Front End Update

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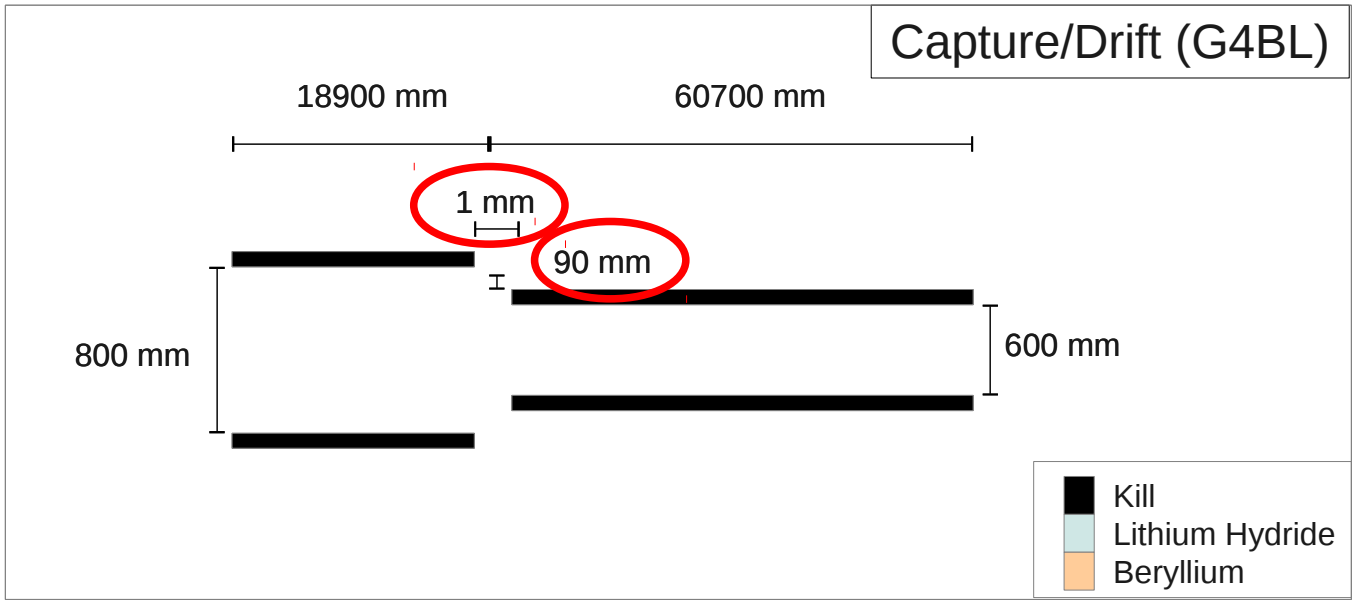
New Baseline

- Aim is to define a new baseline for the front end
  - Take forward to RDR
- Elements to include:
  - RDR target design (Kirk)
  - Chicane (Rogers)
  - Proton absorber (Rogers)
  - Modified RF capture for chicane/proton absorber (Neuffer)
    - Modified coils for 1.5 T field region (Stratakis/Grant + Sayed/Weggel)
  - 7 cell option ionisation cooling channel (Stratakis)
  - Discretize RF, add Be windows (?Neuffer)
- Would like ICOOL and G4Beamline lattice files
- Here review first updated lattice from **Diktys Stratakis**
  - Intend to issue new lattice files ASAP
- Lattice files are available from (revision 1)
  - bzr checkout lp:~chris-rogers/muon-front-end/diktys
  - http://bazaar.launchpad.net/~chris-rogers/muon-front-end/diktys/files

Capture/Drift



From 0 to 18900 mm fields defined by coil set

From 18900 mm onwards constant 1.5 T field

Actions

- Missing aperture in G4BL at target/drift interface
- No good target aperture model
- Missing chicane
- Missing realistic coils in drift

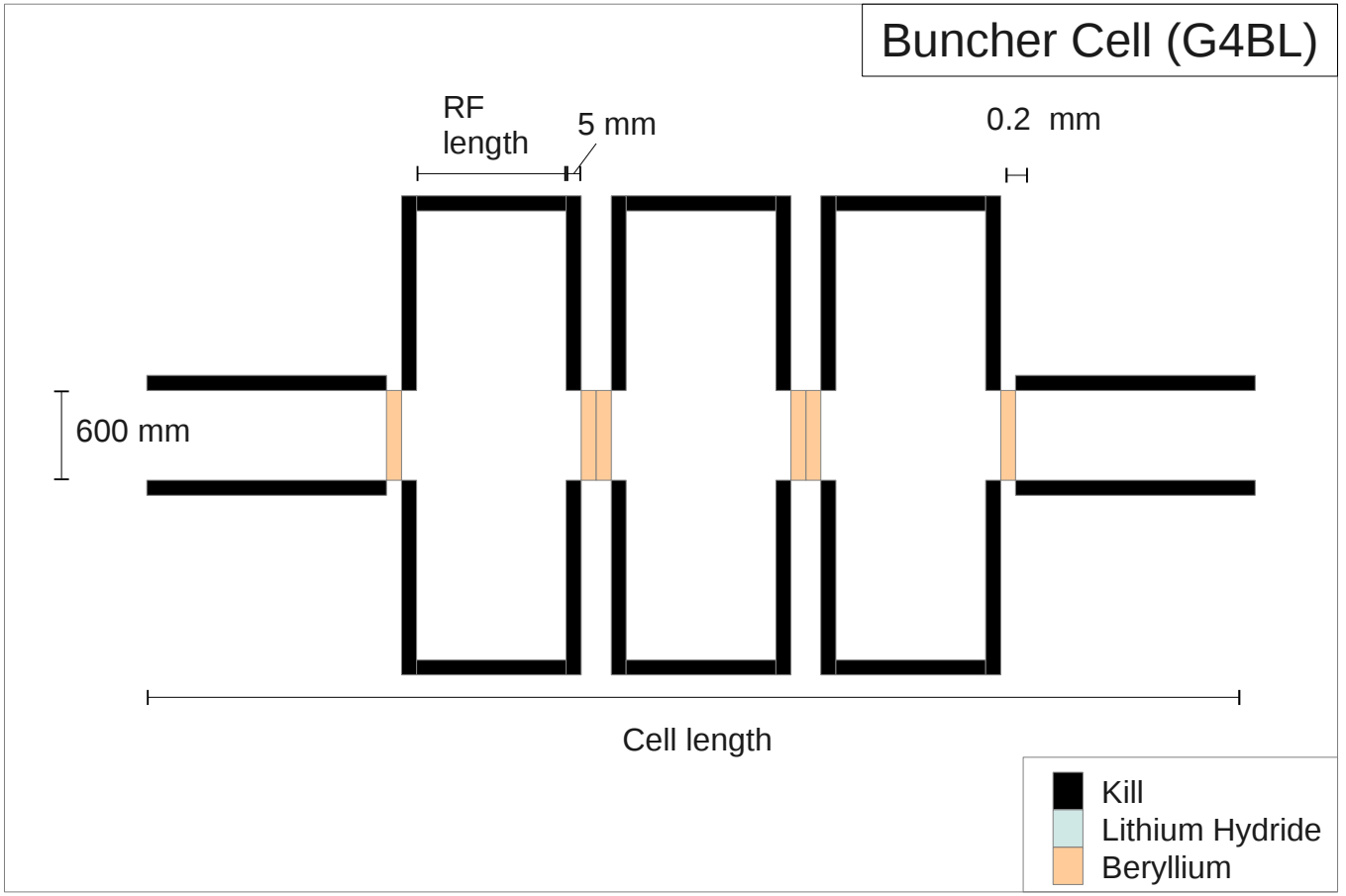
Coil number	Z Start [m]	Length [m]	Radius [m]	Current Density [A/m]
1	-0.48	0.103	8.350001E-02	764999.8
2	-0.48	0.103	0.1005	764999.8
3	-0.48	0.103	0.1175	764999.8
4	-0.48	0.475	0.1305	439200
5	-0.48	0.475	0.1395	439200
6	-0.48	0.475	0.1485	439200
7	-0.48	0.616	0.1636667	776533.4
8	-0.48	0.616	0.185	776533.4
9	-0.48	0.616	0.2063333	776533.4
10	-0.48	0.755	0.2308333	650166.6
11	-0.48	0.755	0.2585	650166.6
12	-0.48	0.755	0.2861667	650166.6
13	-0.755	0.882	0.4533333	4970667
14	-0.755	0.882	0.56	4970667
15	-0.755	0.882	0.6666667	4970667
16	0.177	0.517	0.4386667	3688801
17	0.177	0.517	0.516	3688801
18	0.177	0.517	0.5933334	3688801
19	0.7440001	0.485	0.5536667	3065332
20	0.7440001	0.485	0.617	3065332
21	0.7440001	0.485	0.6803333	3065332
22	1.279	0.7099999	0.7158333	2388100
23	1.279	0.7099999	0.7635	2388100
24	1.279	0.7099999	0.8111666	2388100
25	2.039	0.9590001	0.936	1774800

G4BL fields are represented by coil of 1 mm radial thickness and appropriate current density in A/mm^2

Coil number	Z Start [m]	Length [m]	Radius [m]	Current Density [A/m]
26	2.039	0.9590001	0.97	1774800
27	2.039	0.9590001	1.004	1774800
28	3.048	1.465	1.274167	1515834
29	3.048	1.465	1.3025	1515834
30	3.048	1.465	1.330833	1515834
31	4.563001	3.153	1.507833	925898.5
32	4.563001	3.153	1.5235	925898.5
33	4.563001	3.153	1.539167	925898.5
34	7.766	4.707001	1.503833	565033.4
35	7.766	4.707001	1.5115	565033.4
36	7.766	4.707001	1.519167	565033.4
37	12.523	6.700001	1.502167	397873
38	12.523	6.700001	1.5065	397873
39	12.523	6.700001	1.510833	397873
40	19.273	6.700001	1.502167	397873
41	19.273	6.700001	1.5065	397873
42	19.273	6.700001	1.510833	397873

G4BL fields are represented by coil of 1 mm radial thickness and appropriate current density in A/mm^2

Buncher

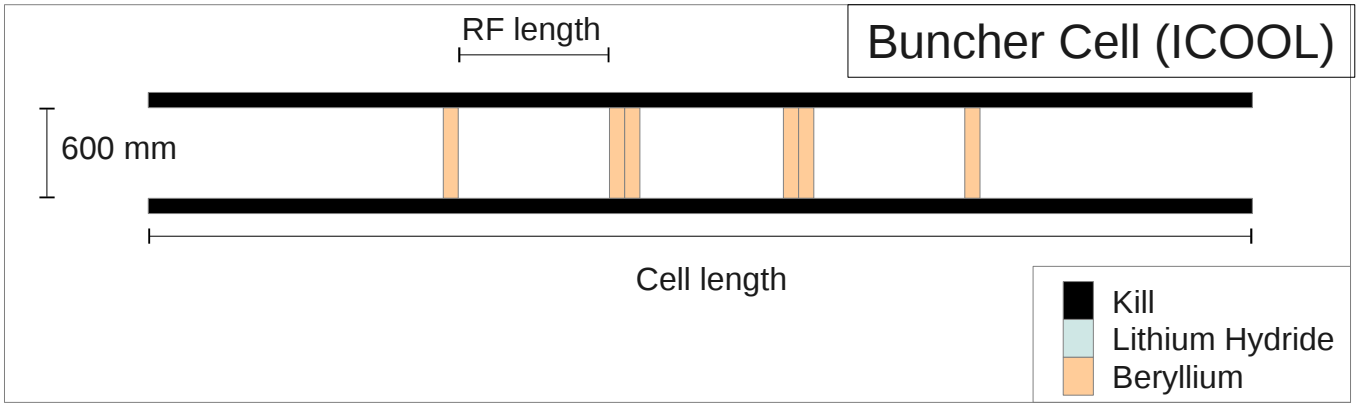


Note RF are close packed

Field is constant 1.5 T (no coils simulated)

Actions:

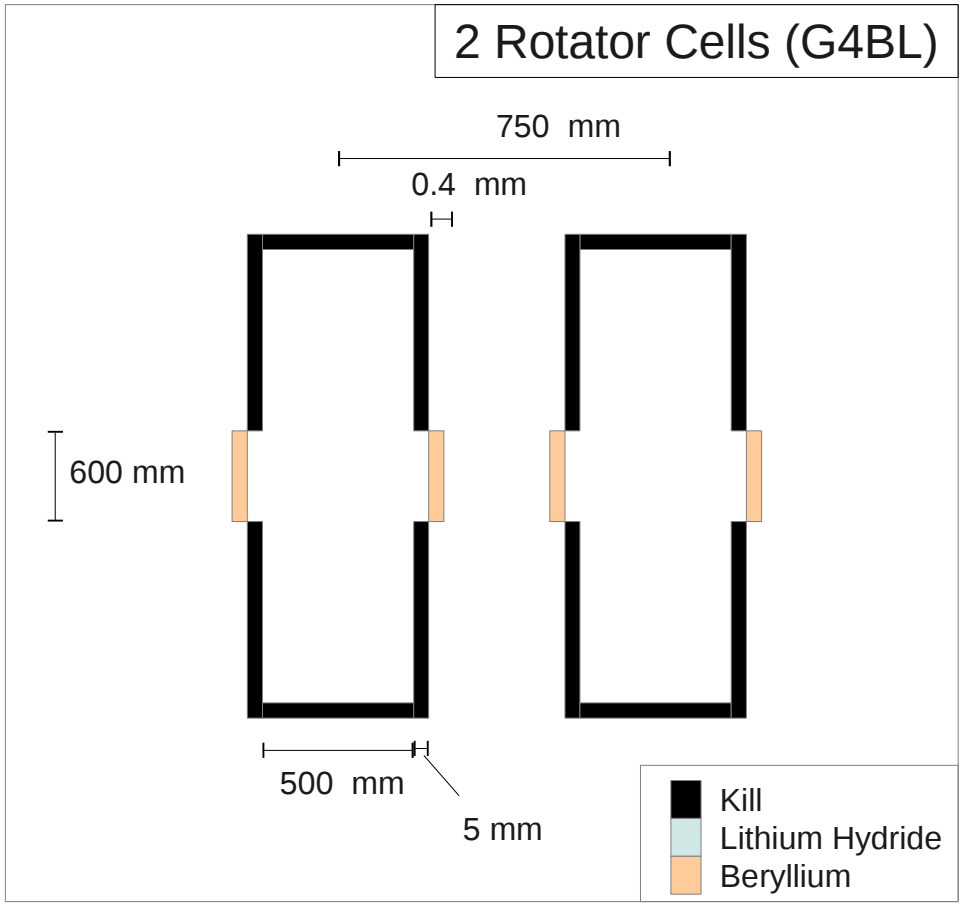
- missing aperture around Be windows
- Not on regular 750 mm cell yet (RF close packed)
- Missing realistic coil geometry

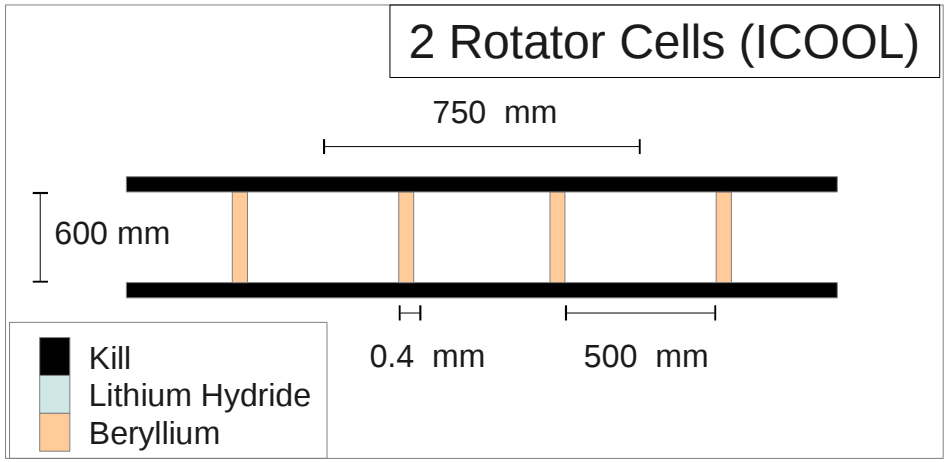


Buncher Cell Parameters

Buncher					
Cell Number	**RF length [mm]**	**RF freq [GHz]**	**RF V [MV/m]**	**Cell length [mm]**	**Number RF**
1	400	0.31963	3.42	3750	1
2	400	0.30556	4.894	3750	2
3	400	0.29393	4.17	3000	2
4	450	0.28546	5.34	2250	2
5	450	0.27859	6.36	2250	2
6	450	0.27205	4.94	2250	3
7	450	0.2658	5.61	2250	3
8	450	0.25983	6.3	2250	3
9	450	0.25413	6.97	2250	3
10	450	0.24867	7.65	2250	3
11	450	0.24344	8.31	2250	3
12	450	0.23842	9.01	2250	3
13	450	0.23361	9.71	2250	3

Rotator





Rotator		
Cell Number	**RF freq [GHz]**	**Number RF**
1	0.23019	3
2	0.22613	3
3	0.22259	3
4	0.21948	3
5	0.21676	3
6	0.21437	3
7	0.21228	3
8	0.21046	3
9	0.20864	4
10	0.2069	4
11	0.20549	4
12	0.20425	5
13	0.20326	5
14	0.20263	5
15	0.20233	5
RF length	500	mm
RF volt	13	MV/m
RF phase	0	

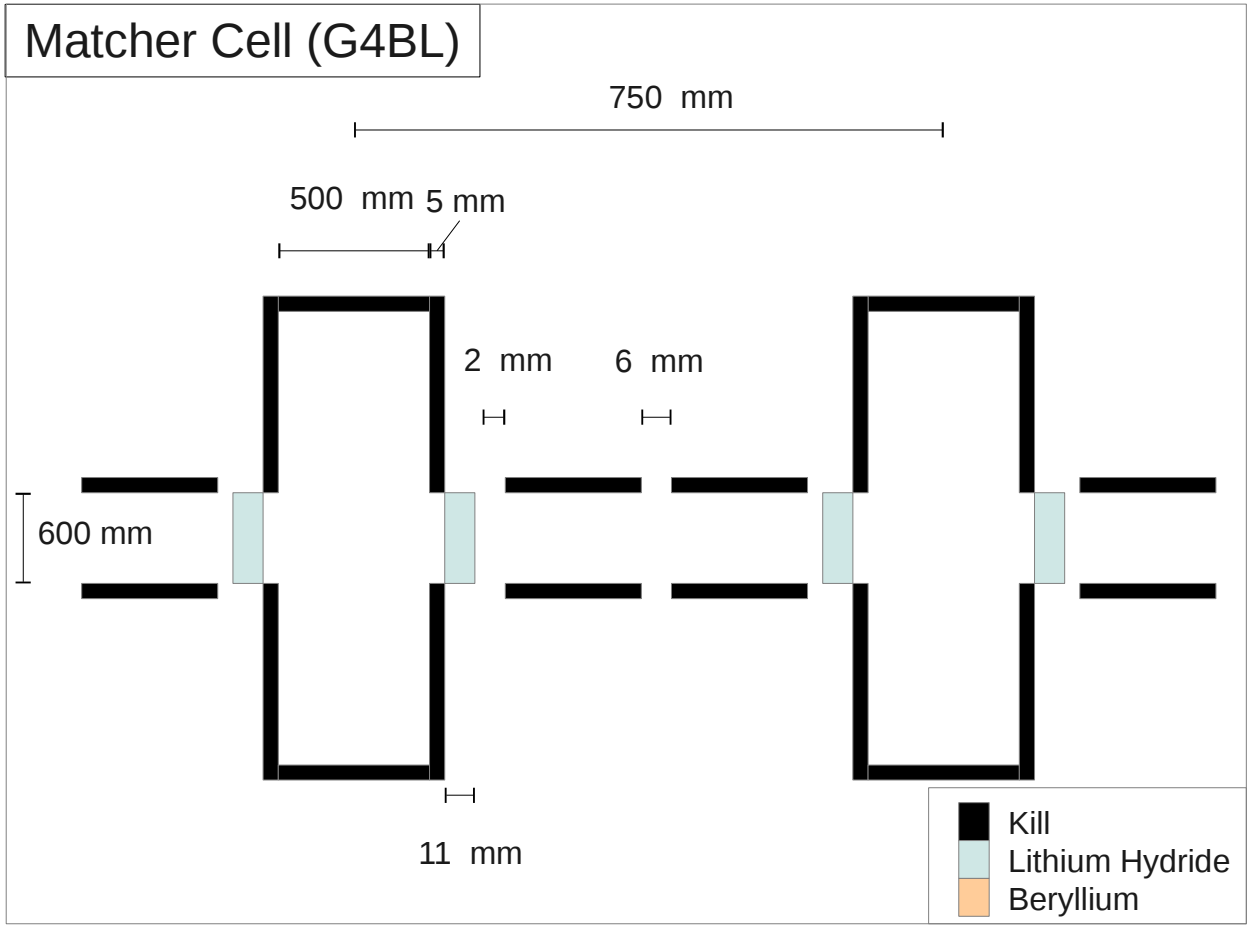
RF are placed every 750 mm (no empty cells)

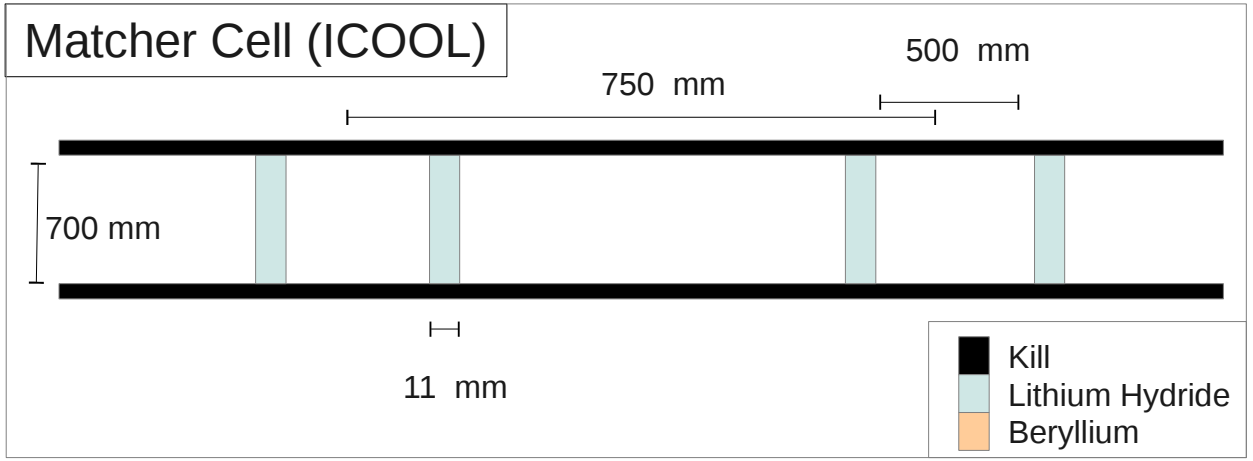
Field is constant 1.5 T (no coils simulated)

Actions:

- missing aperture in G4BL
- Realistic coil geometry

Matcher





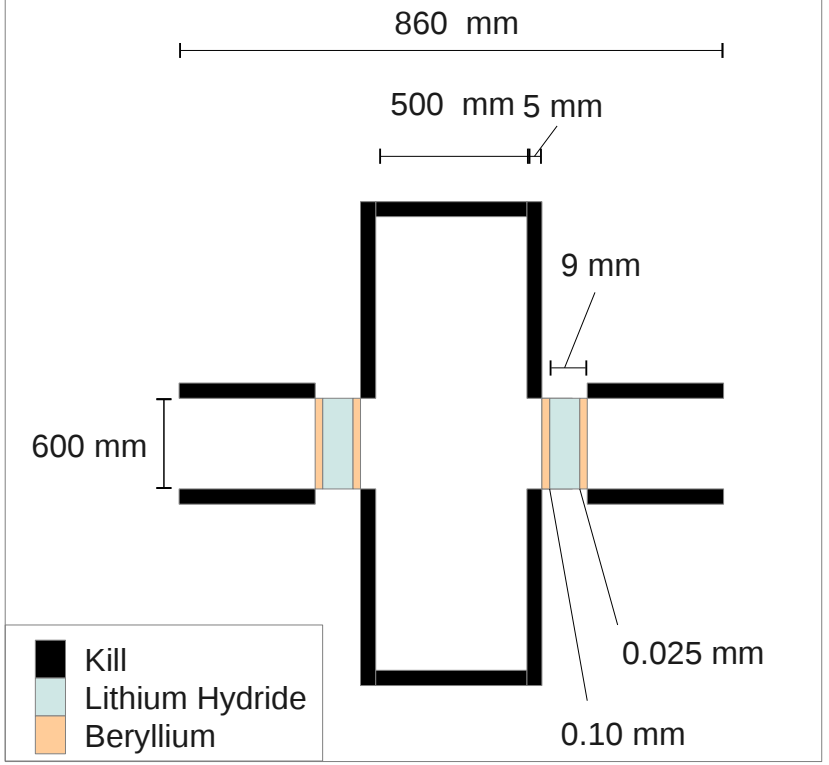
Matcher	
RF length	500 mm
RF volt	16 MV/m
RF phase	35 deg
N cells	8

Actions:

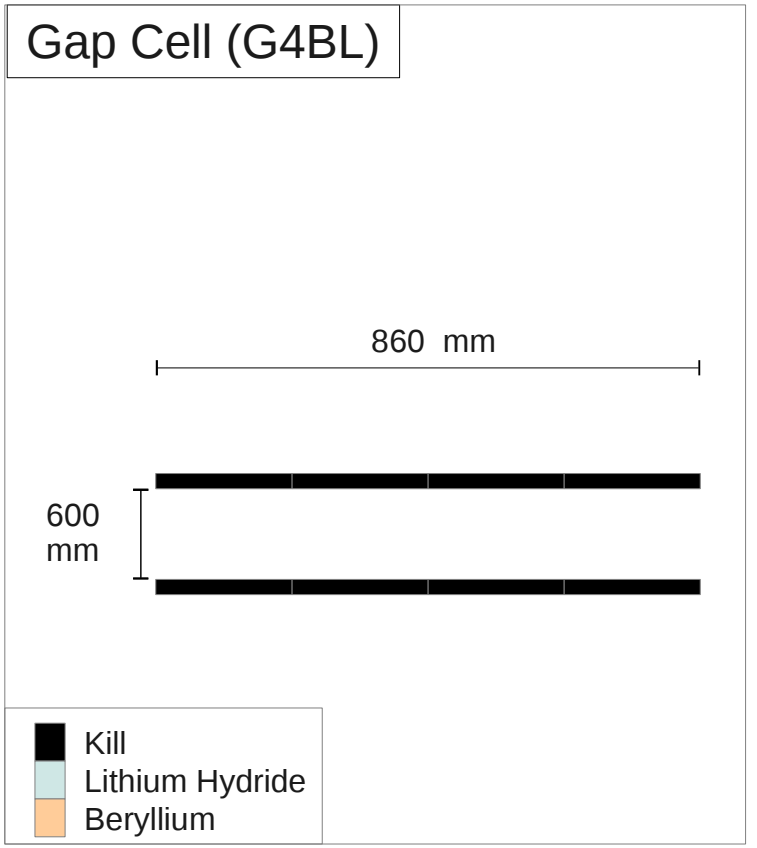
- missing aperture in G4BL
- Move to 860 mm cell (and redo match)

Cooler

RF Cell (G4BL)



Gap Cell (G4BL)



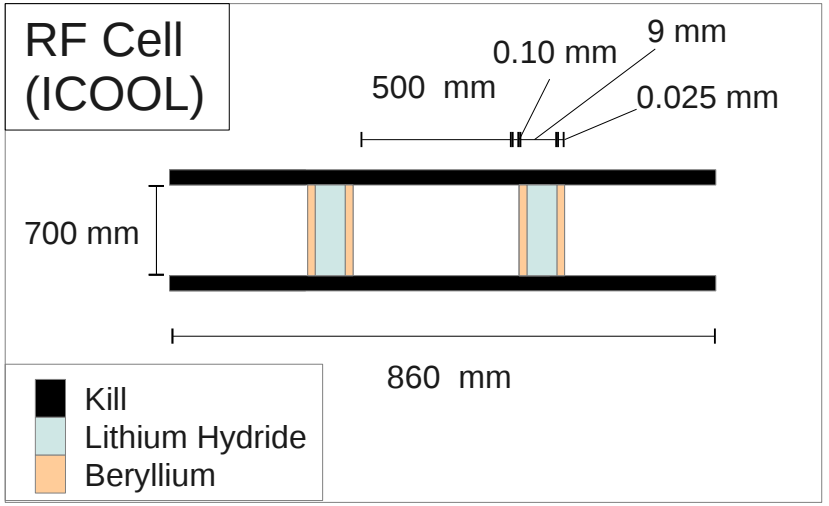
Cooler	
RF length	500 mm
RF volt	16 MV/m
RF phase	35 deg
N RF subcells	6
N Gap subcells	1
N supercells	44

Additional 1 mm LiH block at start of cooling

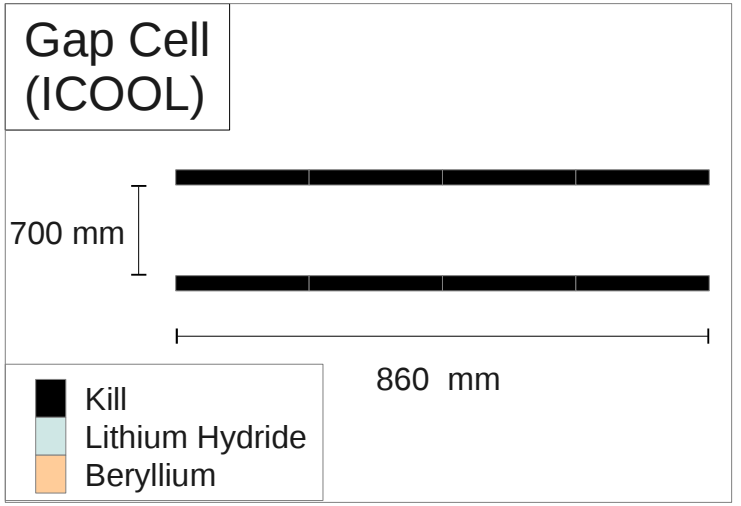
Actions:

- missing aperture in G4BL

RF Cell (ICOOL)

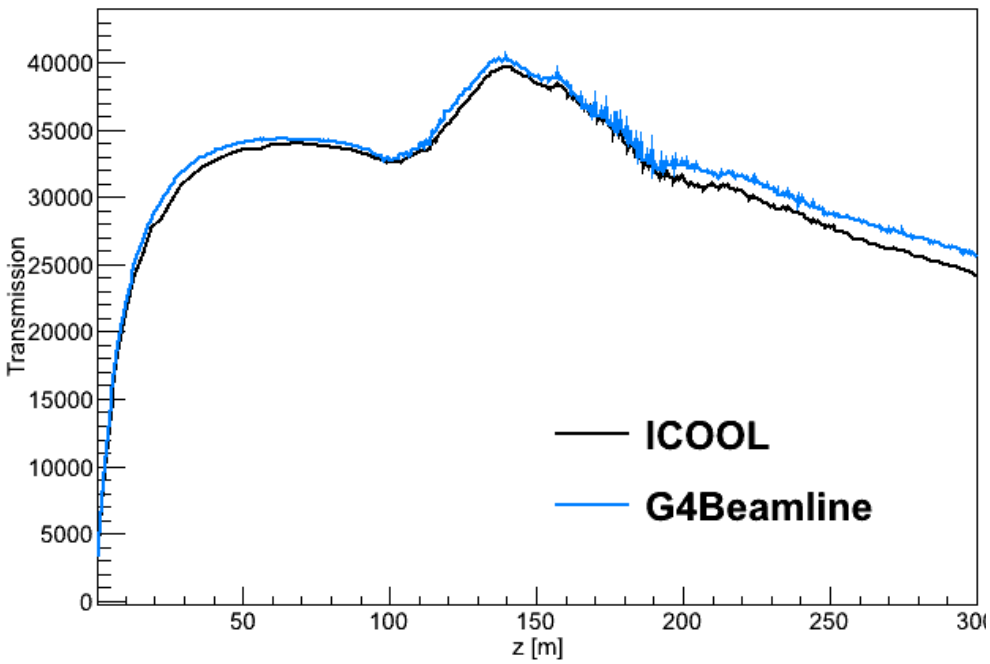


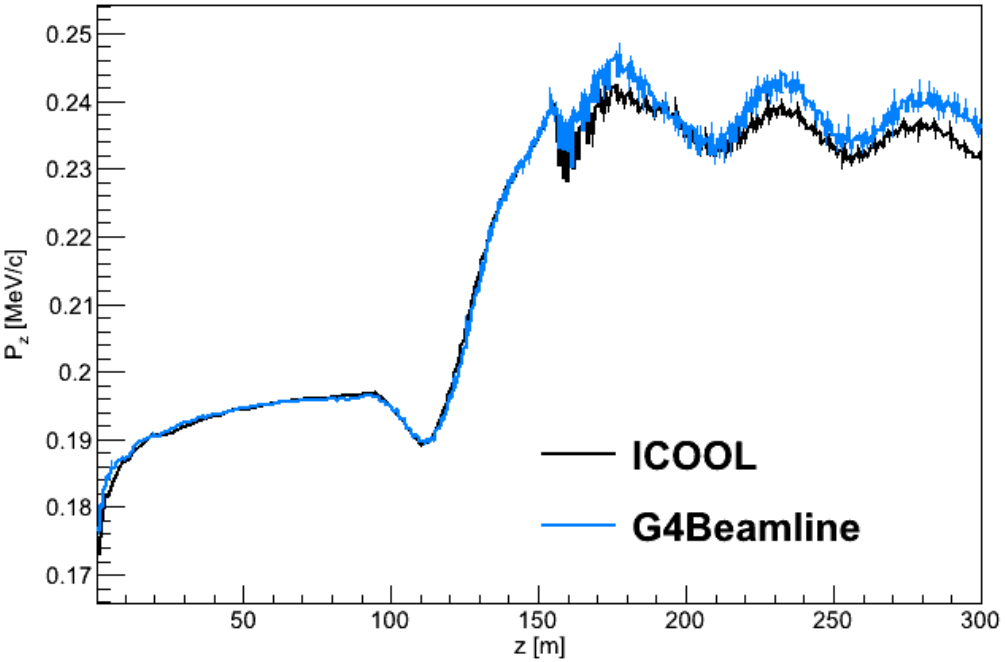
Gap Cell (ICOOL)

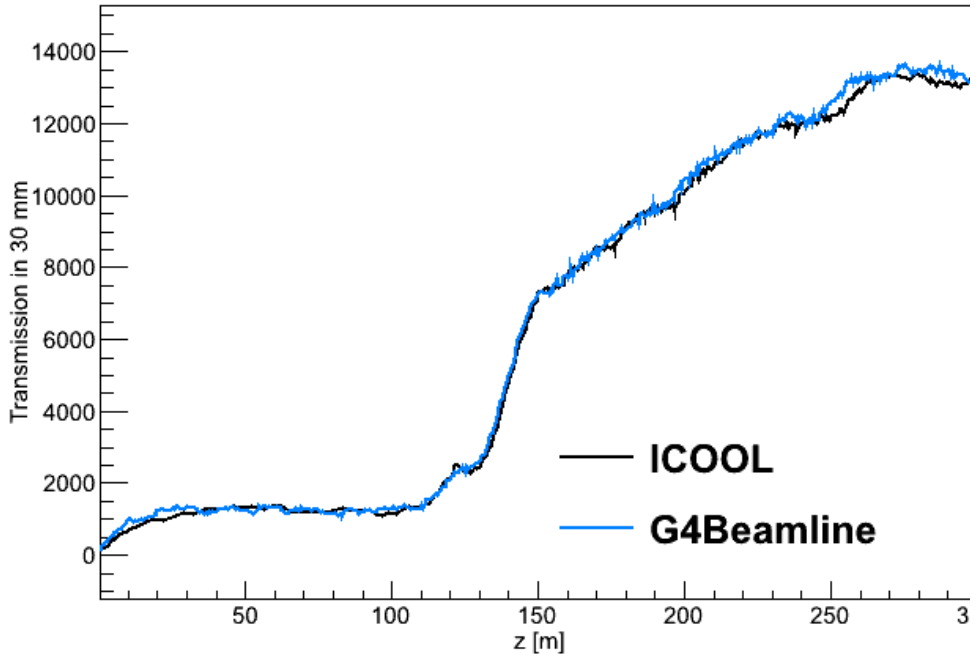


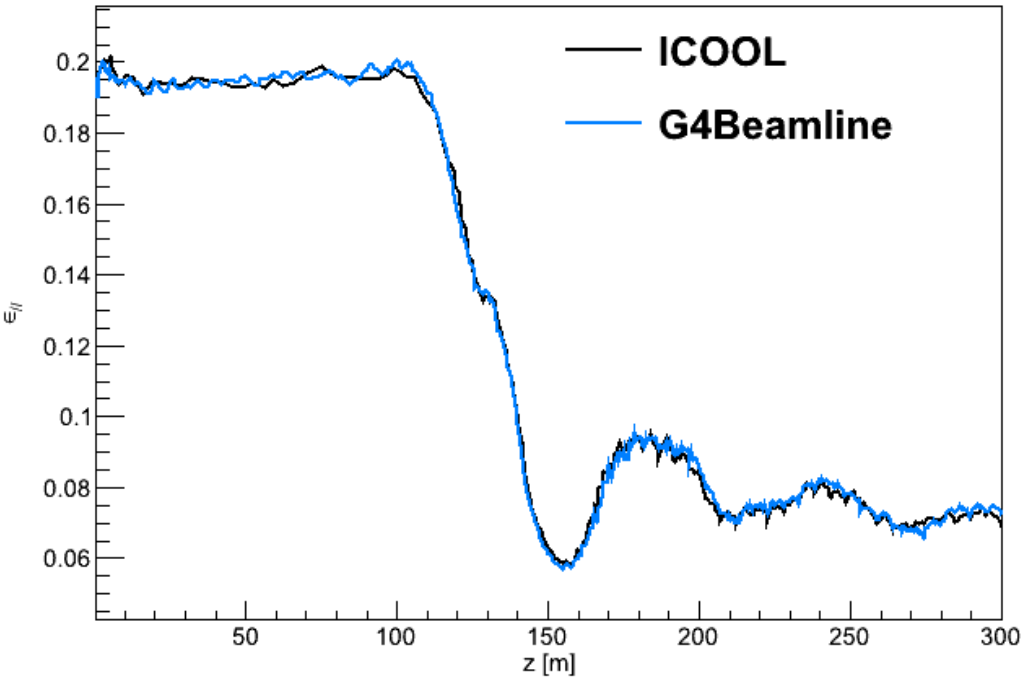
Ecal9f output

- I ran simulation using beam from Diktys
- Don't know what the rate normalisation is
  - Would like to rerun with e.g. beam-v2
- Still using ICOOL 3.20 and G4BL 2.06
- Will upload once I rerun with new files


Transmission
z [m]
ICOOL
G4Beamline


P_z [MeV/c]
z [m]
ICOOL
G4Beamline


Transmission in 30 mm
z [m]
ICOOL
G4Beamline


ε_//
z [m]
ICOOL
G4Beamline