Simulation & Geometry Update

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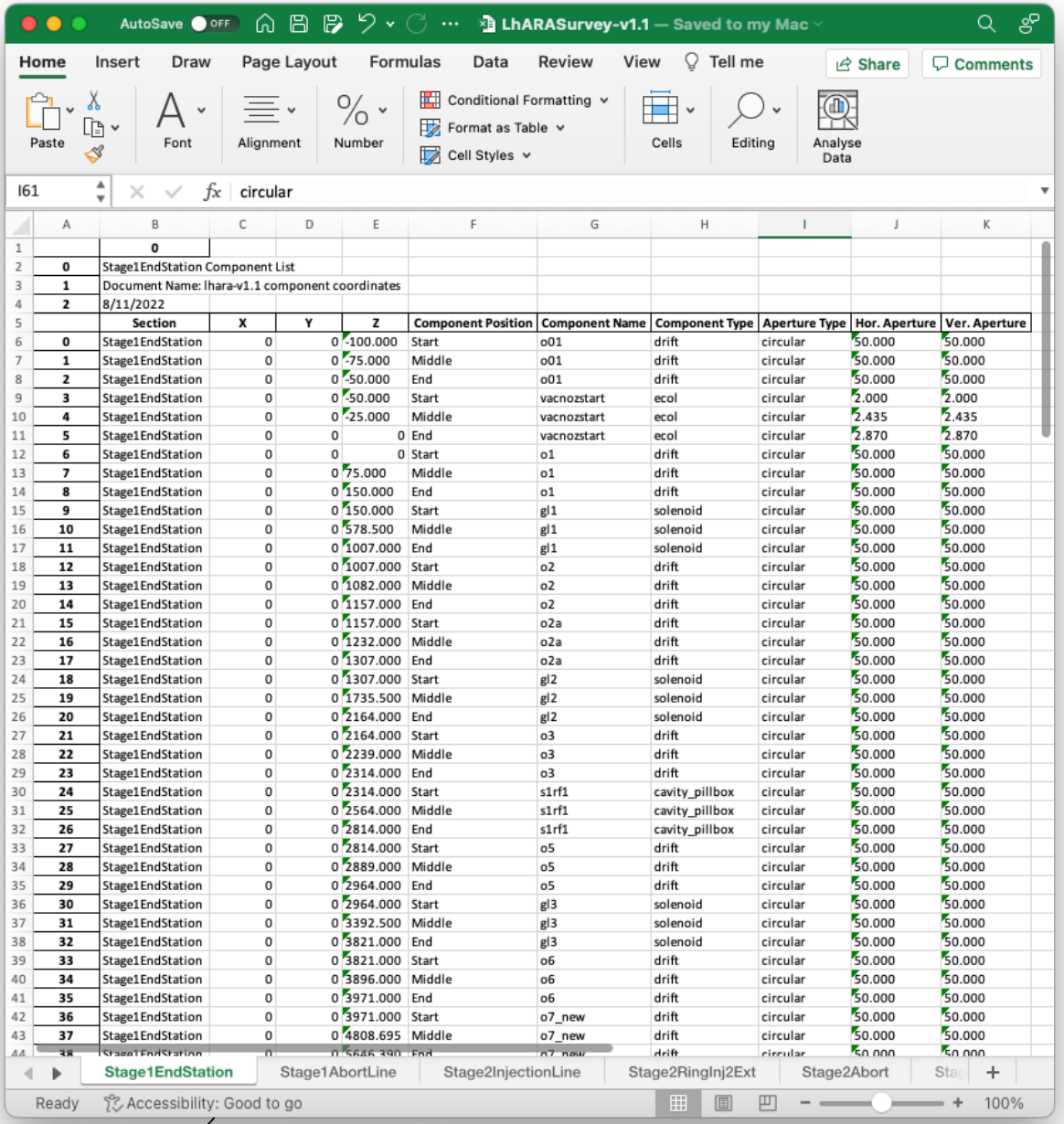
WP6 Meeting

08th November 2022

Excel Sheet Generation

- Automatic generation of Excel spreadsheet
  - Z offset to match target chamber exit flange (target + 10cm).
  - Separate sheets for each “beam line”
    - Removing duplicate components
- Investigating possibility of including markers in BDSIM model output
  - Store locations of non-beam transport components (e.g. radiation shutters)
  - Match by name
  - Need: device types, lengths, numbers / frequency, locations
  - BDSIM development needed



1		0									
2	0	Stage1EndStation Component List									
3	1	Document Name: lhara-v1.1 component coordinates									
4	2	8/11/2022									
5		Section	X	Y	Z	Component Position	Component Name	Component Type	Aperture Type	Hor. Aperture	Ver. Aperture
6	0	Stage1EndStation	0	0	-100.000	Start	o01	drift	circular	50.000	50.000
7	1	Stage1EndStation	0	0	-75.000	Middle	o01	drift	circular	50.000	50.000
8	2	Stage1EndStation	0	0	-50.000	End	o01	drift	circular	50.000	50.000
9	3	Stage1EndStation	0	0	-50.000	Start	vacnozstart	ecol	circular	2.000	2.000
10	4	Stage1EndStation	0	0	-25.000	Middle	vacnozstart	ecol	circular	2.435	2.435
11	5	Stage1EndStation	0	0	0	End	vacnozstart	ecol	circular	2.870	2.870
12	6	Stage1EndStation	0	0	0	Start	o1	drift	circular	50.000	50.000
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15	9	Stage1EndStation	0	0	150.000	Start	gl1	solenoid	circular	50.000	50.000
16	10	Stage1EndStation	0	0	578.500	Middle	gl1	solenoid	circular	50.000	50.000
17	11	Stage1EndStation	0	0	1007.000	End	gl1	solenoid	circular	50.000	50.000
18	12	Stage1EndStation	0	0	1007.000	Start	o2	drift	circular	50.000	50.000
19	13	Stage1EndStation	0	0	1082.000	Middle	o2	drift	circular	50.000	50.000
20	14	Stage1EndStation	0	0	1157.000	End	o2	drift	circular	50.000	50.000
21	15	Stage1EndStation	0	0	1157.000	Start	o2a	drift	circular	50.000	50.000
22	16	Stage1EndStation	0	0	1232.000	Middle	o2a	drift	circular	50.000	50.000
23	17	Stage1EndStation	0	0	1307.000	End	o2a	drift	circular	50.000	50.000
24	18	Stage1EndStation	0	0	1307.000	Start	gl2	solenoid	circular	50.000	50.000
25	19	Stage1EndStation	0	0	1735.500	Middle	gl2	solenoid	circular	50.000	50.000
26	20	Stage1EndStation	0	0	2164.000	End	gl2	solenoid	circular	50.000	50.000
27	21	Stage1EndStation	0	0	2164.000	Start	o3	drift	circular	50.000	50.000
28	22	Stage1EndStation	0	0	2239.000	Middle	o3	drift	circular	50.000	50.000
29	23	Stage1EndStation	0	0	2314.000	End	o3	drift	circular	50.000	50.000
30	24	Stage1EndStation	0	0	2314.000	Start	s1rf1	cavity_pillbox	circular	50.000	50.000
31	25	Stage1EndStation	0	0	2564.000	Middle	s1rf1	cavity_pillbox	circular	50.000	50.000
32	26	Stage1EndStation	0	0	2814.000	End	s1rf1	cavity_pillbox	circular	50.000	50.000
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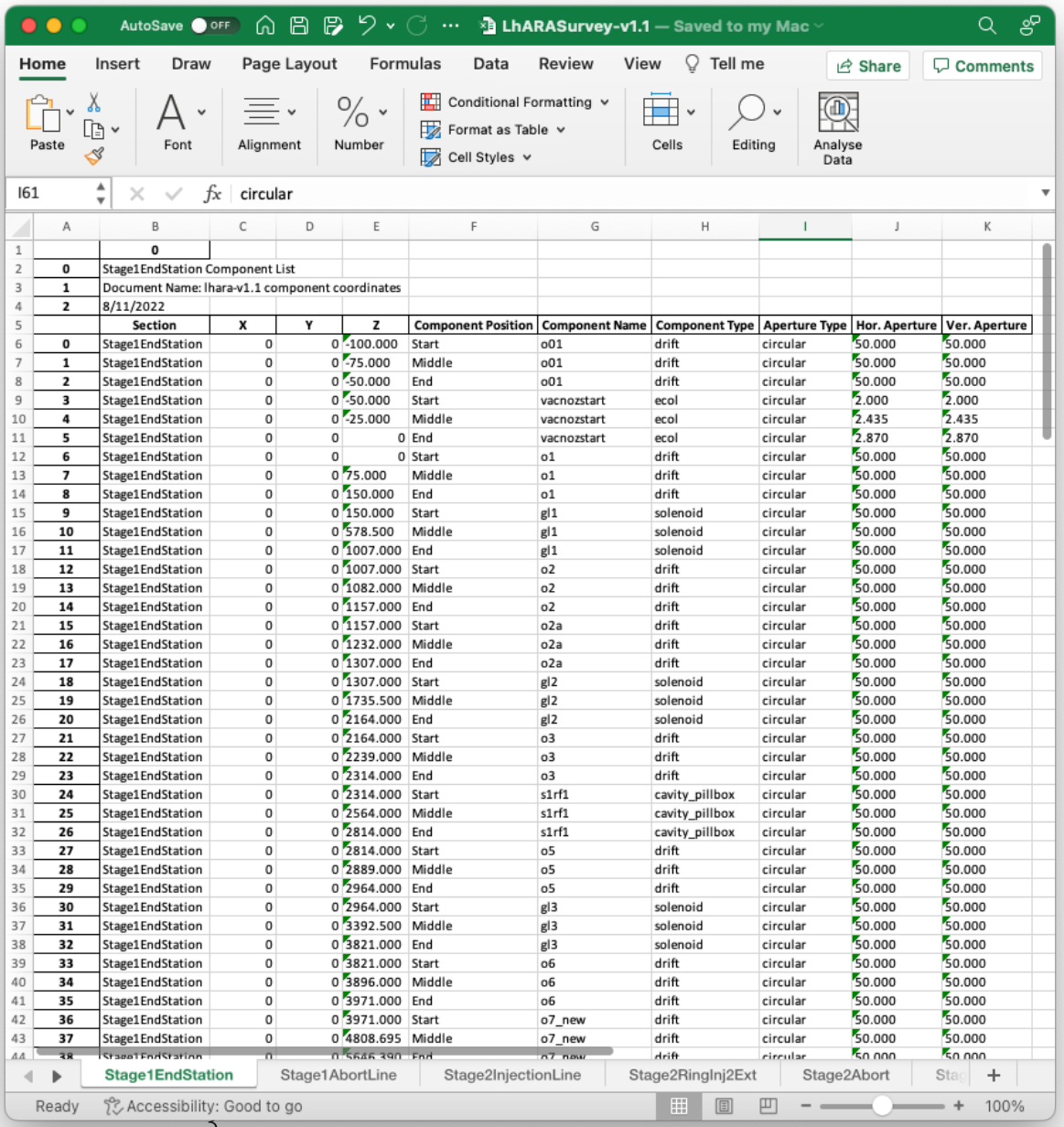
Excel Sheet Generation

- TODO:
  - Update simulation models to match naming scheme – Cannot access stfc365.sharepoint
  - Add comments column
  - Section preservation (CAD hierarchy)



AutoSave OFF — LhARASurvey-v1.1 — Saved to my Mac

Home | Insert | Draw | Page Layout | Formulas | Data | Review | View | Tell me | Share | Comments

Paste | Font | Alignment | Number | Conditional Formatting | Format as Table | Cell Styles | Cells | Editing | Analyse Data

I61 | fx | circular

	A	B	C	D	E	F	G	H	I	J	K
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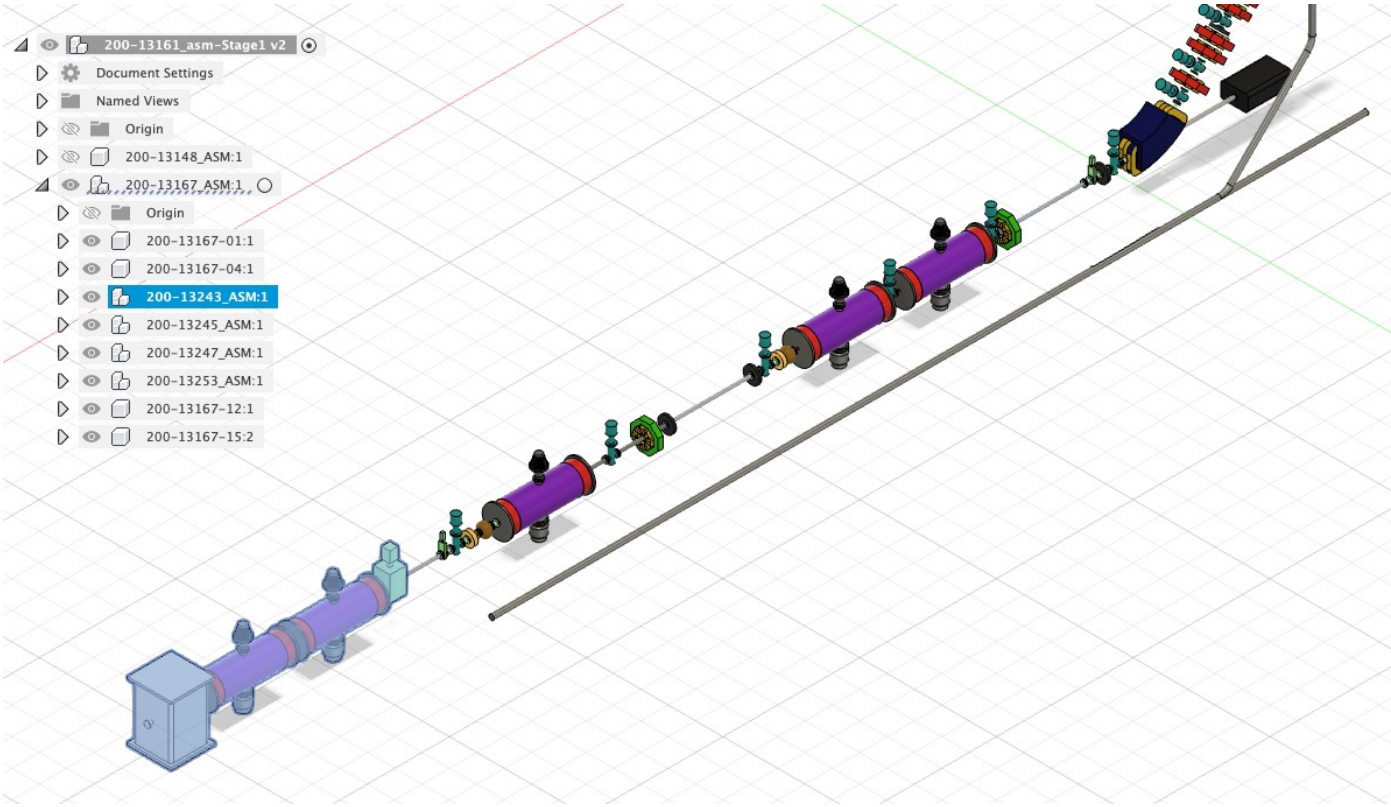
Stage1EndStation | Stage1AbortLine | Stage2InjectionLine | Stage2RingInj2Ext | Stage2Abort

Ready | Accessibility: Good to go | 100%

CAD Conversion

- Ongoing by Stewart Boogert
  - Small number of pyg4ometry bugs found
  - More complicated assemblies are convertible (magnet support stand)

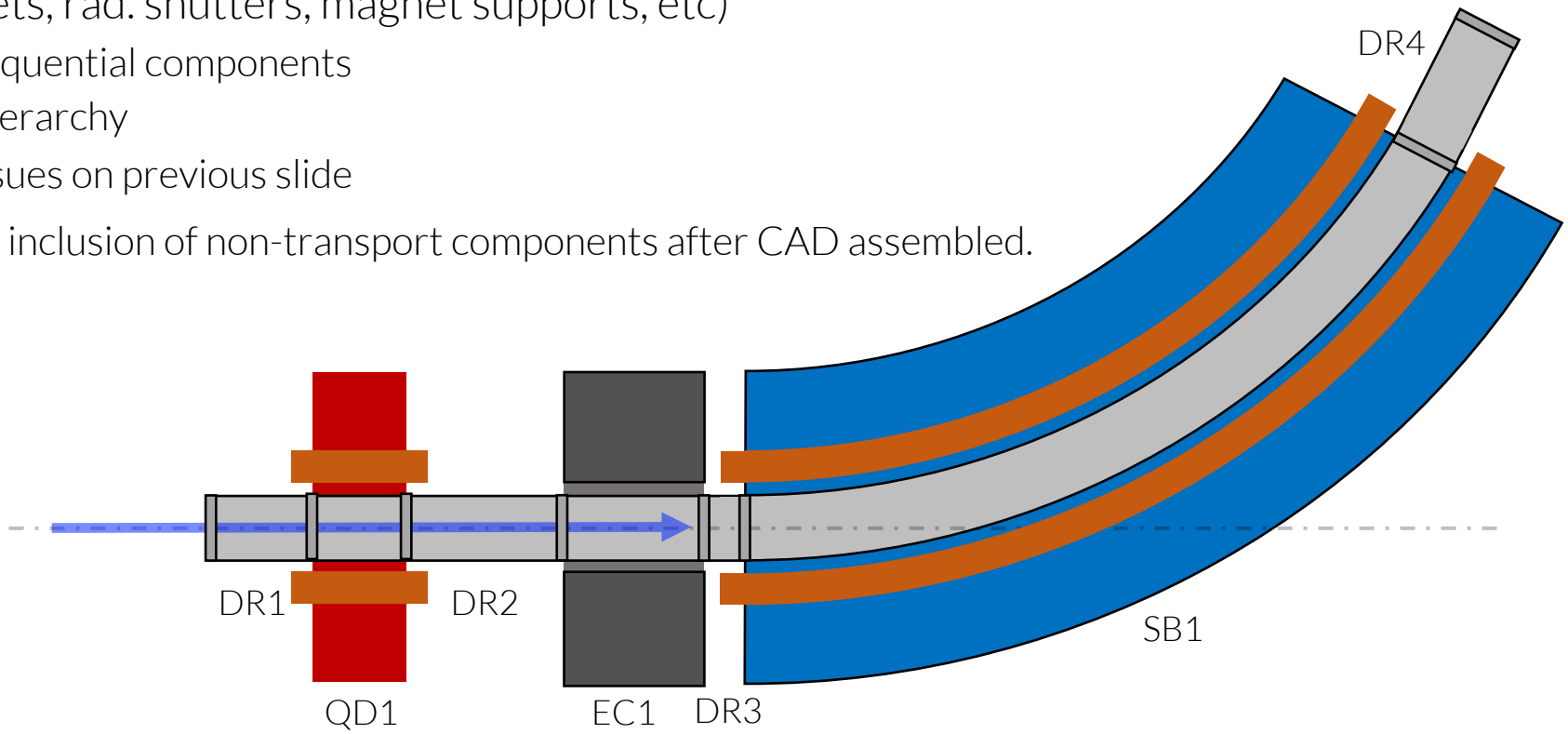


- CAD hierarchy
  - Group components by accelerator section
  - Component naming:
    - Unique (match convention)
    - Degenerate placements

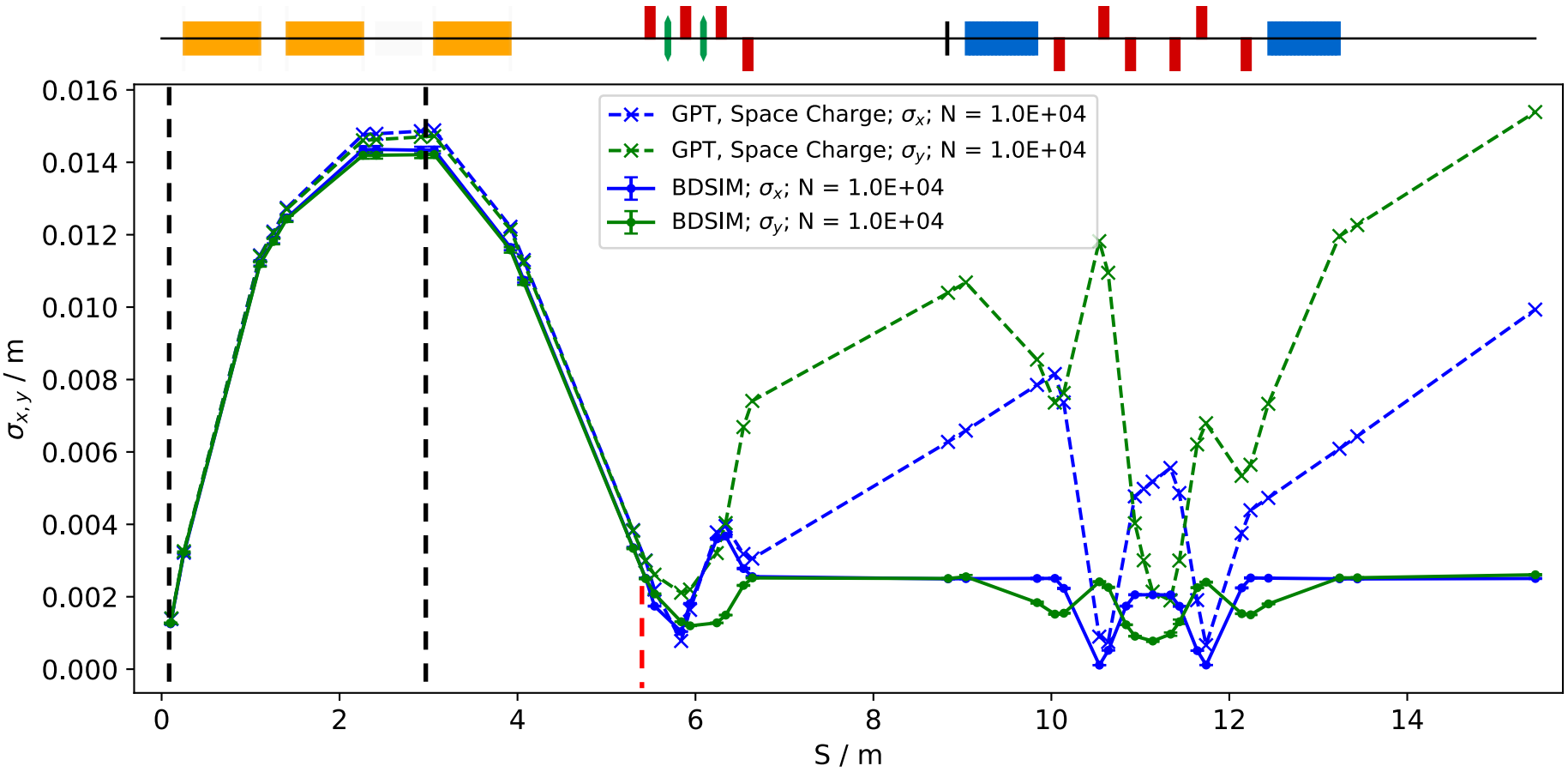
- CAD issues:
  - Single beam pipe volume
    - Some narrower exist anyway, else gaps.
  - No shielding apertures
  - Random extraneous cylinders throughout

CAD Conversion

- Sequential components
  - Beam pipe is currently 1 piece of geometry
    - Overlaps
  - Beam pipe split at component level
  - 1:1 matching to accelerator model
- Recommend fresh CAD model if individual components exportable/already exist (magnets, rad. shutters, magnet supports, etc)
  - Sequential components
  - Hierarchy
  - Issues on previous slide
- Discuss inclusion of non-transport components after CAD assembled.



Alternative Baseline Design



- GPT optimisation program (GDFSOLVE)
  - Optimise Gabor Lens strengths in capture section to produce parallel beam at section exit
  - Untested
  - Switch from ideal to HTs beam.

Summary

- DONE:
  - Automatic Excel survey generation
  - Small offset added to GPT model for tout output (testing ongoing)

- ONGOING:
  - CAD conversion testing
  - GPT optimisation of capture section
    - Model in development

- TODO:
  - Finalise Excel survey export
  - Update model components to match naming convention
  - Identify locations for non-beam transport systems + add to model
  - New ccap-sim repository model versions?
    - V4.4 – main baseline design
    - V5.4 – alternative design
    - Current versions frozen as pre-October (grant).