Front-End: Magnetic Channel and rf Cavity Parameters

R.C Fernow and J.C. Gallardo

Brookhaven National Laboratory

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Abstract

We list the magnetic lattice and rf cavities components.

I. MAGNETIC LATTICE

TABLE I: Magnetic Lattice Components: target, capture, matching, drift sections

No. (Type)	z–position (m)	Length (m)	Radius (m)	Thickness (m)	Current density (A/mm^2)
Target and Capture Section					
1 (SC)	-1.252	0.683	0.640	0.640	52.87
2 (Fe)	-0.846	0.326	0.430	0.010	29.29
3 (Fe)	-0.726	0.206	0.150	0.010	46.36
4 (Cu)	-0.500	0.948	0.160	0.070	16.52
5 (Cu)	-0.500	1.320	0.240	0.100	19.69
6 (Cu)	-0.500	1.791	0.350	0.160	20.96
7 (SC)	-0.400	0.690	1.000	0.210	26.23
8 (SC)	0.310	0.640	0.800	0.210	52.95
9 (SC)	1.070	0.850	0.800	0.210	63.02
10 (SC)	1.940	0.880	0.800	0.150	47.09
11 (SC)	2.840	1.160	0.800	0.090	56.74
12 (SC)	4.100	0.470	0.673	0.070	45.97
13 (SC)	4.590	1.127	0.800	0.050	65.18
14 (SC)	5.803	1.070	0.740	0.050	44.00
15 (SC)	6.910	1.360	0.849	0.050	39.77
16 (SC)	8.500	0.990	1.000	0.050	45.69
17 (SC)	9.800	1.900	1.000	0.050	32.01
18 (SC)	12.180	0.470	1.000	0.100	42.96
Matching Section					
19 (SC)	13.000	0.360	0.430	0.100	12.63
20 (SC)	13.500	0.360	0.430	0.100	16.74
21 (SC)	14.000	0.360	0.430	0.100	19.42
22 (SC)	14.500	0.360	0.430	0.100	19.06
23 (SC)	15.000	0.360	0.430	0.100	18.84
Large Radius Drift Section					
24–71 (SC)	15.5–39.0	0.360	0.430	0.100	19.22
Matching Section					
72 (SC)	39.500	0.360	0.430	0.100	18.76
73 (SC)	39.960	0.355	0.450	0.100	20.39
74 (SC)	40.450	0.364	0.377	0.100	18.67
75 (SC)	40.960	0.389	0.352	0.100	19.16
76 (SC)	41.500	0.360	0.320	0.100	18.91

TABLE II: Magnetic Lattice Components: drift, buncher, phase rotator and cooling sections

No.	z–position (m)	Length (m)	Radius (m)	Thickness (m)	Current density (A/mm^2)
Small Radius Drift Section					
77–209 (SC)	42.000–108.000	0.360	0.320	0.100	19.00
Matching Section					
210 (SC)	108.500	0.360	0.320	0.100	18.71
211 (SC)	109.000	0.360	0.320	0.100	17.48
212 (SC)	109.500	0.360	0.320	0.100	16.68
213 (SC)	110.250	0.408	0.650	0.100	40.43
214 (SC)	111.200	0.50	0.650	0.100	24.37
Buncher and Phase Rotator Section					
215–350 (SC)	111.200–213.950	0.500	0.650	0.100	21.01
Matching Section					
351 (SC)	213.950	0.500	0.650	0.100	21.11
352 (SC)	214.700	0.500	0.650	0.100	20.80
353 (SC)	215.625	0.150	0.350	0.150	34.50
354 (SC)	216.375	0.150	0.350	0.150	64.73
355 (SC)	217.125	0.150	0.350	0.150	-107.11
356 (SC)	217.875	0.150	0.350	0.150	106.67
357 (SC)	218.625	0.150	0.350	0.150	-106.67
358 (SC)	219.375	0.150	0.350	0.150	106.67
359 (SC)	220.125	0.150	0.350	0.150	-106.67
360 (SC)	220.875	0.150	0.350	0.150	106.67
361 (SC)	221.625	0.150	0.350	0.150	-106.67
Cooling Section					
362–460 (SC)	222.375–295.875	0.150	0.350	0.150	$\pm$ 106.67

TABLE III: rf Cavity Parameters: buncher section

Buncher Section					
rf Cavity			**Window**		
No.	Frequency (MHz)	Gradient (MV/m)	Mat$^{\text{erial}}$	Radius (cm)	Thick$^{\text{ness}}$(μm)
1	332.6	5.0	BE	25.0	200.0
2	308.2	10.0	BE	25.0	395.0
3–4	284.6	7.0	BE	25.0	200.0
5–6	275.3	10.0	BE	25.0	395.0
7–9	264.4	10.0	BE	25.0	395.0
10–11	255.7	10.0	BE	25.0	395.0
12–13	253.8	10.0	BE	25.0	395.0
14–15	248.1	7.0	BE	25.0	200.0
16–18	245.1	7.0	BE	25.0	200.0
19–20	242.1	7.0	BE	25.0	200.0
21–22	239.8	10.0	BE	25.0	395.0
23–25	237.0	10.0	BE	25.0	395.0
25–27	234.2	10.0	BE	25.0	395.0

TABLE IV: rf Cavities Parameters: phase rotator section

Phase Rotator Section							
rf Cavity			**Window**				
No.	Frequency (MHz)	Gradient (MV/m)	Mat$^{\text{erial}}$	Radius$_1$ (cm)	Radius$_2$ (cm)	Thick$^{\text{ness}}{}_1$(μm)	Thick$^{\text{ness}}{}_2$(μm)
28–30	231.9	12.5	BE	20.0	25.0	750.0	750.0
31–33	228.9	12.5	BE	20.0	25.0	750.0	750.0
34–36	226.2	12.5	BE	20.0	25.0	750.0	750.0
37–39	223.6	12.5	BE	20.0	25.0	750.0	750.0
40–42	221.3	12.5	BE	20.0	25.0	750.0	750.0
43–45	219.1	12.5	BE	20.0	25.0	750.0	750.0
46–49	217.2	12.5	BE	20.0	25.0	750.0	750.0
50–53	215.1	12.5	BE	20.0	25.0	750.0	750.0
54–57	212.9	12.5	BE	20.0	25.0	750.0	750.0
58–61	211.0	12.5	BE	20.0	25.0	750.0	750.0
62–64	209.4	12.5	BE	20.0	25.0	750.0	750.0
65–69	207.9	12.5	BE	20.0	25.0	750.0	750.0
70–74	206.1	12.5	BE	20.0	25.0	750.0	750.0
75–83	204.2	12.5	BE	20.0	25.0	750.0	750.0
84–99	202.3	12.5	BE	20.0	25.0	750.0	750.0

TABLE V: rf Cavities Parameters: matching and cooling section

Matching Section							
rf Cavity			**Window**				
No.	Frequency (MHz)	Gradient (MV/m)	$\mathrm{Mat}^{\mathrm{erial}}{}_1$	$\mathrm{Thick}^{\mathrm{ness}}{}_1(\mu m)$	$\mathrm{Mat}^{\mathrm{erial}}{}_2$	$\mathrm{Thick}^{\mathrm{ness}}{}_2(cm)$	Radius_1 (cm)
100–103	201.25	15.25	BE	25.0	LiH	1.0	25.0
Cooling Section							
104–206	201.25	15.25	BE	25.0	LiH	1.0	25.0