

# Simulation & Geometry Update

William Shields  
([william.shields@rhul.ac.uk](mailto:william.shields@rhul.ac.uk))

WP6 Meeting

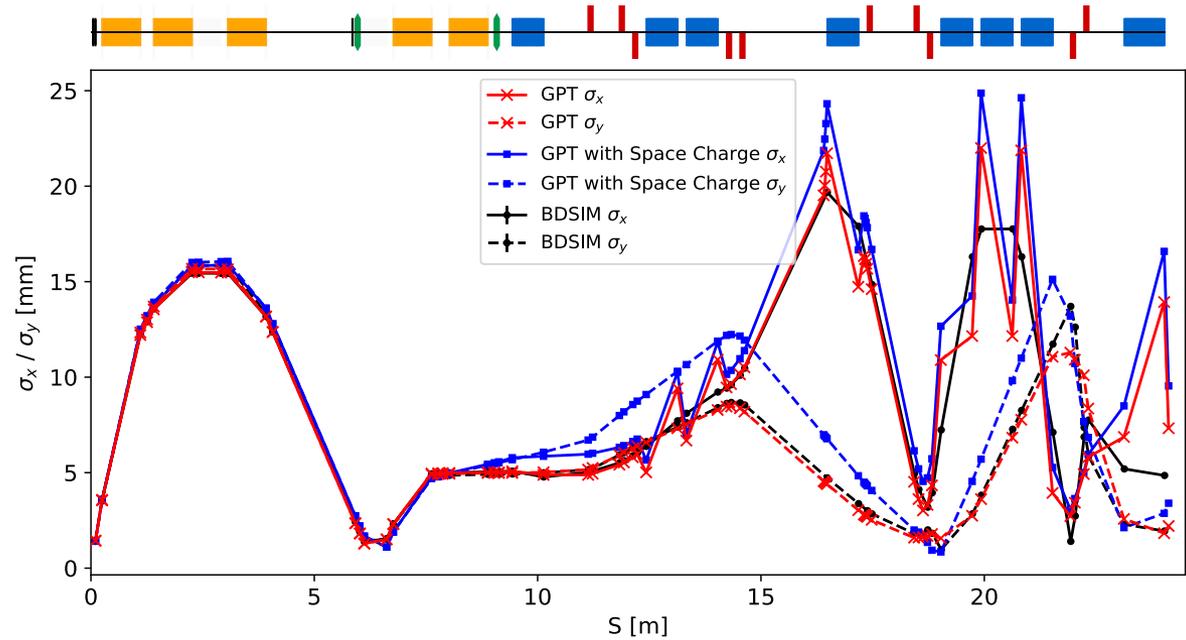
01<sup>st</sup> November 2022



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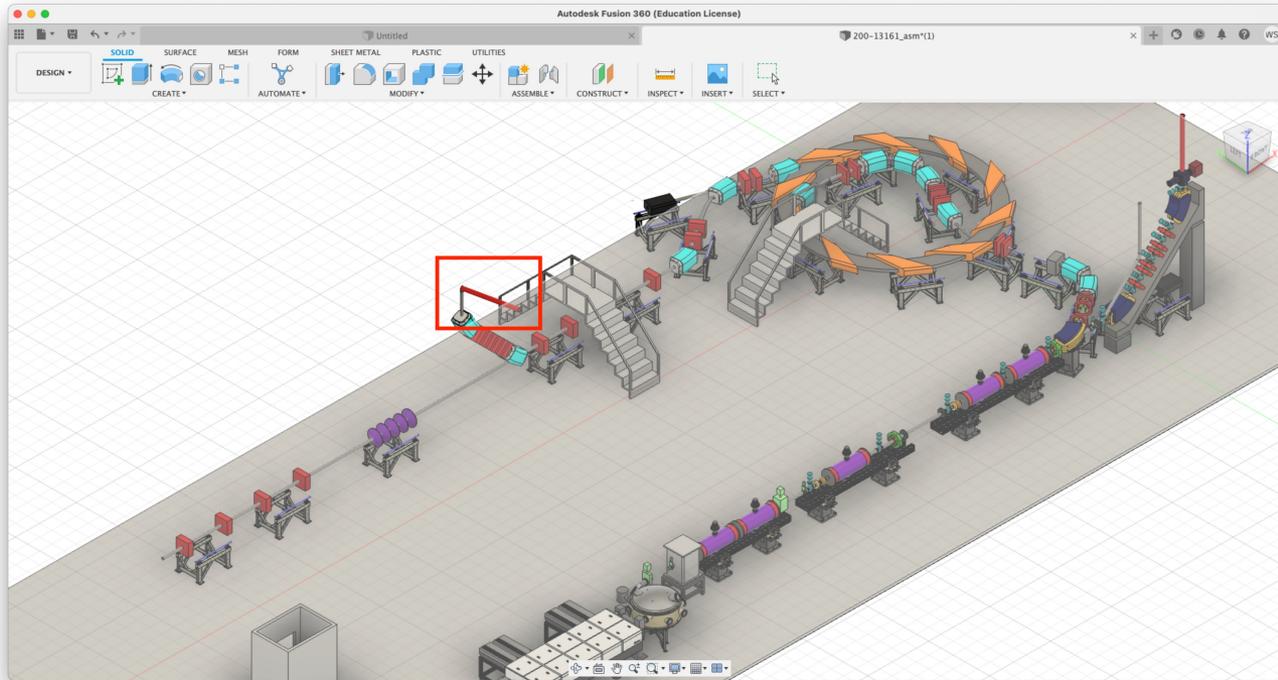


- Aim: resolve GPT model issues
  - Tout – beam before/after dipoles recorded partially within dipole field.
- Test: stage 1 – switch tout to screens.
- Bizarre output behaviour:
  - All tout ✓
  - Tout up to arc, screens in arc ✓
  - Nothing up to arc, screens in arc ✗
  - All screens ✓ (up to arc) ✗ (in arc).



- Cleanest solution: keep tout, add small T offset around dipole
  - Total beam length after matching section > 1cm.
  - Inevitable optics mismatch with BDSIM, but manageable.
  - Implementation & testing ongoing.

- Updating ccap-sim repository with collimator settings & Gabor lens strengths
  - TSD added to TN-11 (ccap-tn)
- Updating GPT model with output at locations matching collimator positions
  - Investigating:
    - GPT rmax (boolean aperture limits)
    - Switching models to take input post-collimation (BDSIM)
- Optics testing with correct beam ongoing
  - Space charge simulations



- Assessing complexity for conversion
- Wrong orientation of last stage 2 arc vertical drift
- Material information
  - Some stored in STEP file?

```
#1370030=DESCRIPTIVE_REPRESENTATION_ITEM('PTC_MATERIAL_NAME', 'STEEL');
```

- Looking to install Cleo – investigate material export

- BDSIM to CAD:
  - Model stored in output files
  - Python script to extract relevant parameters
  - Element locations, orientations, sizes, strengths, apertures, ...
  - Pandas: DataFrame.to\_excel

survey — less -S ccapv43.dat — 204x60

```
### BDSIM output - created Thu Mar 12 16:32:39 2020
```

Type	Name	SStart[m]	SMid[m]	SEnd[m]	ChordLength[m]	ArcLength[m]	X[m]	Y[m]	Z[m]	Phi[rad]	Theta[rad]
drift	o0	0.000000	0.050000	0.100000	0.100000	0.100000	0.000000	0.000000	0.050000	0.000000	0.000000
drift	o1	0.100000	0.175000	0.250000	0.150000	0.150000	0.000000	0.000000	0.175000	0.000000	0.000000
solenoid	gl1_fringe_in	0.250000	0.250000	0.250000	0.000000	0.000000	0.000000	0.000000	0.250000	0.000000	0.000000
	gl1_centre	0.250000	0.678500	1.107000	0.857000	0.857000	0.000000	0.000000	0.678500	0.000000	0.000000
	gl1_fringe_out	1.107000	1.107000	1.107000	0.000000	0.000000	0.000000	0.000000	1.107000	0.000000	0.000000
drift	o2	1.107000	1.182000	1.257000	0.150000	0.150000	0.000000	0.000000	1.182000	0.000000	0.000000
drift	o2a	1.257000	1.332000	1.407000	0.150000	0.150000	0.000000	0.000000	1.332000	0.000000	0.000000
solenoid	gl2_fringe_in	1.407000	1.407000	1.407000	0.000000	0.000000	0.000000	0.000000	1.407000	0.000000	0.000000
	gl2_centre	1.407000	1.835500	2.264000	0.857000	0.857000	0.000000	0.000000	1.835500	0.000000	0.000000
	gl2_fringe_out	2.264000	2.264000	2.264000	0.000000	0.000000	0.000000	0.000000	2.264000	0.000000	0.000000
drift	o3	2.264000	2.339000	2.414000	0.150000	0.150000	0.000000	0.000000	2.339000	0.000000	0.000000
cavity_pillbox	s1rf1	2.414000	2.664000	2.914000	0.500000	0.500000	0.000000	0.000000	2.664000	0.000000	0.000000
drift	o5	2.914000	2.989000	3.064000	0.150000	0.150000	0.000000	0.000000	2.989000	0.000000	0.000000
solenoid	gl3_fringe_in	3.064000	3.064000	3.064000	0.000000	0.000000	0.000000	0.000000	3.064000	0.000000	0.000000
	gl3_centre	3.064000	3.492500	3.921000	0.857000	0.857000	0.000000	0.000000	3.492500	0.000000	0.000000
	gl3_fringe_out	3.921000	3.921000	3.921000	0.000000	0.000000	0.000000	0.000000	3.921000	0.000000	0.000000
drift	o6	3.921000	3.996000	4.071000	0.150000	0.150000	0.000000	0.000000	3.996000	0.000000	0.000000
drift	o7	4.071000	4.996000	5.921000	1.850000	1.850000	0.000000	0.000000	4.996000	0.000000	0.000000
octupole	oct1	5.921000	5.971000	6.021000	0.100000	0.100000	0.000000	0.000000	5.971000	0.000000	0.000000
drift	o7a	6.021000	6.071000	6.121000	0.100000	0.100000	0.000000	0.000000	6.071000	0.000000	0.000000
cavity_pillbox	s1rf2	6.121000	6.371000	6.621000	0.500000	0.500000	0.000000	0.000000	6.371000	0.000000	0.000000
drift	o8	6.621000	6.696000	6.771000	0.150000	0.150000	0.000000	0.000000	6.696000	0.000000	0.000000
solenoid	gl4_fringe_in	6.771000	6.771000	6.771000	0.000000	0.000000	0.000000	0.000000	6.771000	0.000000	0.000000
	gl4_centre	6.771000	7.199500	7.628000	0.857000	0.857000	0.000000	0.000000	7.199500	0.000000	0.000000
	gl4_fringe_out	7.628000	7.628000	7.628000	0.000000	0.000000	0.000000	0.000000	7.628000	0.000000	0.000000
drift	o9	7.628000	7.703000	7.778000	0.150000	0.150000	0.000000	0.000000	7.703000	0.000000	0.000000
drift	o10	7.778000	7.828000	7.878000	0.100000	0.100000	0.000000	0.000000	7.828000	0.000000	0.000000
drift	o11	7.878000	7.953000	8.028000	0.150000	0.150000	0.000000	0.000000	7.953000	0.000000	0.000000
solenoid	gl5_fringe_in	8.028000	8.028000	8.028000	0.000000	0.000000	0.000000	0.000000	8.028000	0.000000	0.000000
	gl5_centre	8.028000	8.456500	8.885000	0.857000	0.857000	0.000000	0.000000	8.456500	0.000000	0.000000
	gl5_fringe_out	8.885000	8.885000	8.885000	0.000000	0.000000	0.000000	0.000000	8.885000	0.000000	0.000000
drift	o12	8.885000	8.960000	9.035000	0.150000	0.150000	0.000000	0.000000	8.960000	0.000000	0.000000
octupole	oct2	9.035000	9.085000	9.135000	0.100000	0.100000	0.000000	0.000000	9.085000	0.000000	0.000000
drift	o12ea	9.135000	9.285000	9.435000	0.300000	0.300000	0.000000	0.000000	9.285000	0.000000	0.000000
sbend	s1esb1_even_ang	9.435000	9.461923	9.488846	0.053844	0.053844	0.000453	0.000000	9.461918	-1.570796	0.016827
sbend	s1esb1_even_ang	9.488846	9.515769	9.542692	0.053844	0.053844	0.002264	0.000000	9.515723	-1.570796	0.050481
sbend	s1esb1_even_ang	9.542692	9.569615	9.596538	0.053844	0.053844	0.005885	0.000000	9.569437	-1.570796	0.084135
sbend	s1esb1_even_ang	9.596538	9.623461	9.650384	0.053844	0.053844	0.011311	0.000000	9.622999	-1.570796	0.117788
sbend	s1esb1_even_ang	9.650384	9.677307	9.704230	0.053844	0.053844	0.018537	0.000000	9.676348	-1.570796	0.151442
sbend	s1esb1_even_ang	9.704230	9.731153	9.758077	0.053844	0.053844	0.027553	0.000000	9.729424	-1.570796	0.185096
sbend	s1esb1_even_ang	9.758077	9.785000	9.811923	0.053844	0.053844	0.038350	0.000000	9.782166	-1.570796	0.218750
sbend	s1esb1_even_ang	9.811923	9.838846	9.865769	0.053844	0.053844	0.050915	0.000000	9.834515	-1.570796	0.252404
sbend	s1esb1_even_ang	9.865769	9.892692	9.919615	0.053844	0.053844	0.065235	0.000000	9.886412	-1.570796	0.286058
sbend	s1esb1_even_ang	9.919615	9.946538	9.973461	0.053844	0.053844	0.081293	0.000000	9.937797	-1.570796	0.319712
sbend	s1esb1_even_ang	9.973461	10.000384	10.027307	0.053844	0.053844	0.099071	0.000000	9.988613	-1.570796	0.353365
sbend	s1esb1_even_ang	10.027307	10.054230	10.081153	0.053844	0.053844	0.118549	0.000000	10.038802	-1.570796	0.387019
sbend	s1esb1_even_ang	10.081153	10.108077	10.135000	0.053844	0.053844	0.139704	0.000000	10.088307	-1.570796	0.420673
drift	s1edr1	10.135000	10.635000	11.135000	1.000000	1.000000	0.362536	0.000000	10.565789	-1.570796	0.437500
quadrupole	s1eqf1	11.135000	11.185000	11.235000	0.100000	0.100000	0.595558	0.000000	11.063986	-1.570796	0.437500
drift	s1edr2	11.235000	11.535000	11.835000	0.600000	0.600000	0.743845	0.000000	11.381021	-1.570796	0.437500
quadrupole	s1eqf2	11.835000	11.885000	11.935000	0.100000	0.100000	0.892132	0.000000	11.698056	-1.570796	0.437500
drift	s1edr3	11.935000	12.035000	12.135000	0.200000	0.200000	0.955683	0.000000	11.833928	-1.570796	0.437500
quadrupole	s1eqd1	12.135000	12.185000	12.235000	0.100000	0.100000	1.019234	0.000000	11.969800	-1.570796	0.437500
drift	s1edr4	12.235000	12.335000	12.435000	0.200000	0.200000	1.082786	0.000000	12.105672	-1.570796	0.437500
sbend	s1esb2_even_ang	12.435000	12.458333	12.481666	0.046663	0.046667	1.135487	0.000000	12.217172	-1.570796	0.458833
sbend	s1esb2_even_ang	12.481666	12.505000	12.528333	0.046663	0.046667	1.157037	0.000000	12.258549	-1.570796	0.501500
sbend	s1esb2_even_ang	12.528333	12.551666	12.575000	0.046663	0.046667	1.180333	0.000000	12.298969	-1.570796	0.544167