Matching for the Electron Lens Lattice in IOTA Using Synergia

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Simulation Cases

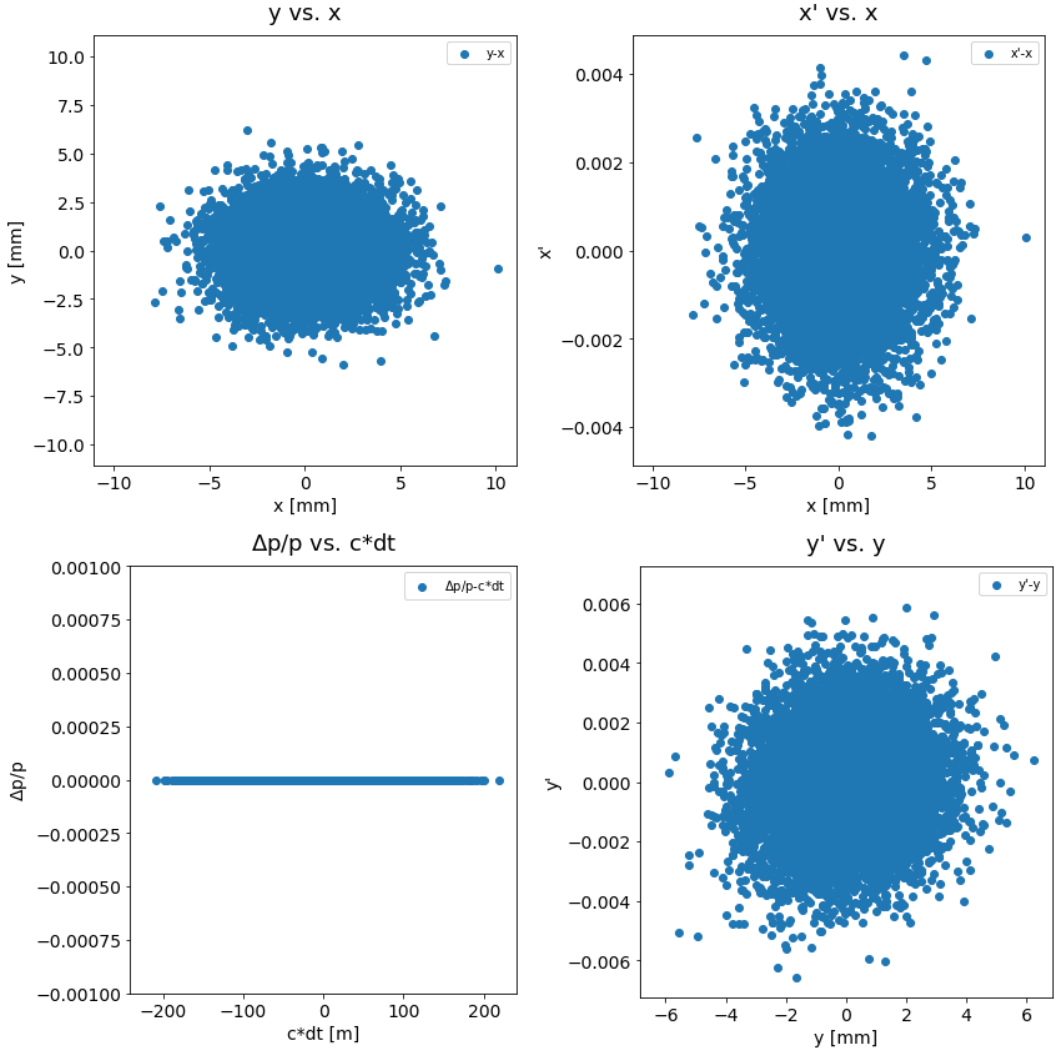
- In all cases, sextupoles and space charge are off, and the 1st order propagator is used

1) Gaussian beam matched 4D, RF off
2) KV beam matched 4D, RF off
3) Gaussian beam matched 6D, RF on (500 V/m, lag = 0)

Case 1 (Gaussian 4D) – Input Distribution

- generate_matched_bunch_transverse
- RF off

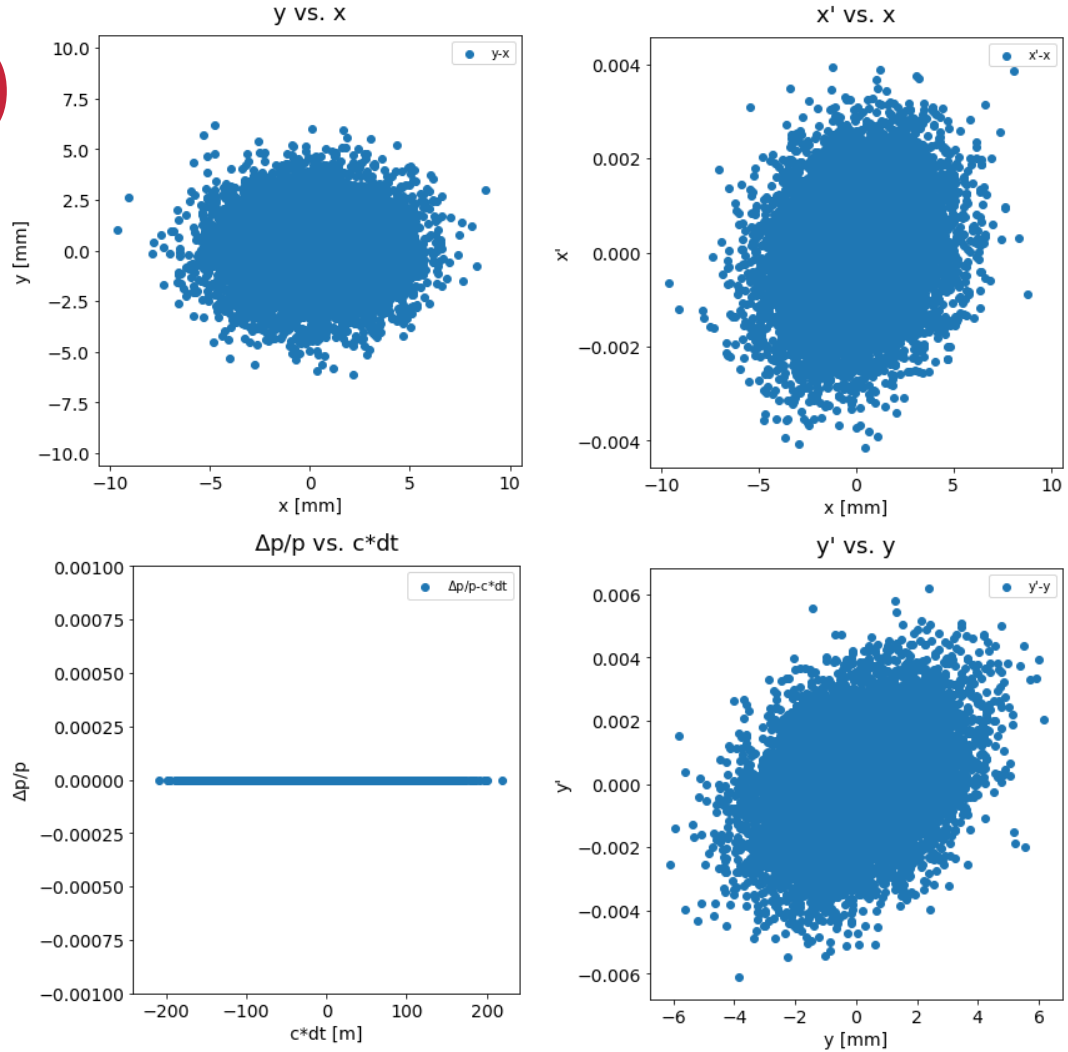
Distribution	Gaussian (matched 4D)
Macro particles	10,240
dp/p	0.000
RMS x, y	2.1, 1.54 mm
Norm. emit. x, y	0.183, 0.183 mm-mrad
RMS emit. x, y	2.50, 2.51 mm-mrad



Case 1 (Gaussian 4D) – 1st Pass Distribution

- Slight mismatch

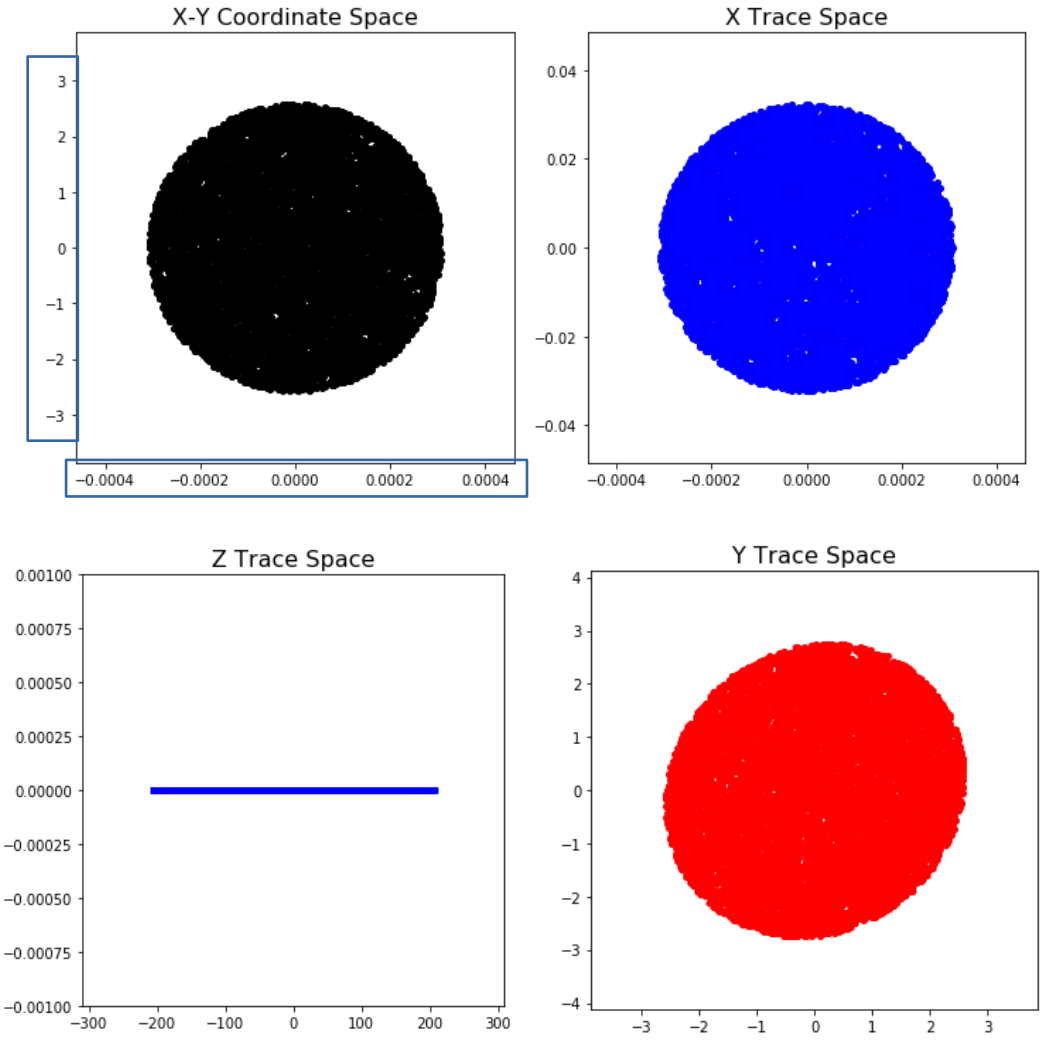
Distribution	Gaussian (matched 4D)
Macro particles	10,240
dp/p	0.000
RMS x, y	2.23, 1.65 mm
Norm. emit. x, y	0.187, 0.195 mm-mrad
RMS emit. x, y	2.57, 2.67 mm-mrad



Case 2 (KV 4D) – Input Distribution

- generate_matchedKV_bunch_transverse
- Inputs: $\varepsilon_{x,y}$ = 2.5 mm-mrad; c*dt = 38.66 m, dp/p = 0

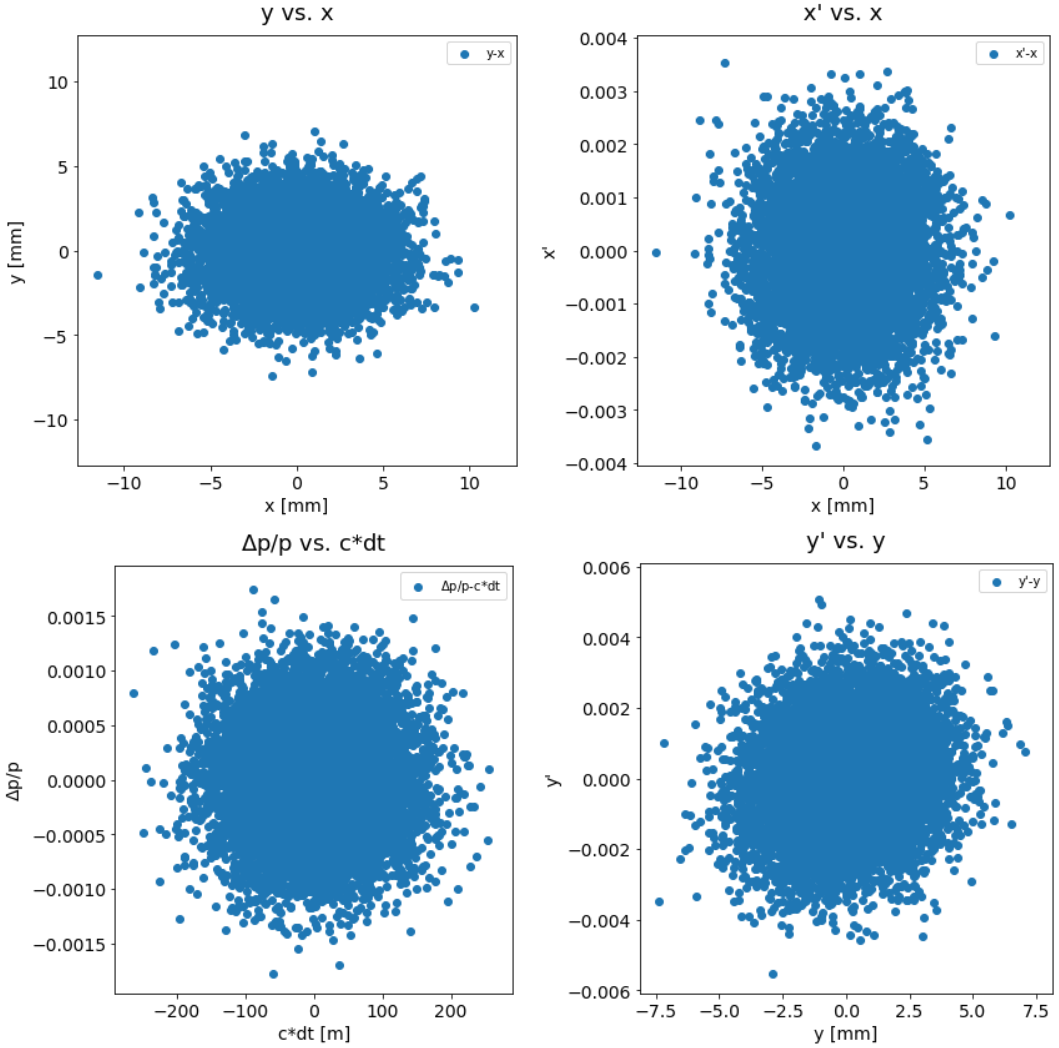
Distribution	KV (matched 4D)
Macro particles	10,240
dp/p	0.000
RMS x, y	0.154, 1290 mm
Norm. emit. x, y	0.182, 130000 mm-mrad
RMS emit. x, y	2.49, 1780000 mm-mrad



Case 3 (Gaussian 6D) – Input Distribution

- generate_matched_bunch
- Inputs: a_{rms} = 2.541e-3, b_{rms} = 1.856e-3, c_{rms} = 0.371

Distribution	Gaussian (matched 6D)
Macro particles	10,240
dp/p	0.00352
RMS x, y	2.541, 1.856 mm
Norm. emit. x, y	0.183, 0.184 mm-mrad
RMS emit. x, y	2.50, 2.52 mm-mrad



Case 3 (Gaussian 6D) – 1st Pass Distribution

- Match looks okay

Distribution	Gaussian (matched 6D)
Macro particles	10,240
dp/p	0.00431
RMS x, y	2.541, 1.856 mm
Norm. emit. x, y	0.183, 0.184 mm-mrad
RMS emit. x, y	2.50, 2.52 mm-mrad