

Integrating Warp and Synergia for Electron Column Simulations

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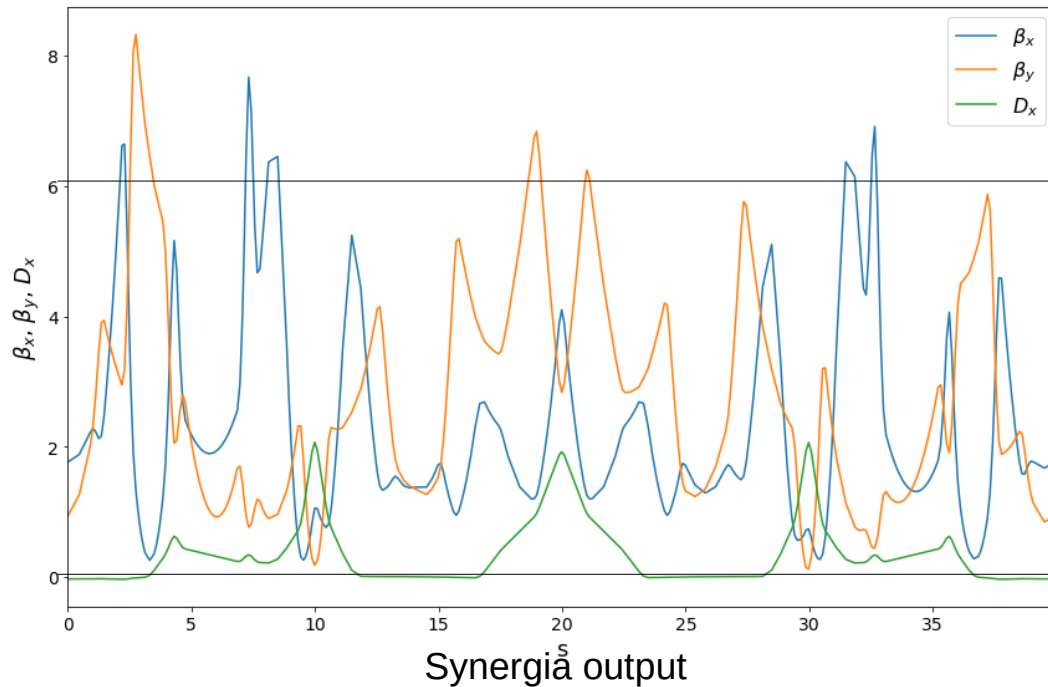
Northern Illinois
University

IOTA Physics Meeting
September 11, 2018

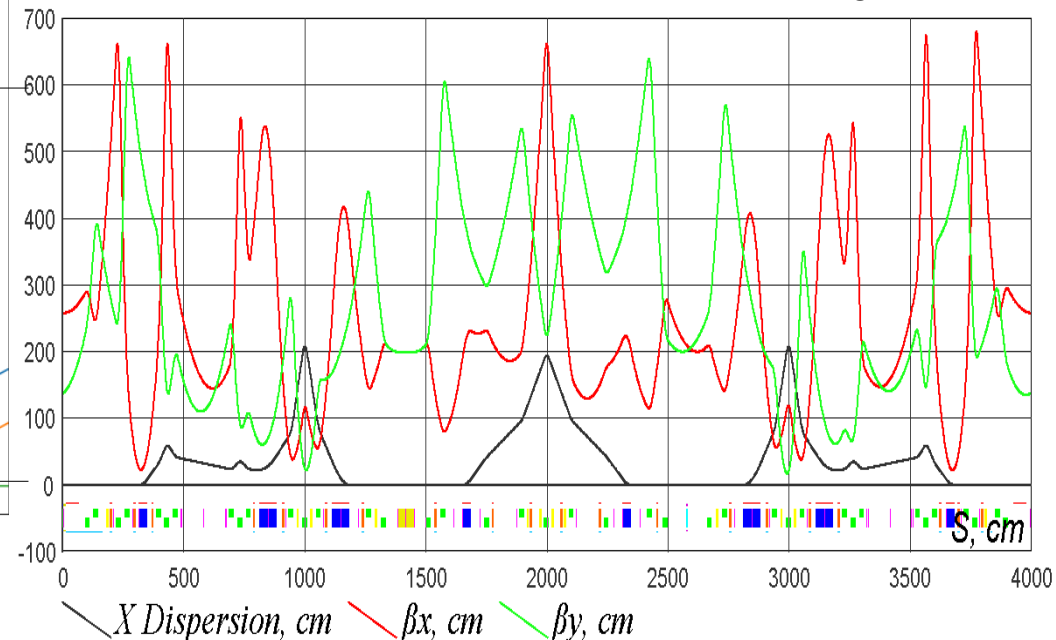
Lattice Functions – Old

- Default plotting functions in rssynergia notebook do not take into account account parameterization for transverse coupling

Lattice functions for IOTA 8-3 Electron Lens lattice

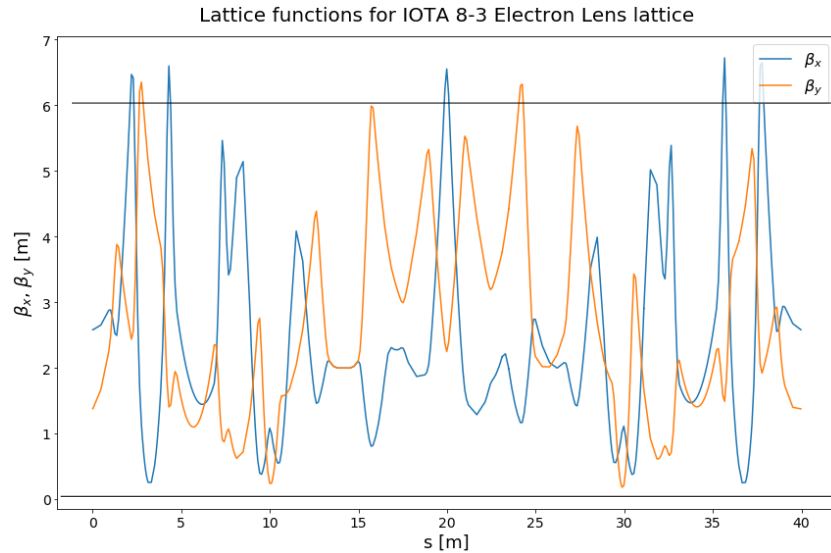


A. Romanov, FAST/IOTA Collaboration Meeting, 6/6/17

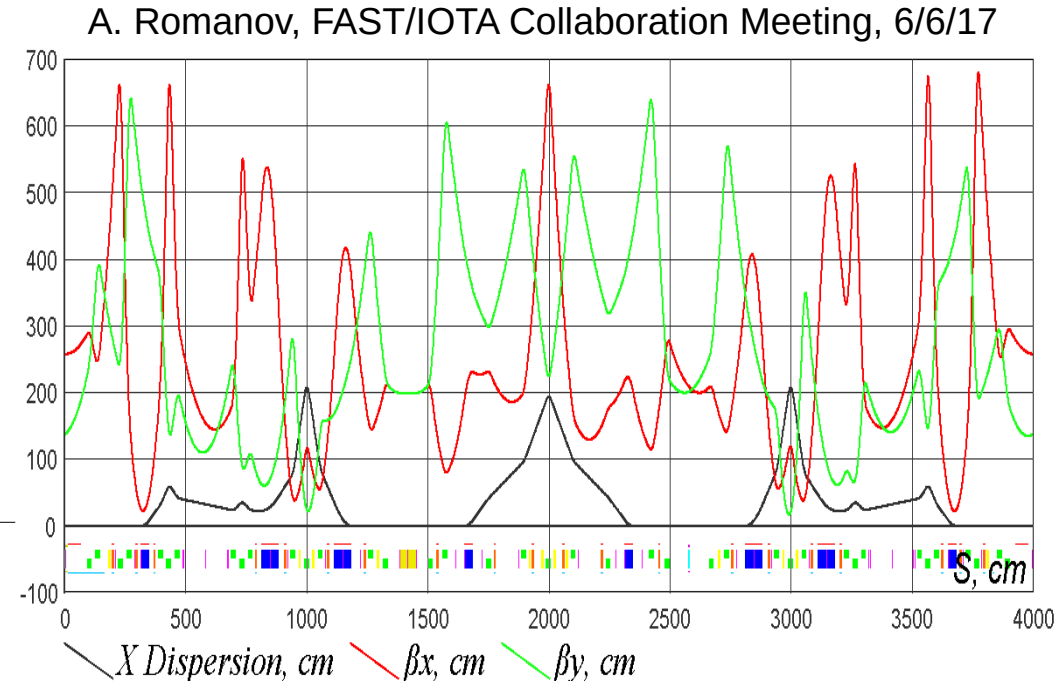


Lattice Functions – New

- Lattice functions obtained using Edwards-Teng parameterization match MADX output more closely
- Now betas matched at location of Electron Column (14 m)



Synergia output



Tunes

- MadX: 0.05570462, 0.5570302
- Synergia: 0.05572113, 0.5571157

Single Turn Transfer Matrices

All transverse components agree to better than 1e-5

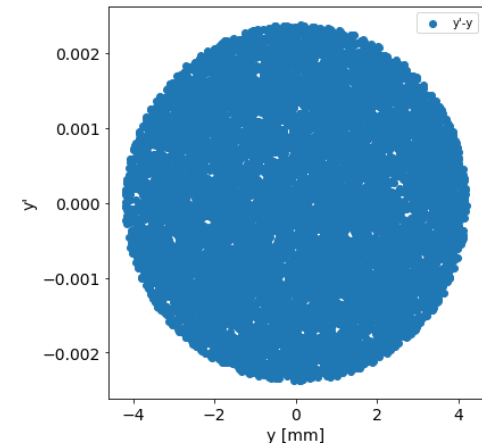
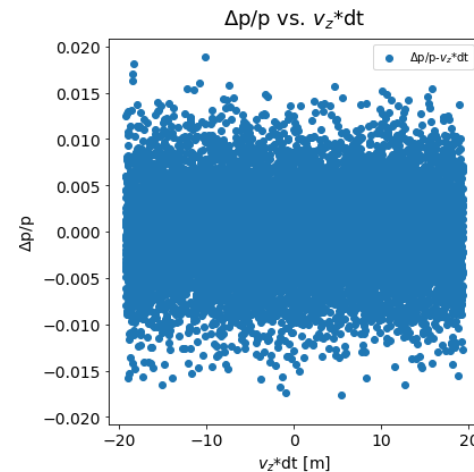
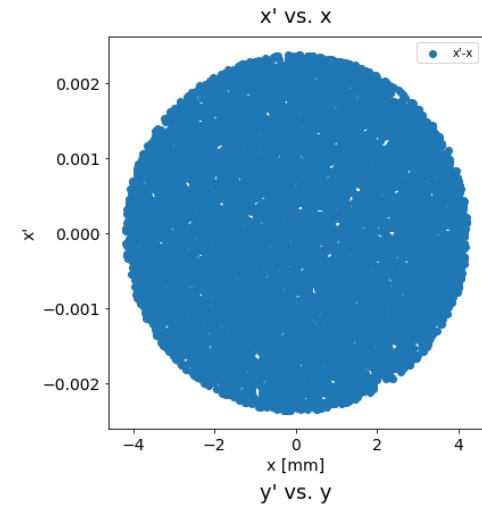
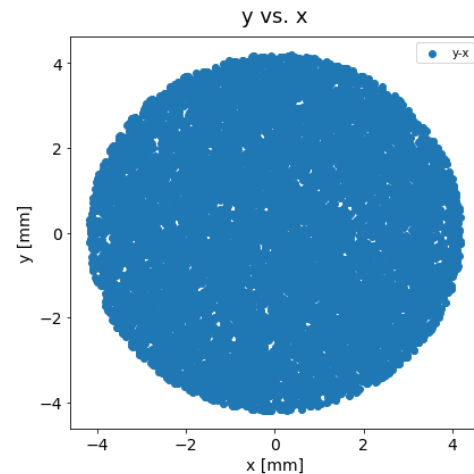
MadX

0.8869133343	0.8320647504	0.4476622818	0.1255131302	0	4.442066556e-5
-0.1247209092	0.8779270661	-0.06295416516	0.2450001631	0	-9.612252562e-5
0.2208979767	0.312833825	-0.8367709042	-0.4438185088	0	-1.381117117e-6
-0.06294877339	0.4431294584	0.2384618662	-0.9280763705	0	-1.074105455e-5
9.325215235e-5	4.373021184e-5	3.650974937e-5	-2.303727948e-6	1	7315.682648
0	0	0	0	0	1
0.886912806	0.832067495	0.447661996	0.125513821	0	-3.26294171e-6
-0.124721615	0.877926540	-0.0629544077	0.245000154	0	-7.06231664e-6
0.220897892	0.312834411	-0.836770637	-0.443819603	0	-1.13143306e-7
-0.0629490085	0.443129128	0.238462326	-0.928076111	0	-7.94958183e-7
-9.41228661e-5	-4.40891725e-5	-3.67348991e-5	2.20861440e-6	1	-532.675020
0	0	0	0	0	1

Synergia

Input Distribution

Distribution	KV
Macro particles	10,240
Current	8 mA
dp/p	0.005
Bunch length	1.77 μ s
RMS x, y	2.1 mm
Norm. emit. x, y	0.182 mm-mrad
RMS emit. x, y	2.50 mm-mrad



1st Pass Distribution

- Space-charge off, sextupoles off

Distribution	KV
Macro particles	10,240
Current	8 mA
dp/p	0.005
Bunch length	1.77 μ s
RMS x, y	2.34, 1.93 mm
Norm. emit. x, y	0.192, 1.88 mm-mrad
RMS emit. x, y	2.63, 2.57 mm-mrad

