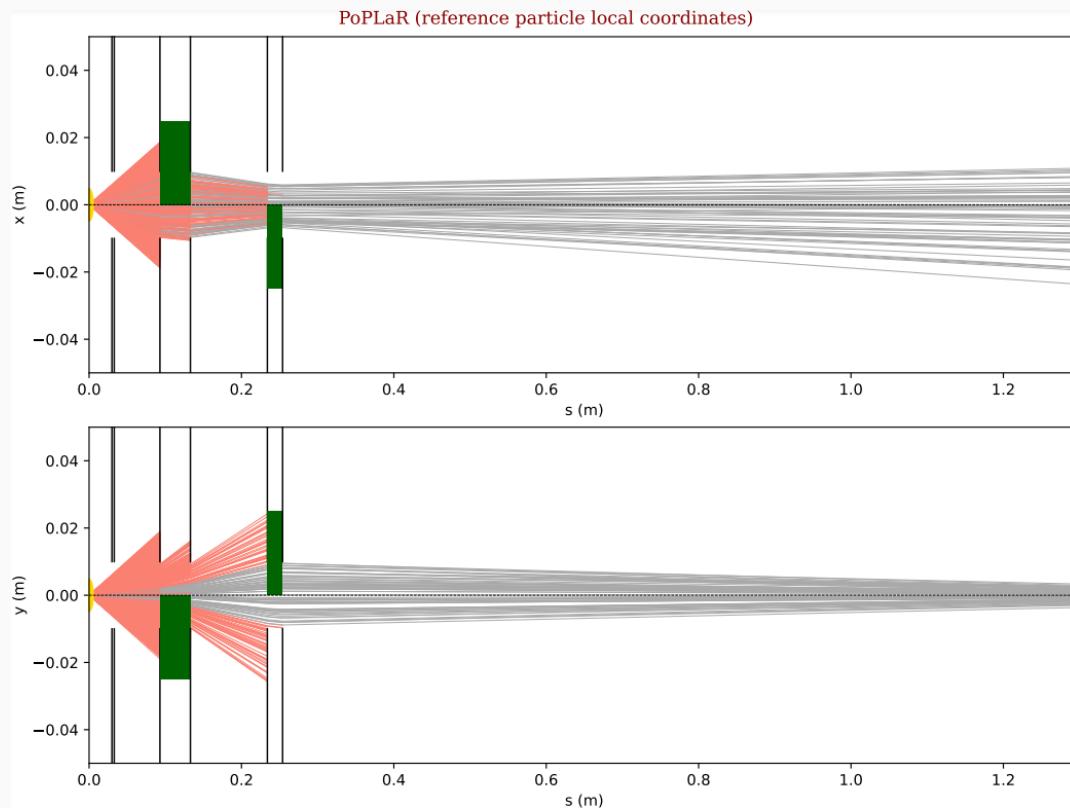


Sensitivity testing step 2- quad tilt



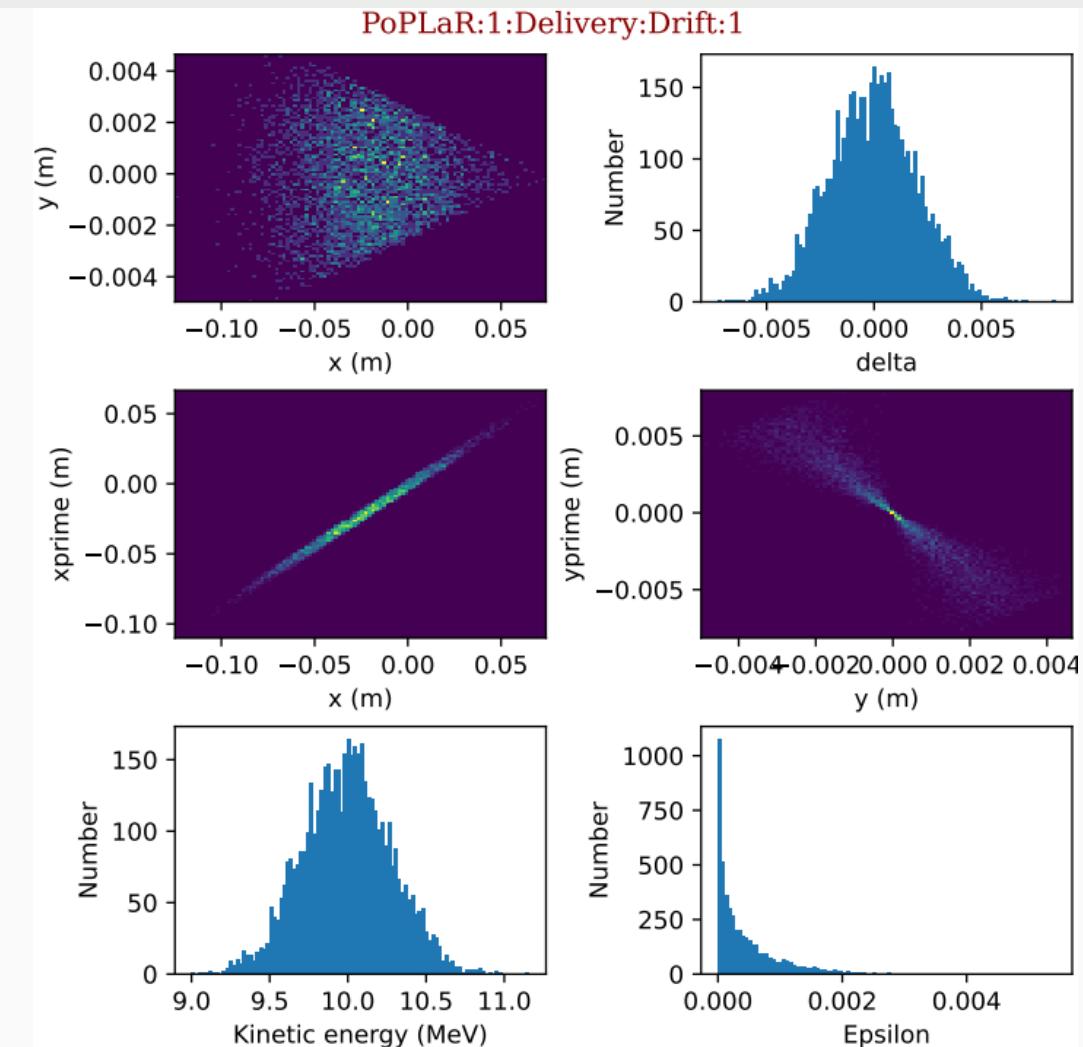
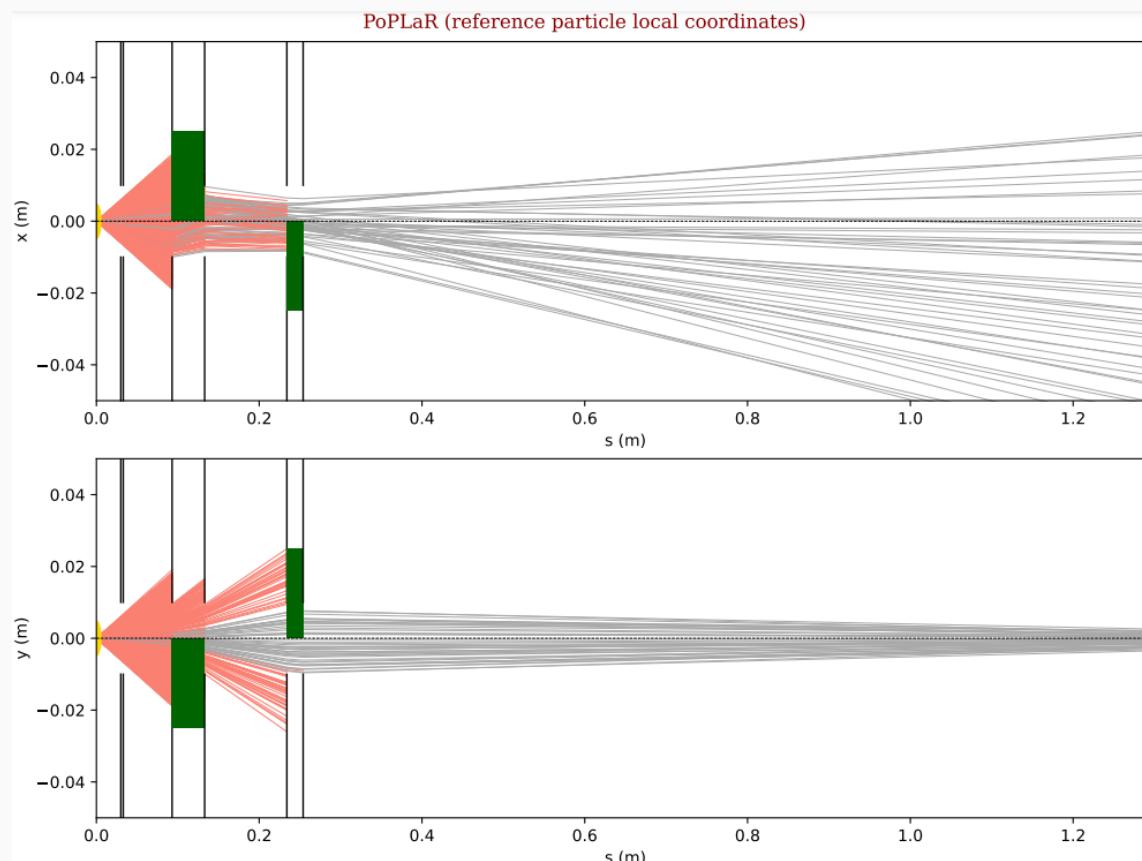
Sensitivity testing step 2- quad tilt

Quadrupole 1 tilted- betaE rotation 0.01rad

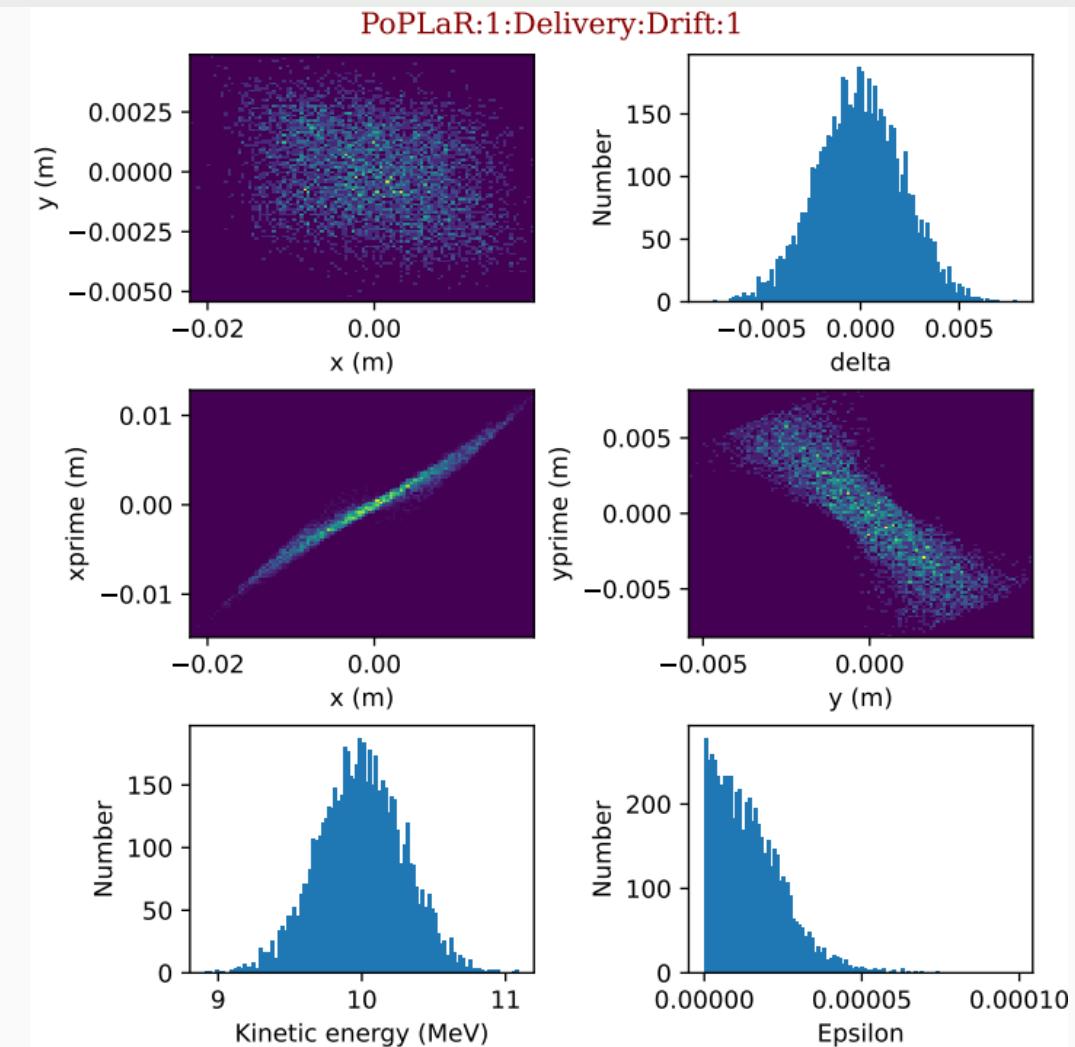
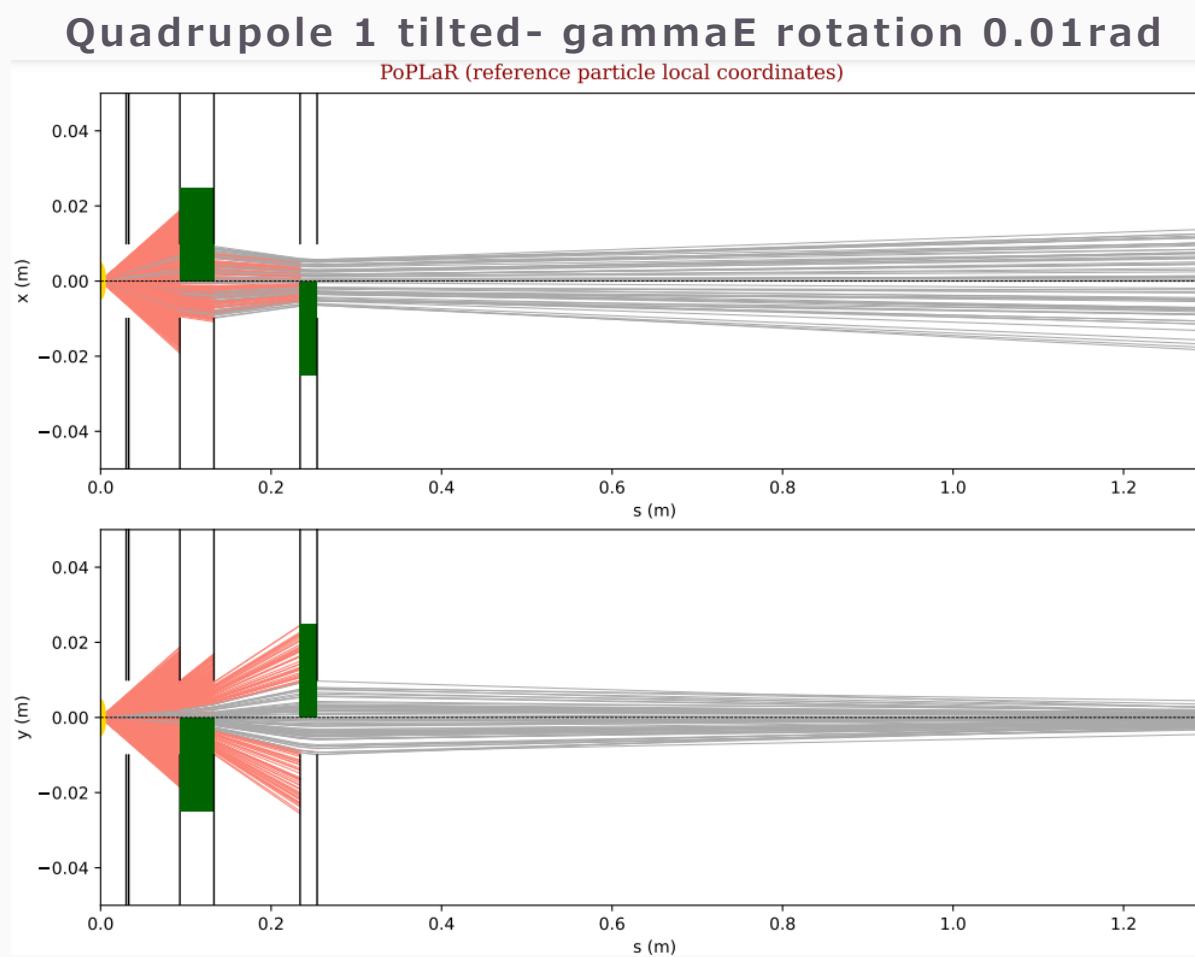


Sensitivity testing step 2- quad tilt

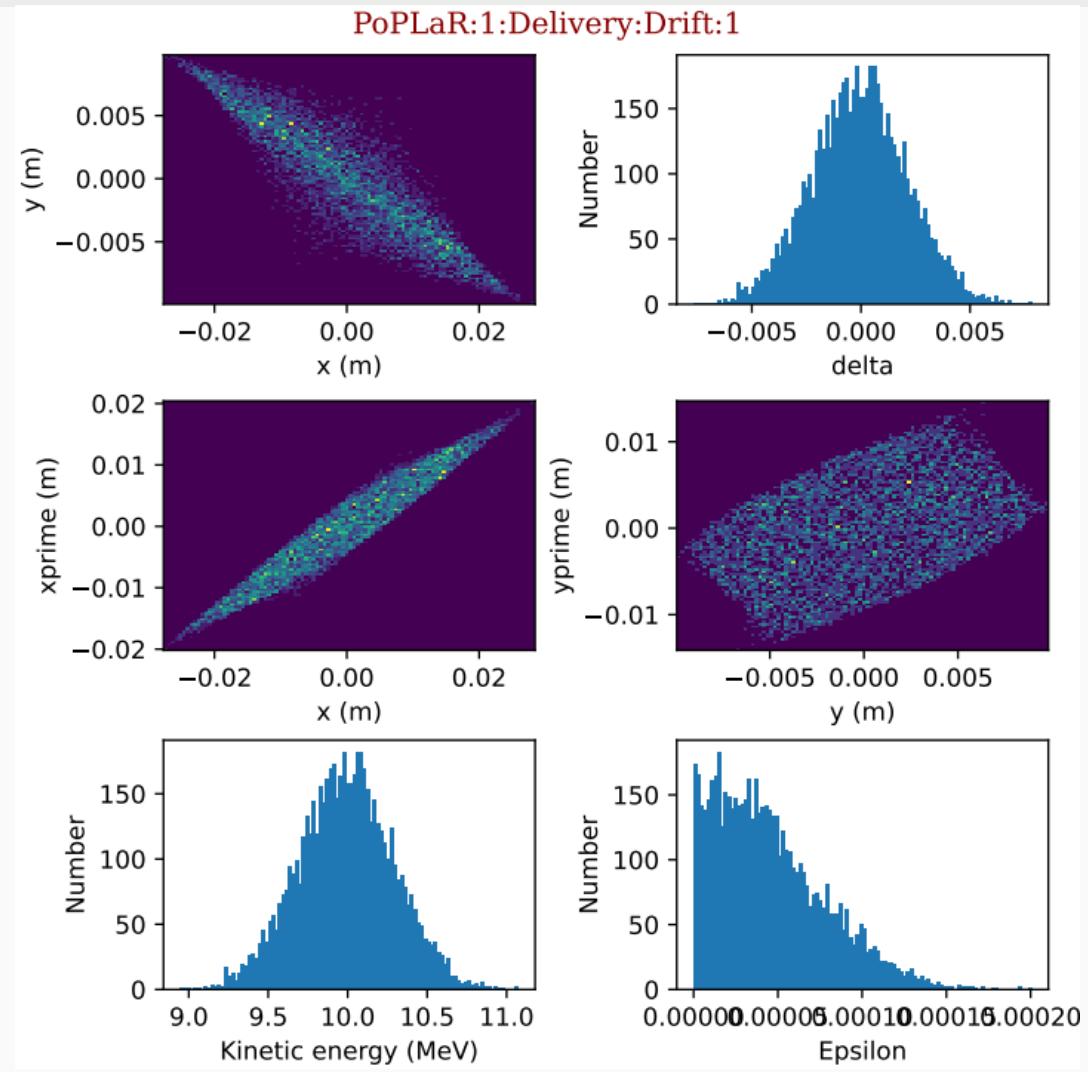
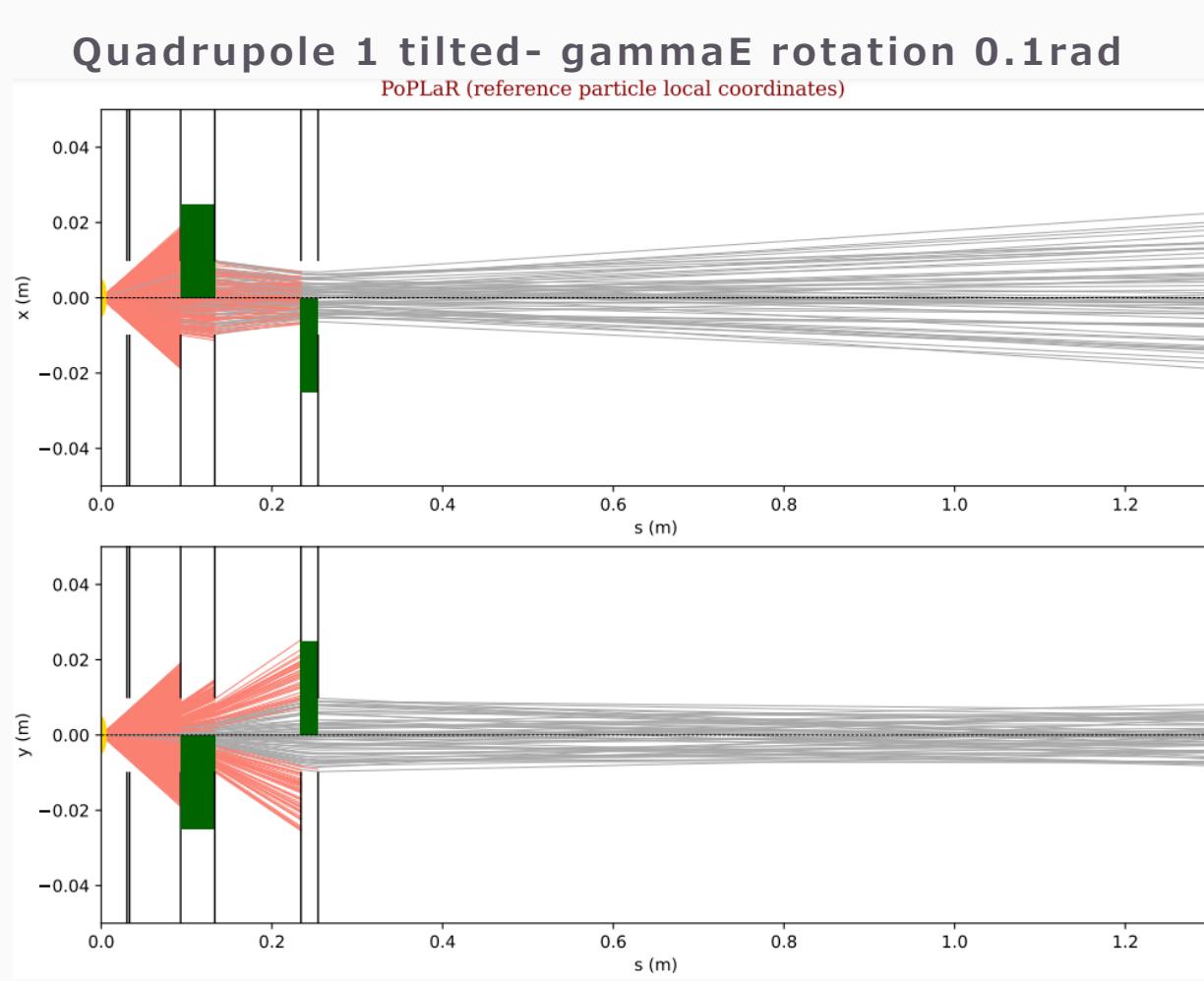
Quadrupole 1 tilted- betaE rotation 0.1rad



Sensitivity testing step 2- quad tilt

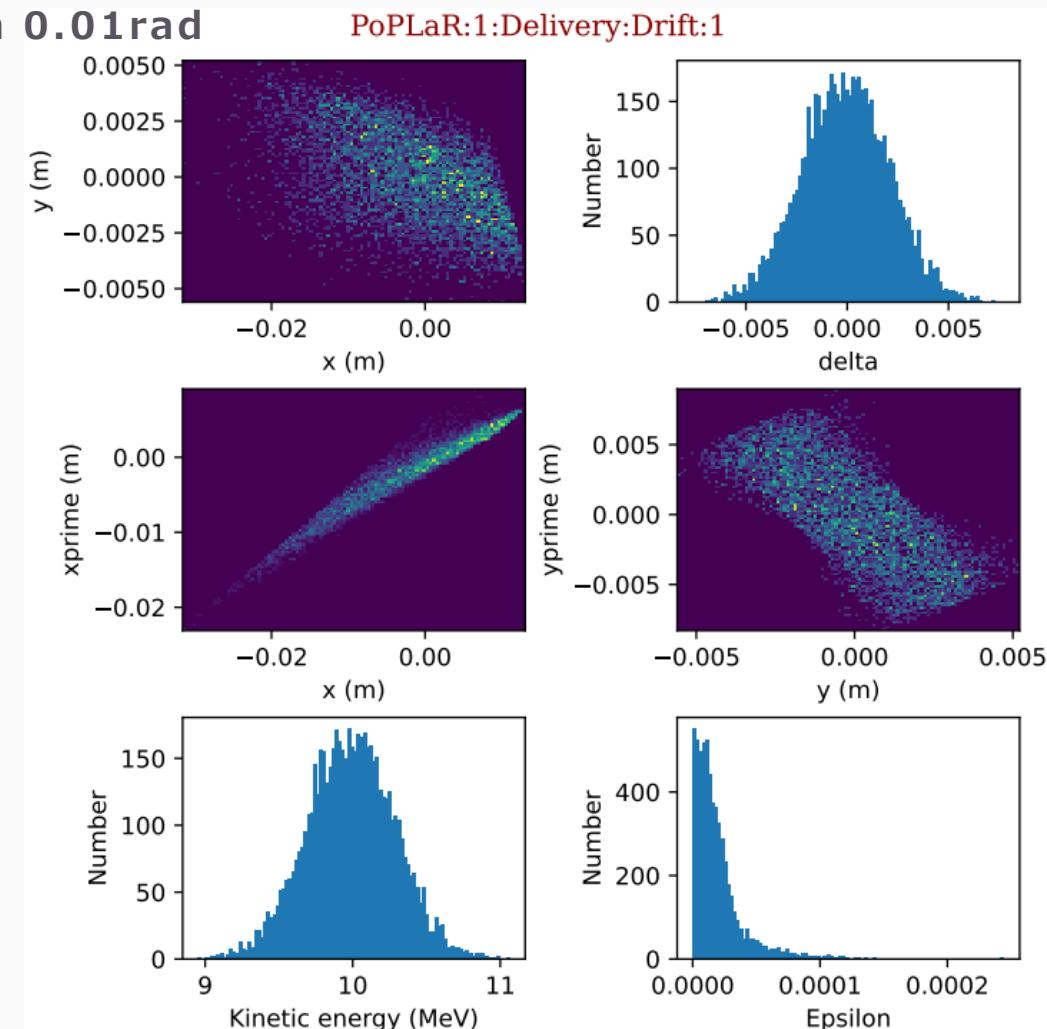
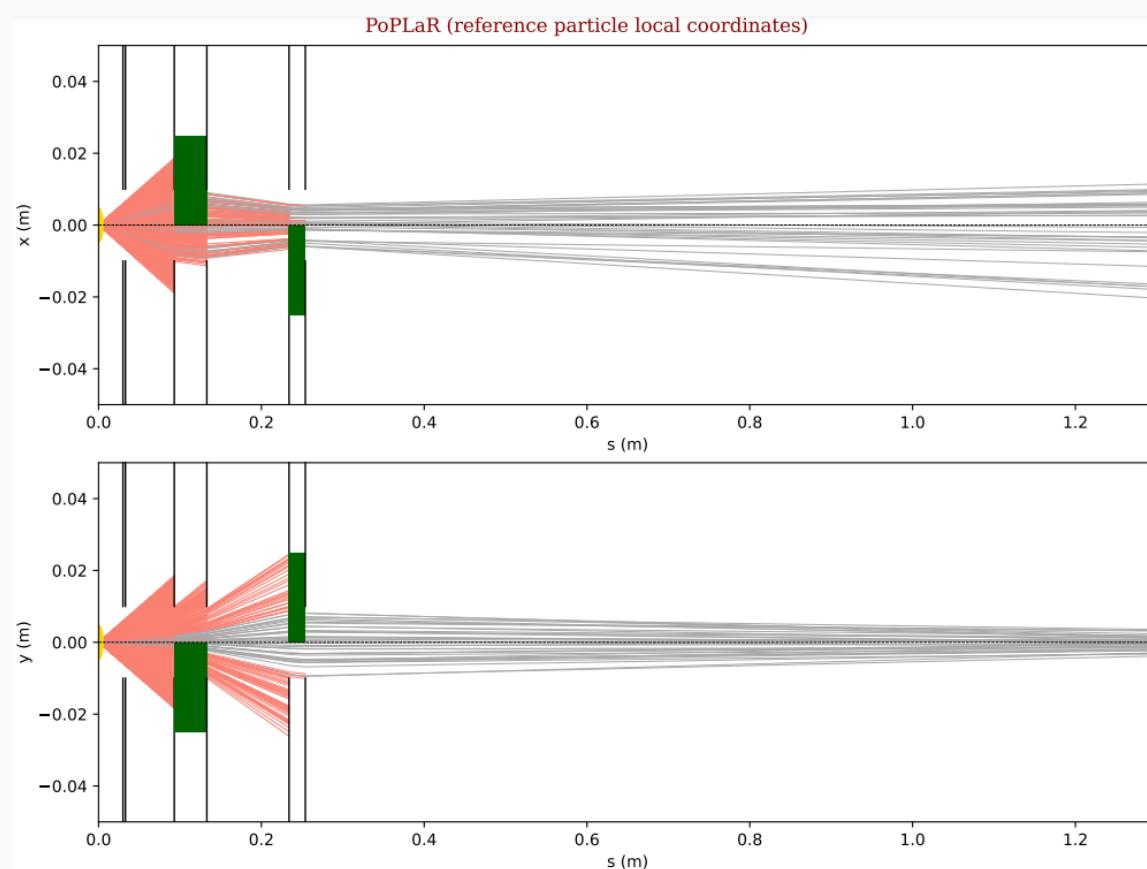


Sensitivity testing step 2- quad tilt



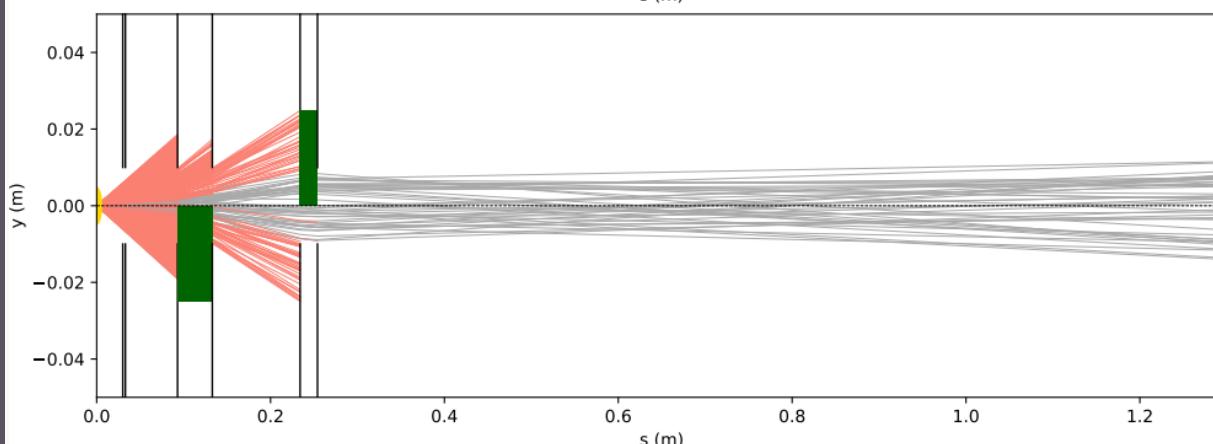
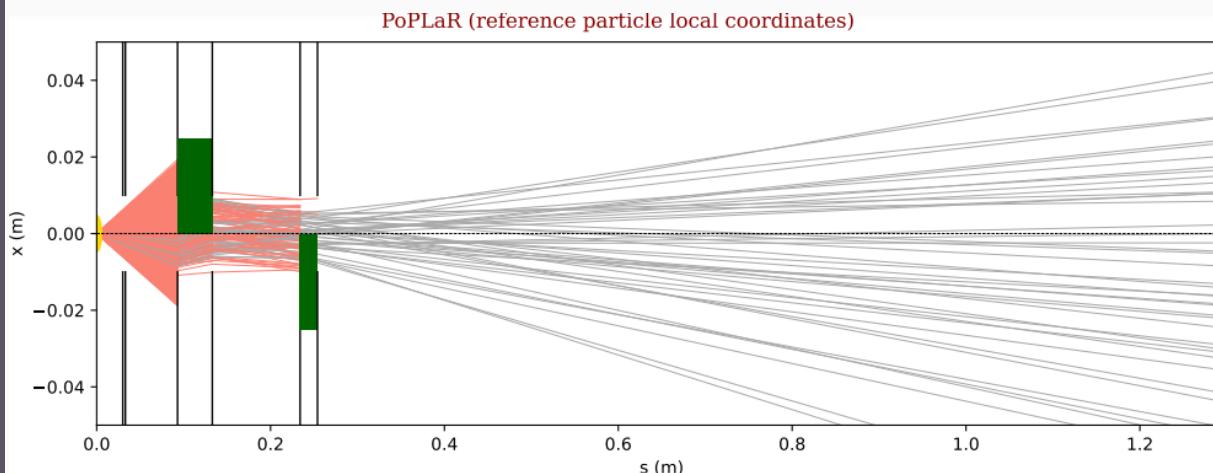
Sensitivity testing step 2- quad tilt

Quadrupole 1 tilted- alphaE, betaE, gammaE rotation 0.01rad



Sensitivity testing step 2- quad tilt

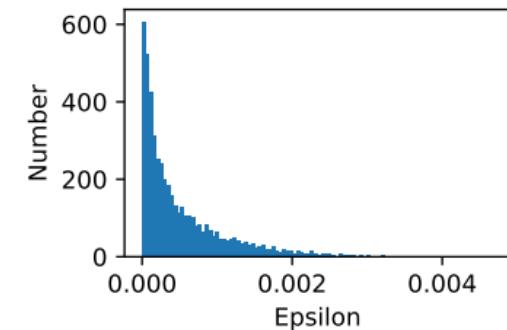
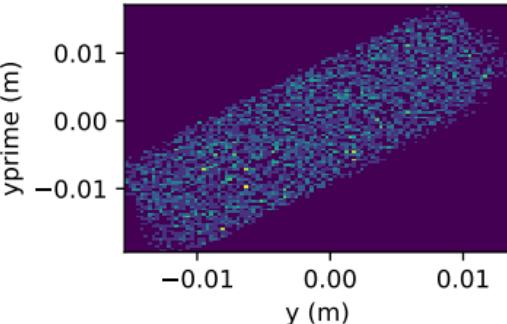
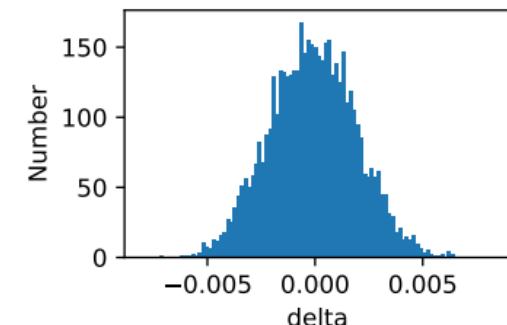
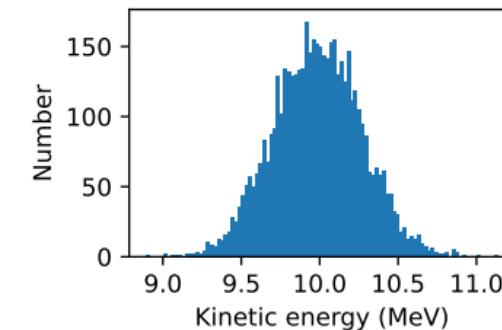
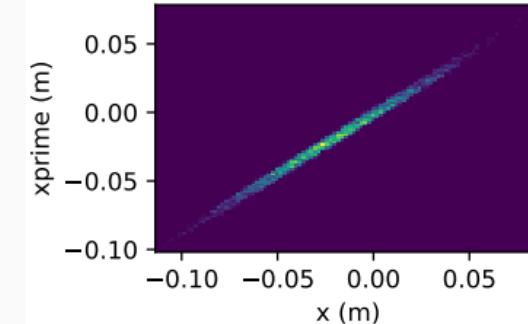
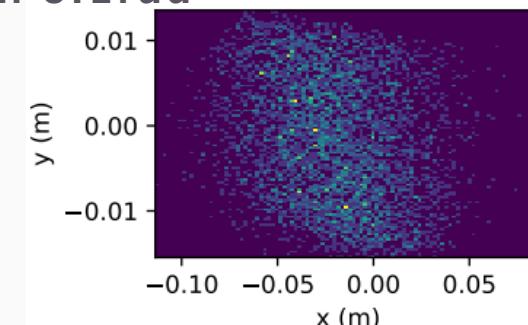
Quadrupole 1 tilted- alphaE, betaE, gammaE rotation 0.1rad



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PoPLaR:1:Delivery:Drift:1



Next steps

- Sensitivity testing on the source
- Decide on if 2nd collimator
- Design & make collimator/s
- Obtain or design clamp for 4cm quads
- Order xyz motorised stage
- Magnet testing
- Alignment
- Experiment

Order xyz stage, decide on collimator 2, design collimator/s, quads should arrive, sensitivity testing on the source

Hopefully alignment, expect xyz stage to arrive by then & all equipment to be secured

Experiment!

December

November

February

March

Make collimators, potentially alignment- more likely testing without components, obtain or design clamp for 4cm quads

Any additional simulations/extra planning to be done to correct any inconsistencies found in alignment testing

Timeline