

# 1911-work-v1

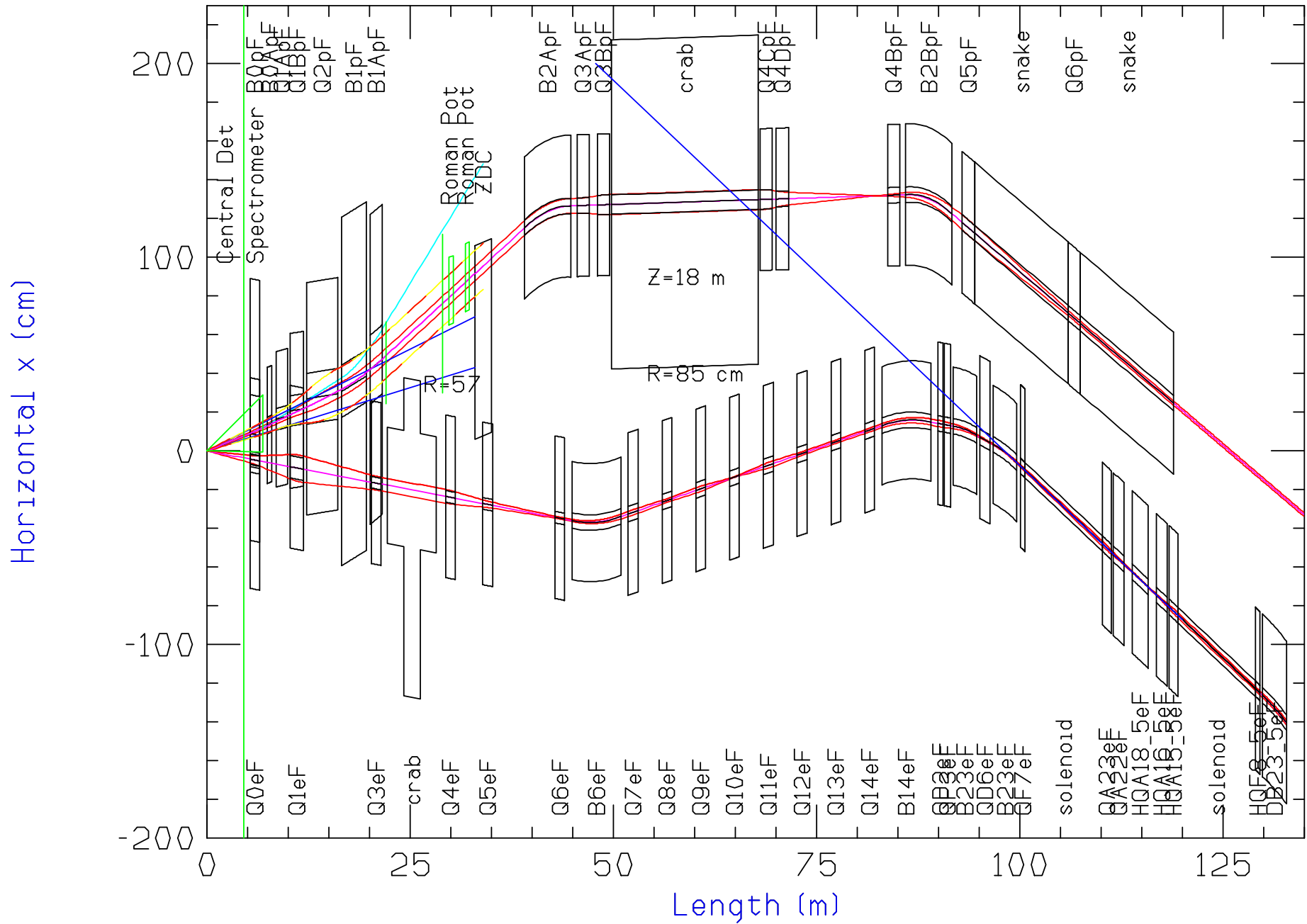
## Baseline Problems & possible fixes

11/01/19

- Add in Layouts:
  - Dimensions of warm electron quad yokes (from Holger)
  - Dimensions of RHIC cryostats where appropriate
  - 85 cm radial size of forward hadron crabs (from Qiong)
  - Revised dimensions of electron crab cryostat (from Qiong)
  - Show 18 m available length for forward hadron crabs
  - Include Rear
- Show layout and problems for baseline: Version (b)
- Suggest possible forward modification: Version (e)
- Fix needed for Rear SR in crab

# Baseline forward Layout

TB35(I) DRAFT 10/23/19 3.3 dbFI363b



# Problems

1. Electron crab interferes with neutron cone
2. Q3eF interferes with B1ApF
3. Zero degrees Calorimeter (ZDC) interferes with Q5eF
4. Limited sep. of neutral & charged beams at Roman pots
5. SR from B6eF hits crab aperture

Fixed by moving electron crab upstream by 5 m, requiring:

- Modified Q1eF, Q3eF, Q4eF, and Q5eF

For geometric match to ring

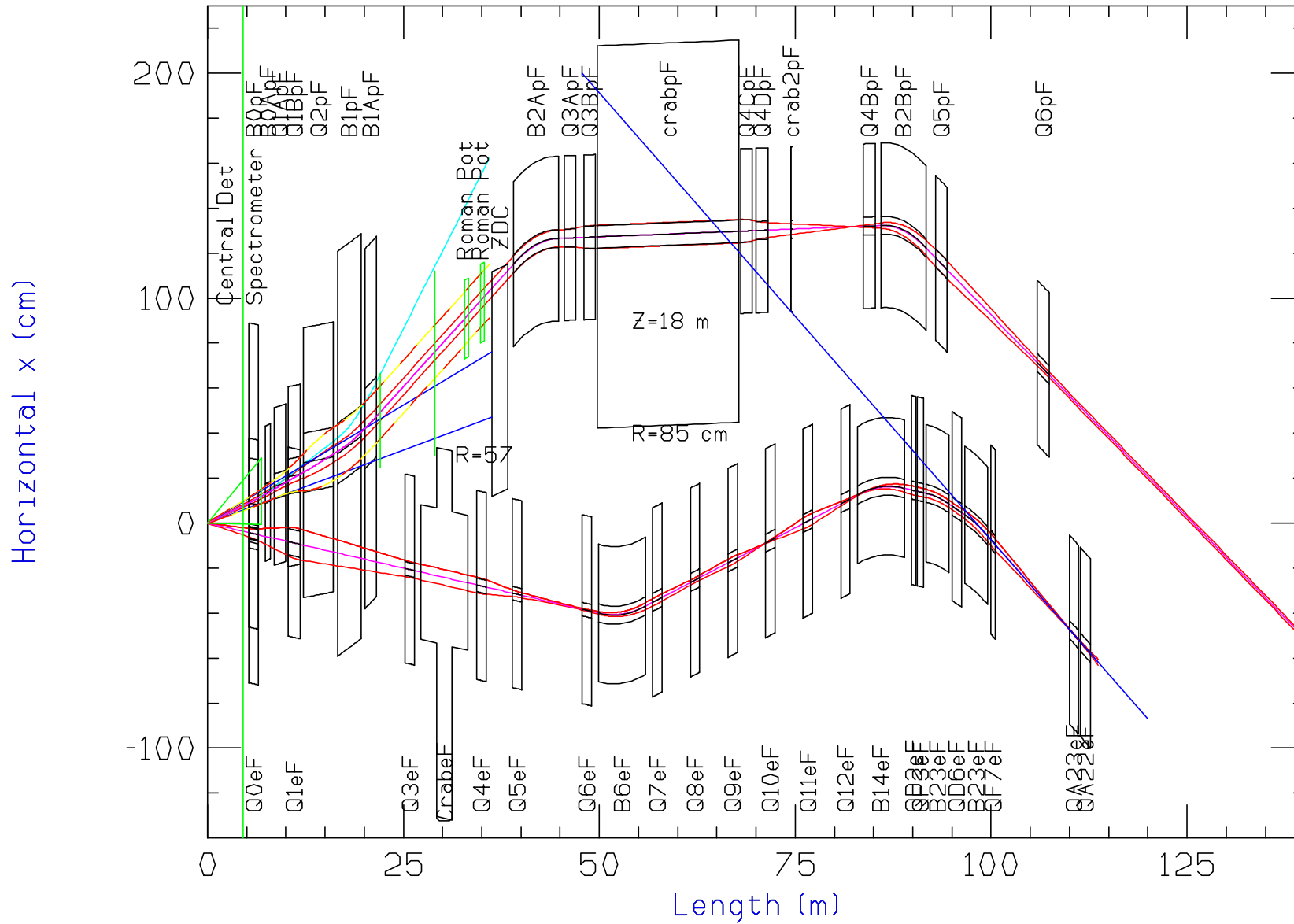
- $\approx 16\%$  increased fields in B6eF and B14eF
- Removing Q13eF and Q14eF and some quad spacing

Needs beta & dispersion match to ring

- Beta Re-matching using quads beyond Q5eF (not done)

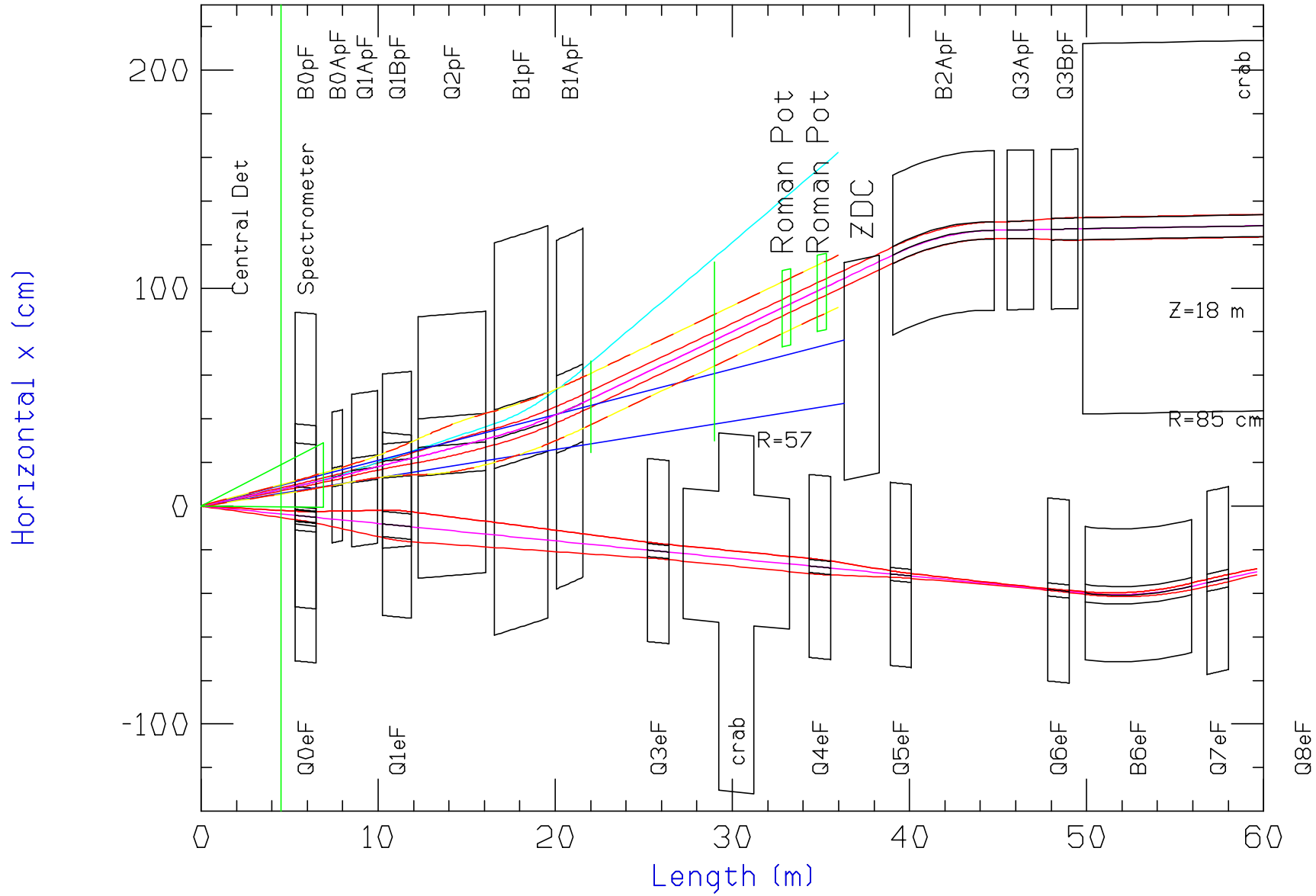
# Version (e) with crab and B6eF moved 5 m

TB35(I) DRAFT 10/23/19 3.3 dbFI363e

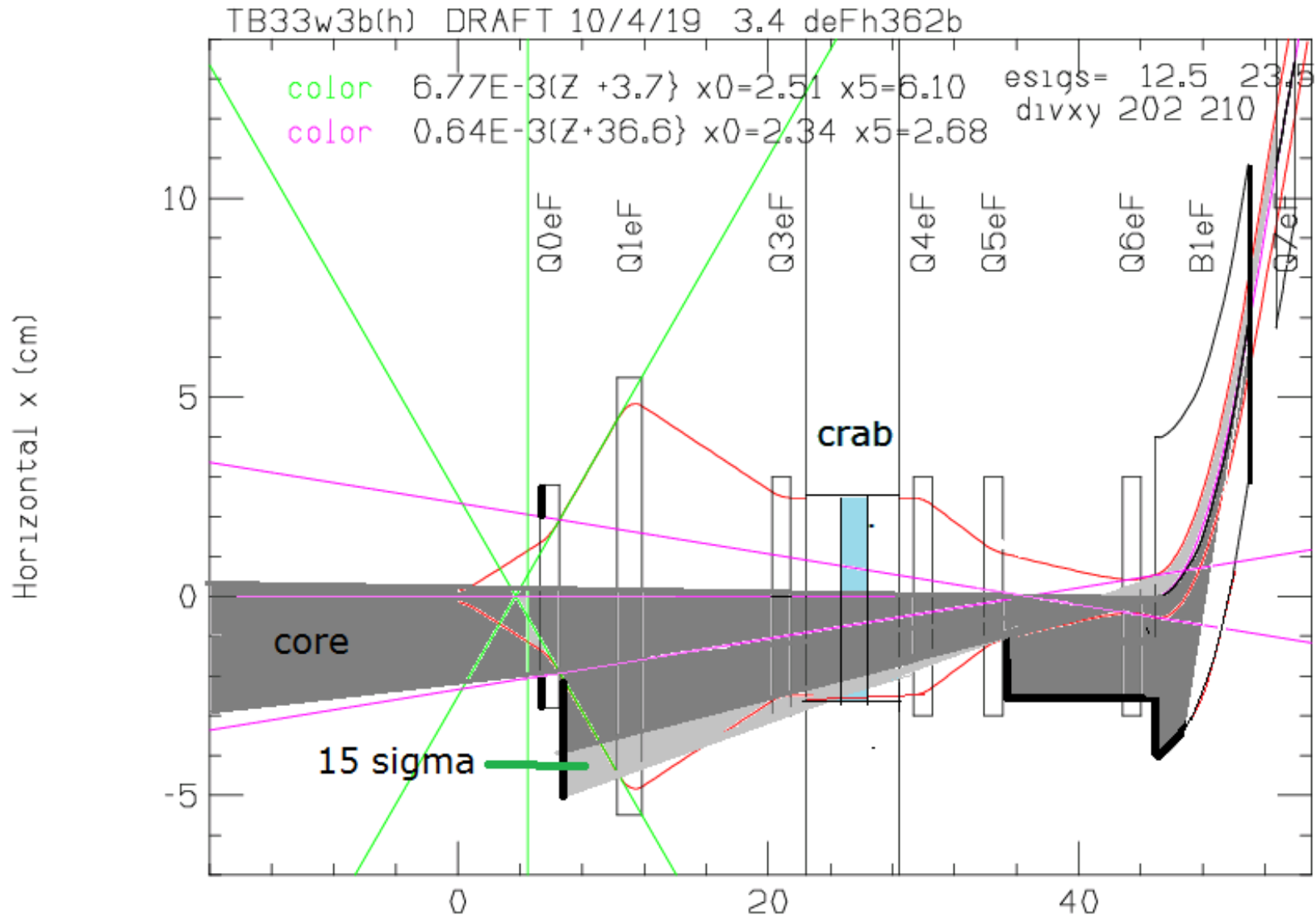


# Detail of Version (e)

TB35(I) DRAFT 10/23/19 3.3 dbFI362e

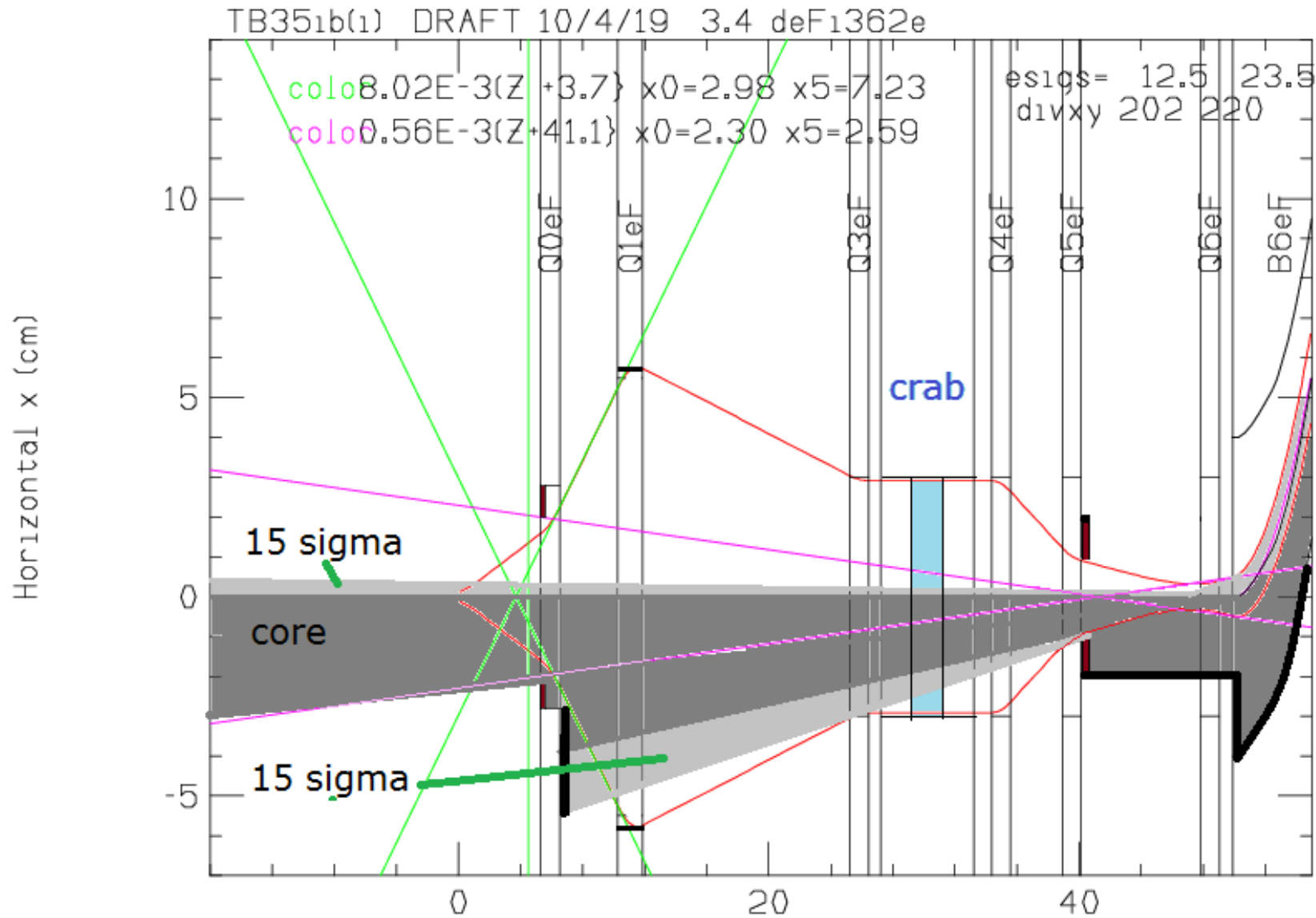


# Baseline (b) SR from B6



Too close for comfort!

# Version (i) SR from B6



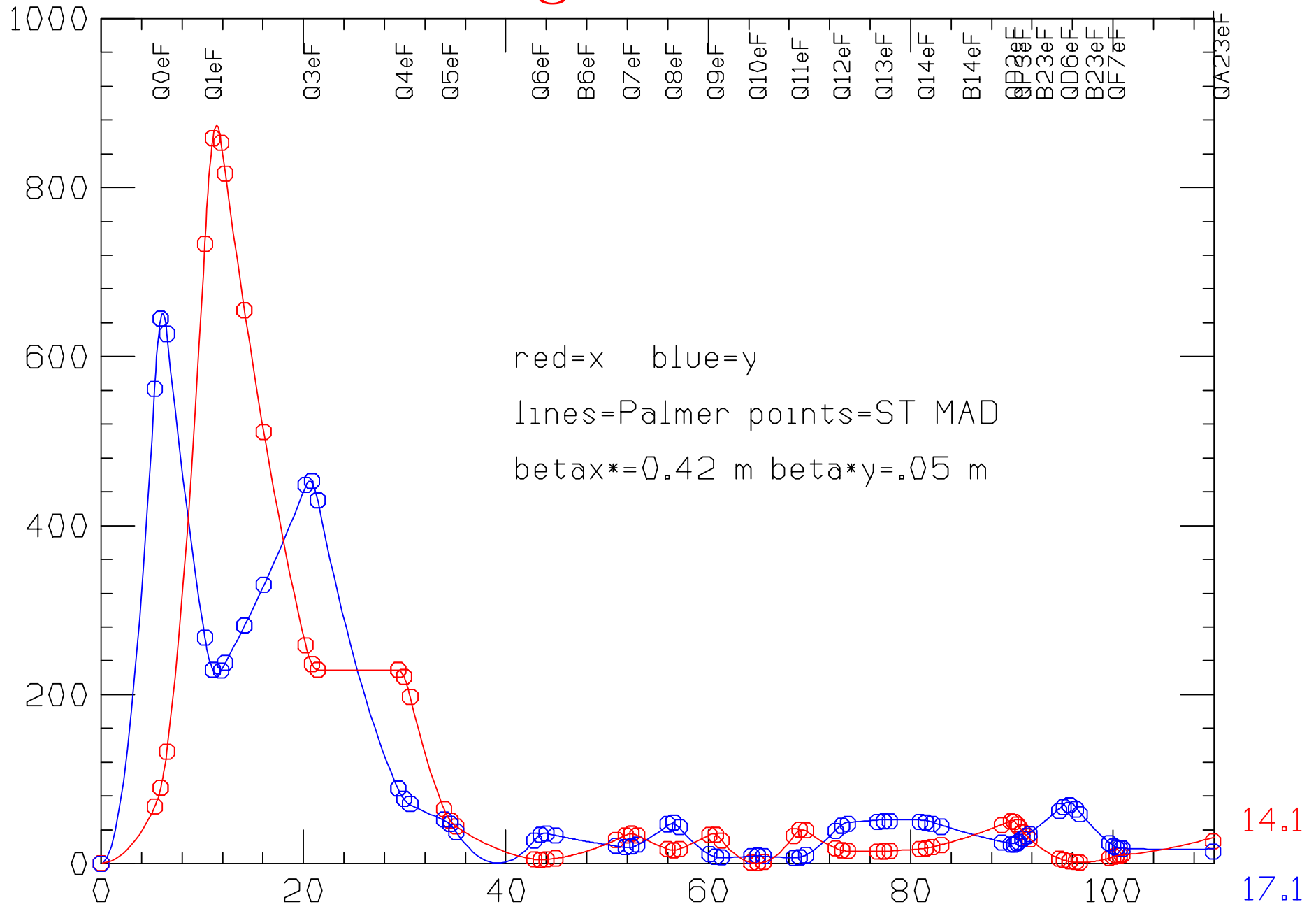
Stronger Q5eF after crab allows mask further in: now ok

## Comments

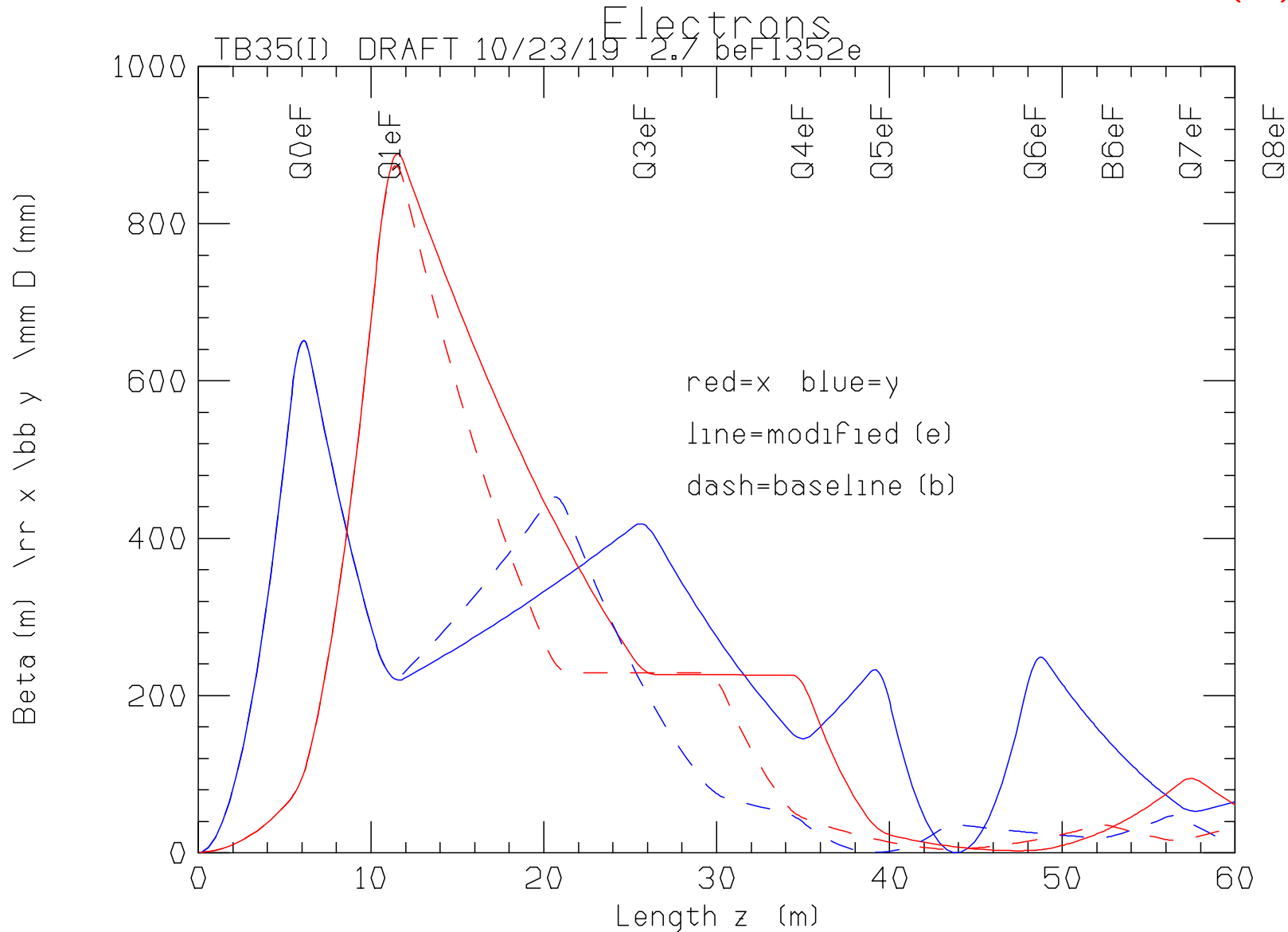
- It is assumed that some SR from the tails of the beam in the quads will enter and hit apertures in the Crab without enough power to cause trouble (as in cavities elsewhere)
- The above figure shows the 2 m long cryostat in blue outside this is warm and less sensitivity to the radiation



# Base-line betas using Palmer's and Steve's MAD



# Betas for Baseline & Modified version (e)



Quadrupole strengths fixed Q0eF to Q4eF

All quads q5eF and above can be used to match to ring

# TB35ib(i) DRAFT 10/23/19 zeFi353e Electron Forward 18

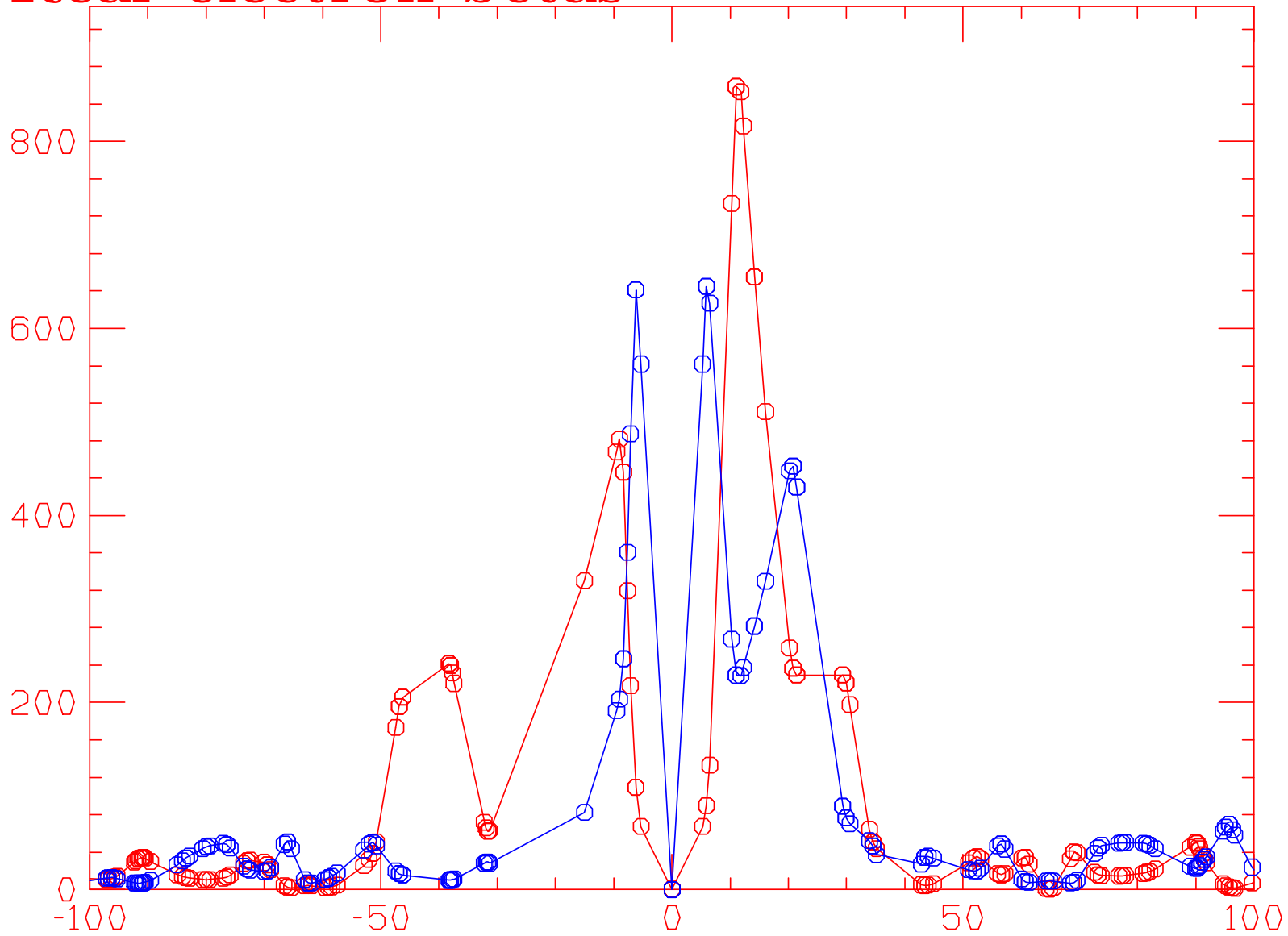
#

#	beta*_x	beta*_y	gm emit_x	gm emit_y	angle_x	angle_y	mom
#	[m]	[m]	[nm]	[nm]	[mrad]	[mrad]	GeV/c
	0.4200	0.0500	24.0000	2.4200	25	0	18

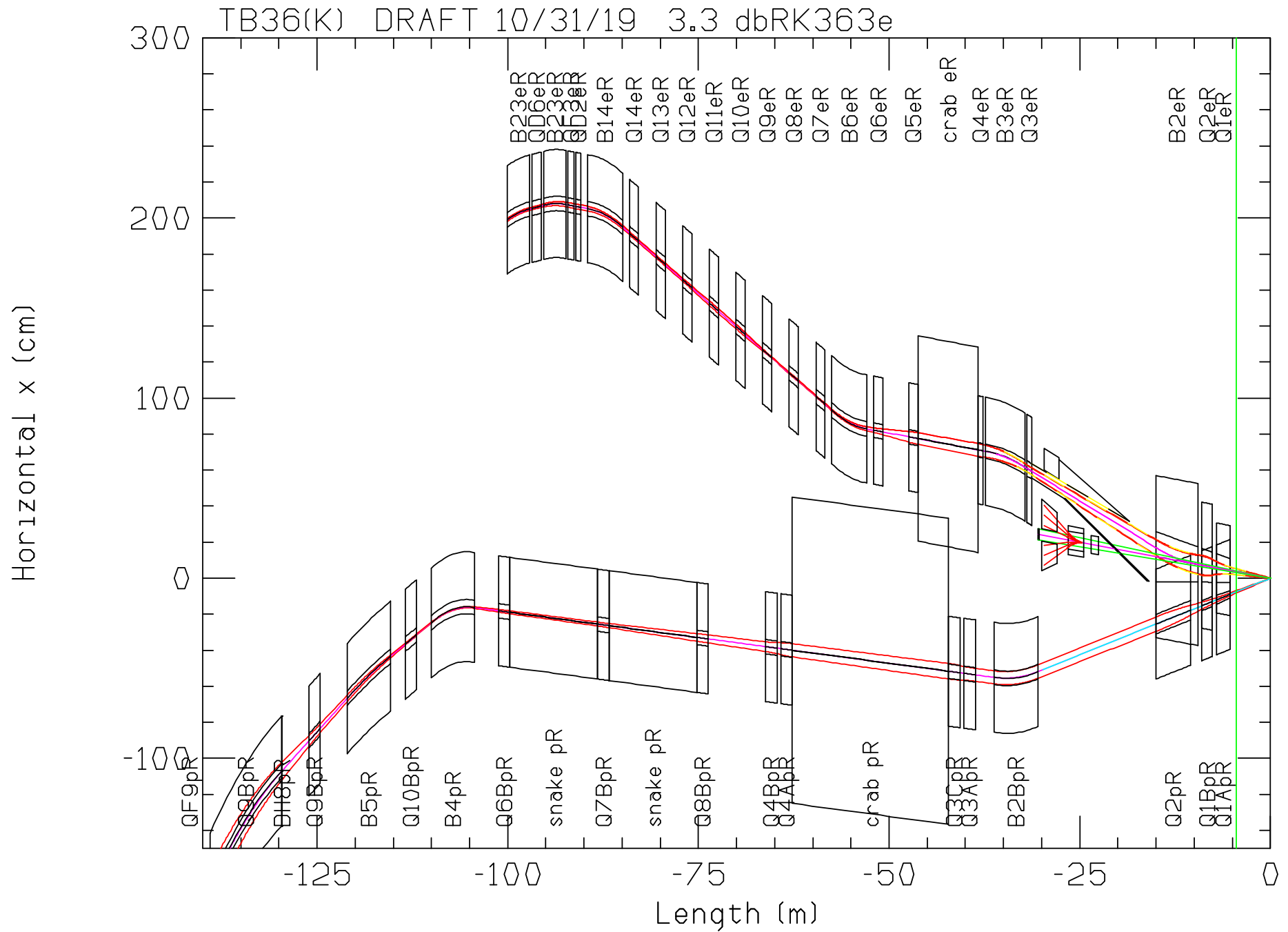
#

#	name	center_z	center_x	rad1	rad2	length	angle	B	grad	ap x grad
#		[m]	[m]	{m}	[m]	[m]	[mrad]	[T]	[T/m]	[T]
	Q0eF	5.900	-0.1475	0.028	0.028	1.20	25.0	0.000	-13.531	-0.379
	Q1eF	11.065	-0.2766	0.058	0.058	1.61	25.0	0.000	6.648	0.386
	Q3eF	25.820	-0.6455	0.030	0.030	1.20	25.0	0.000	-3.400	-0.102
	Q4eF	34.950	-0.8738	0.030	0.030	1.20	25.0	0.000	7.500	0.225
	Q5eF	39.515	-0.9879	0.030	0.030	1.20	25.0	0.000	-15.000	-0.450
	Q6eF	48.415	-1.2104	0.030	0.030	1.20	25.0	0.000	-6.000	-0.180
	B6eF	52.915	-1.2827	0.040	0.040	6.00	38.4	-0.262	0.000	0.000
	Q7eF	57.415	-1.3173	0.040	0.040	1.20	51.2	0.000	9.252	0.370
	Q8eF	62.215	-1.3113	0.040	0.040	1.20	51.2	0.000	-13.205	-0.528
	Q9eF	67.015	-1.3054	0.040	0.040	1.20	51.2	0.000	18.172	0.727
	Q10eF	71.815	-1.2995	0.040	0.040	1.20	51.2	0.000	-6.493	-0.260
	Q11eF	76.615	-1.2936	0.040	0.040	1.20	51.2	0.000	17.824	0.713
	Q12eF	81.415	-1.2876	0.040	0.040	1.20	51.2	0.000	-7.441	-0.298
	B14eF	85.915	-1.3222	0.040	0.040	6.00	37.9	0.262	0.000	0.000
	QD2eF	90.115	-1.3871	0.040	0.040	0.60	25.0	0.000	23.109	0.924
	QF3eF	90.966	-1.4084	0.040	0.040	0.80	25.0	0.000	-2.800	-0.112
	B23eF	93.135	-1.4745	0.040	0.040	2.92	16.9	0.326	0.000	0.000
	QD6eF	95.604	-1.5637	0.040	0.040	1.20	9.1	0.000	-9.875	-0.395
	B23eF	98.074	-1.6766	0.040	0.040	2.92	1.0	0.326	0.000	0.000
	QF7eF	100.243	-1.7880	0.040	0.040	0.60	-6.8	0.000	19.599	0.784
	QA23eF	110.593	-2.3760	0.040	0.040	1.10	-6.8	0.000	28.364	1.135
	QA22eF	112.044	-2.4584	0.040	0.040	1.30	-6.8	0.000	-30.065	-1.203

# Rear electron betas



# Baseline Rear Layout



# Problems

1. Apparent interference between e and hadron crabs
2. Location immediately after bend exposed to SR from B3

## FIX?

1. Need more information on hardon crab dimensions  
Probably ok if harmonic hadron cavities oppose electron crab
2. Need to know how much SR will hurt  
Probably has to be moved