

IR Update(Draft 1)

3/8/2017

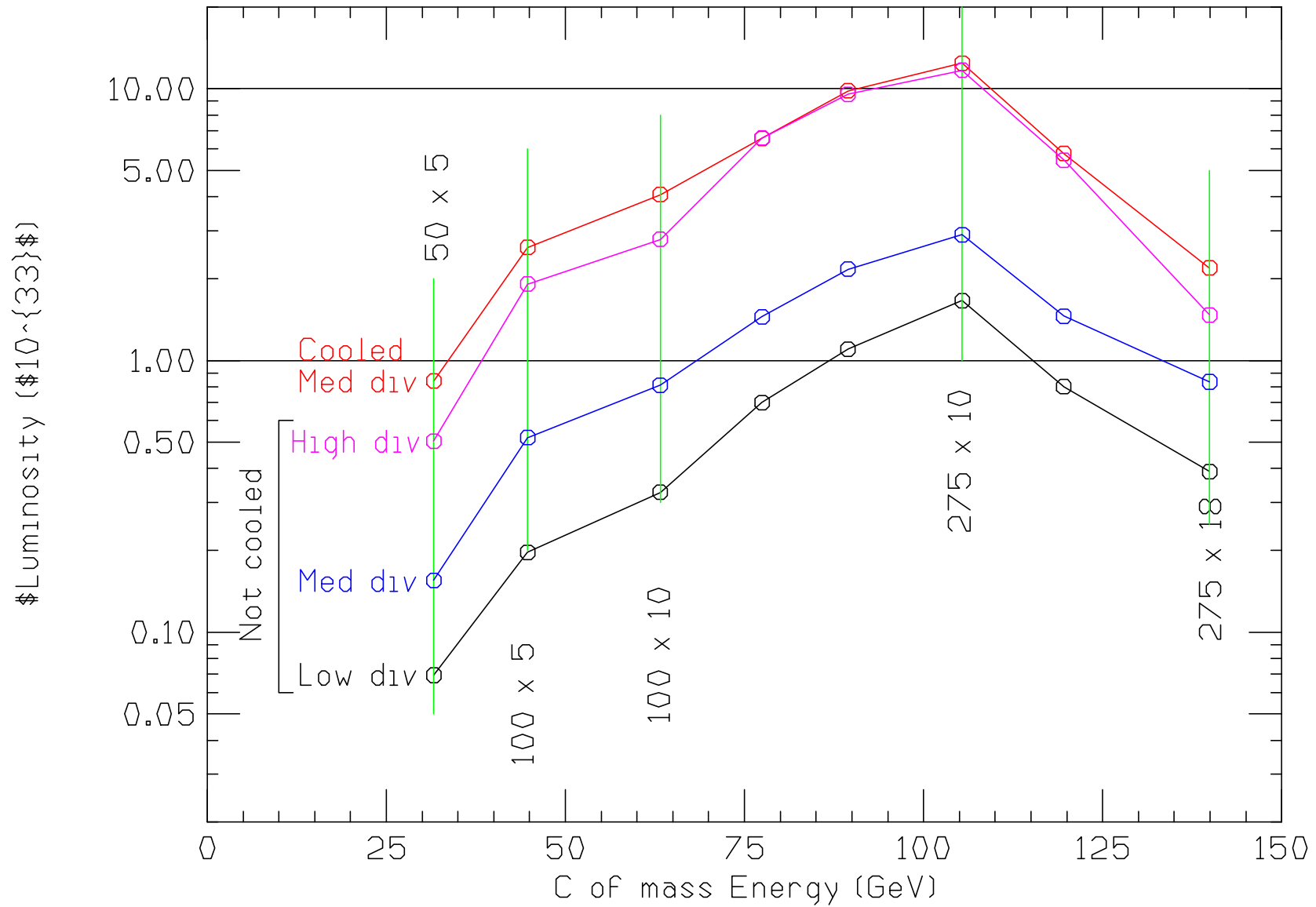
Bob Palmer

IR design for solutions including 10^{34} without cooling

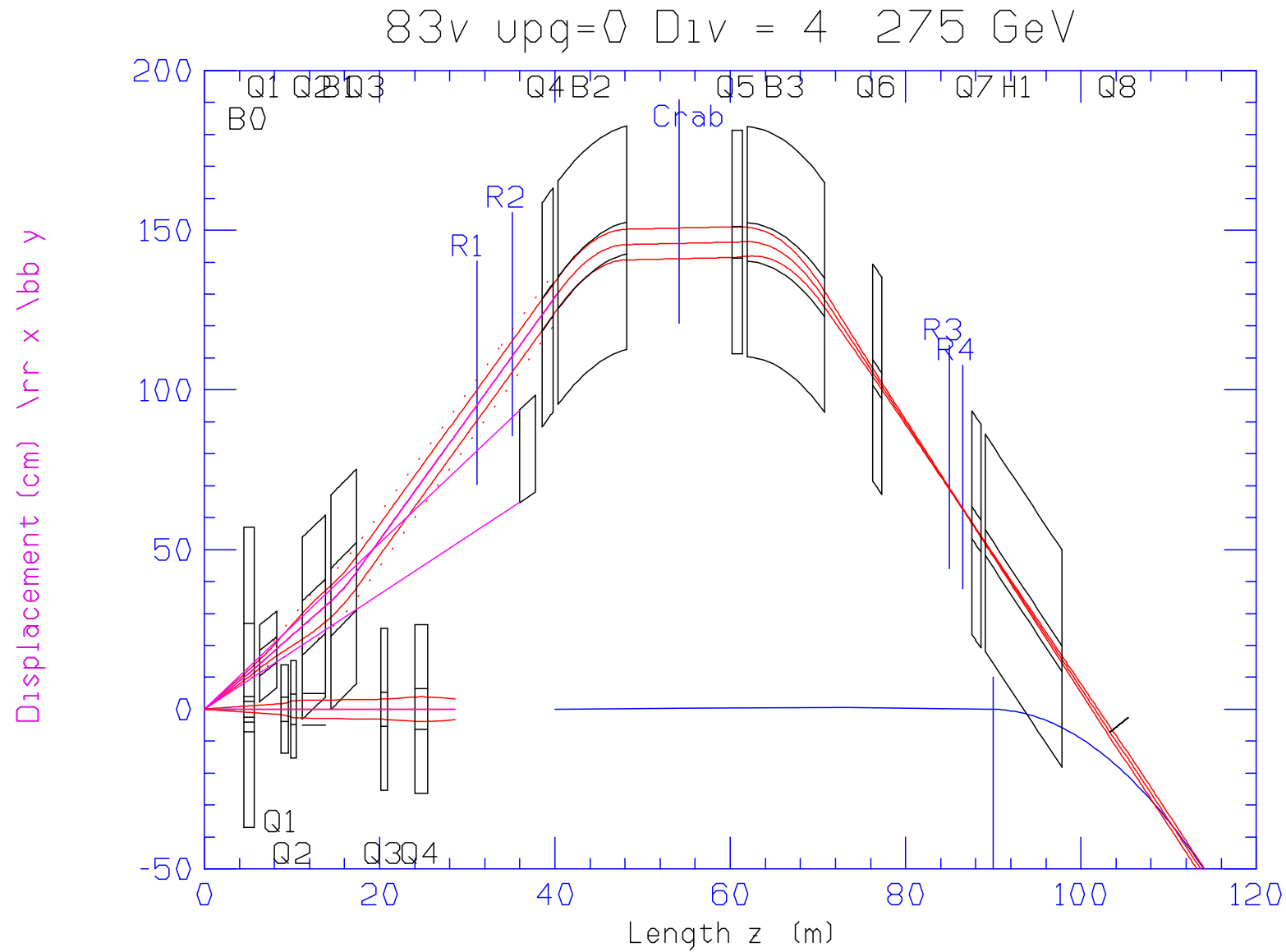
Changes since 2/10/17

- Sign of fields in B0 and B1 now the same
- Order of Q1 B1 Q2 changed to Q1 Q2 B1
- This avoids an excessive β_x with the now smaller β_x^* of 33 cm vs, 94 cm
- But raises the required gradients and fields in the now closer both Q1 and Q2
- More space for crab cavities - need ≥ 7 m for 10^{34} case
- Lower betas at Roman 3 and 4
- Increased dispersion at Roman 3 and 4
- This will require a new Version name

Luminosities vs. Divergences

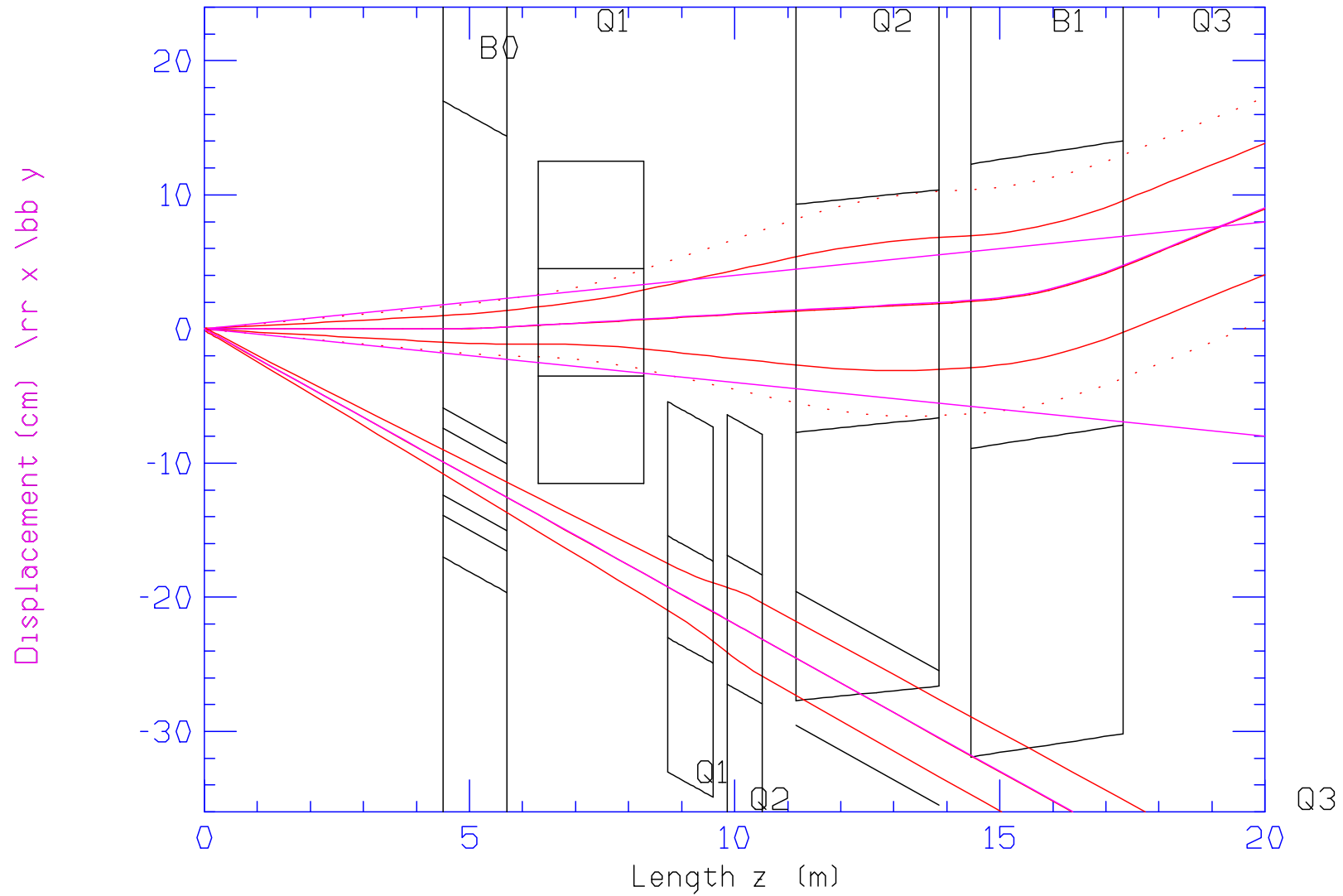


Layout for Med and High Cases



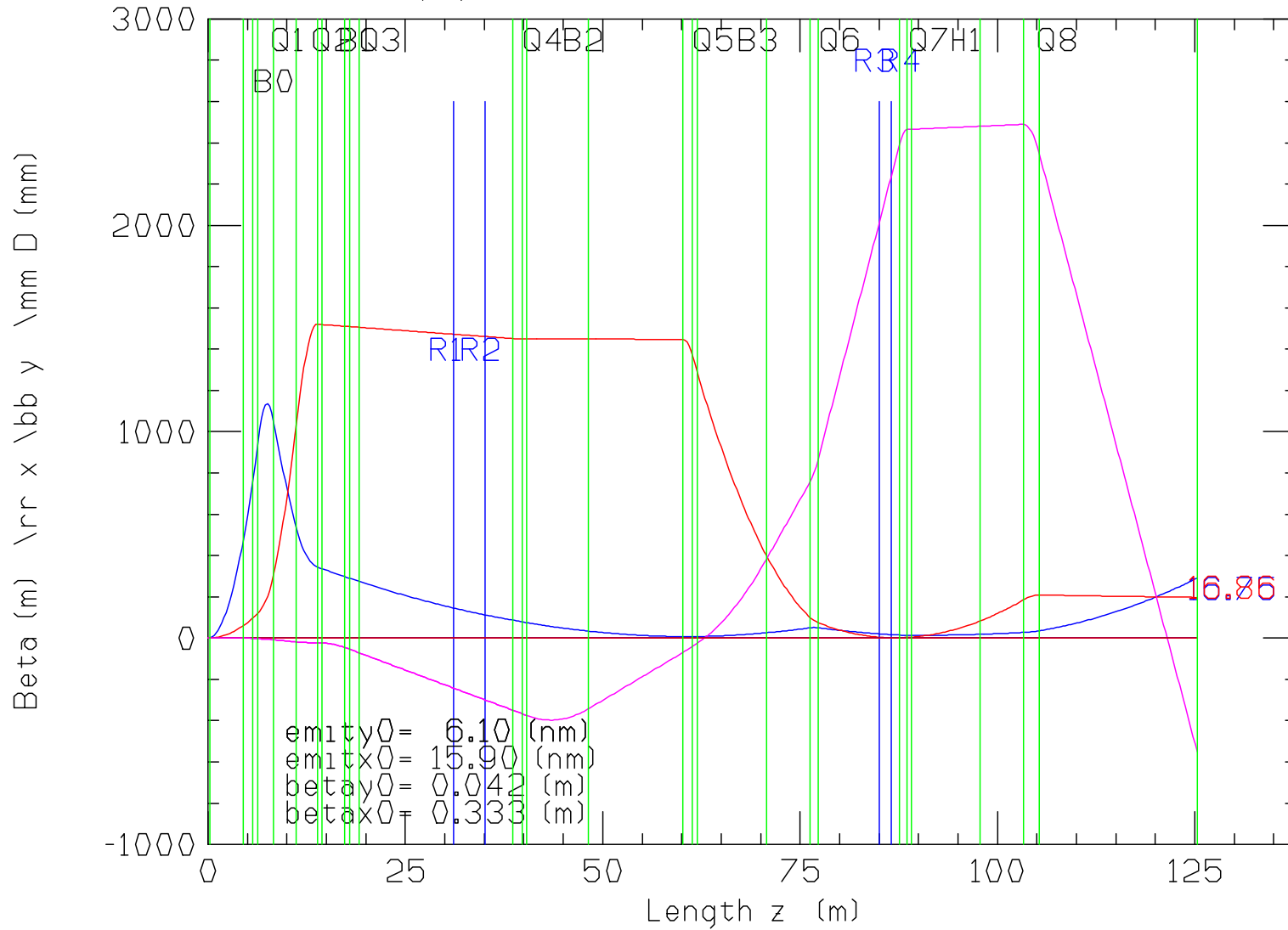
Detail for VHL

83v upg=0 Div = 4 275 GeV



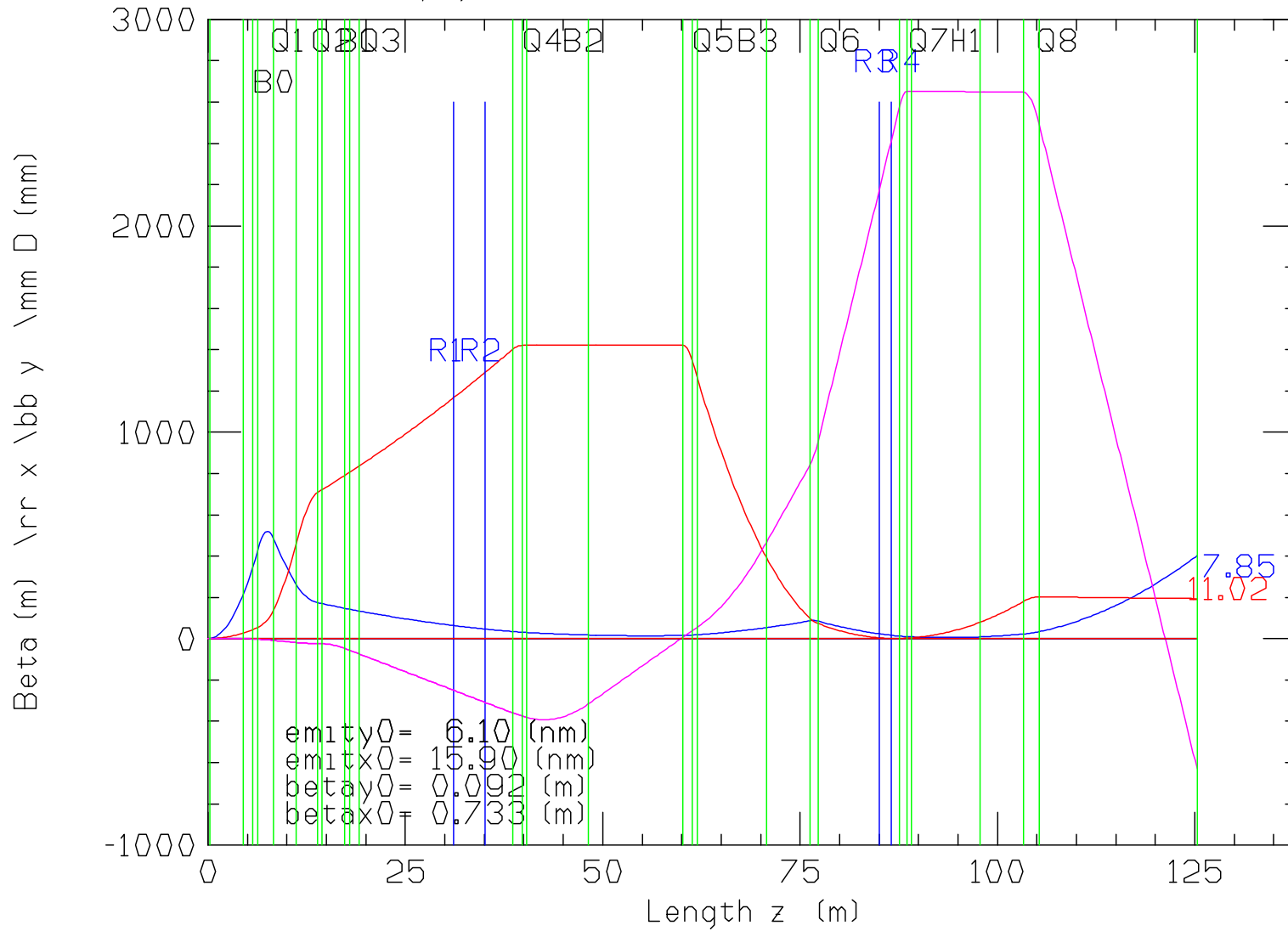
High Div. L=11 10³³

83v upq=0 Hadrons Div = 4 275 GeV



Medium Div. $L=3 \cdot 10^{33}$

83u upg=0 Hadrons Div = 4 275 GeV



Hadron Magnets for both

	L1	DL	x	θ	IR	OR	B	Grad	B	Grad	
	m	m	cm	mrad	cm	cm	T	T/m	T	T/m	
B0	3	4.50	1.20	9.9	0.00	17.00	47.0	1.70	0.00	1.70	0.00
Q1	5	6.30	1.98	14.1	22.00	4.00	12.0	4.54	-113.39	4.40	-110.00
Q2	7	11.16	2.69	25.9	26.00	8.50	28.5	4.04	47.50	3.43	40.33
B1	9	14.45	2.88	33.8	28.00	10.60	33.6	4.40	0.00	4.40	0.00
Q4	13	38.57	1.20	123.6	38.20	5.10	35.1	0.04	-0.69	0.45	8.91
B2	15	40.37	7.80	130.4	22.00	5.00	35.0	-4.40	0.00	-4.40	0.00
Q5	17	60.17	1.20	146.2	0.00	5.00	35.0	1.83	36.67	1.83	36.67
B3	19	61.97	8.80	146.3	-19.80	6.00	36.0	-4.40	0.00	-4.40	0.00
Q6	21	76.27	2.00	105.4	-41.47	4.00	34.0	3.67	-91.67	3.67	-91.67
Q7	23	88.57	1.00	54.2	-41.45	5.00	35.0	2.75	55.00	2.75	55.00
H1	25	90.07	8.75	48.0	-41.45	4.00	34.0	0.00	0.00	0.00	0.00

The more or less corresponding aperture x gradients for the previous "High Luminosity" ($2.9 \cdot 10^{33}$) solution were 3.39 and 3.55 T so these new ones are significantly harder. But if possible it makes a 10^{34} solution without cooling available without any upgrade - just doubling the number of bunches and different settings.