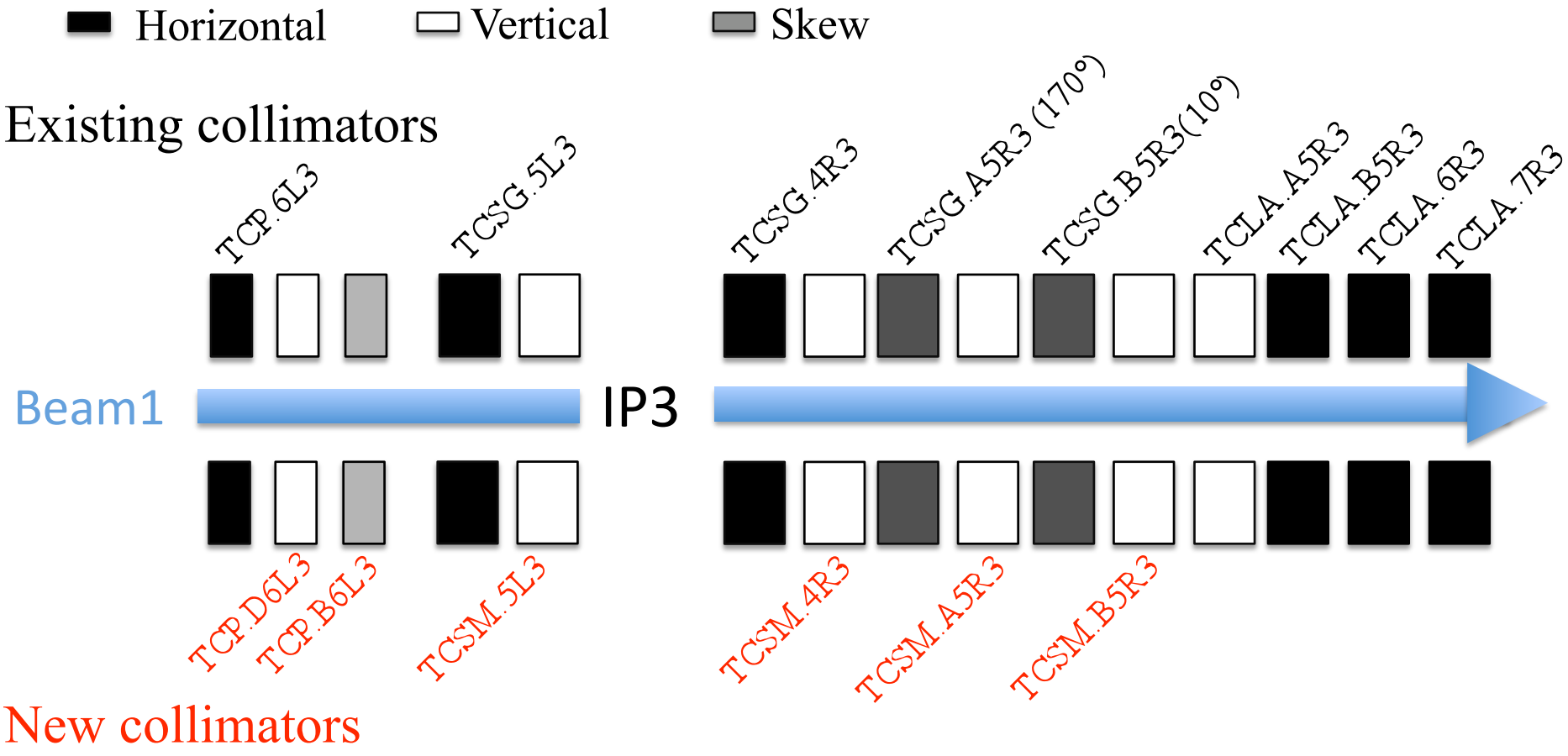
Betatron cleaning in IR3

Stregnthened IR3 adding collimators



CFC secondary collimators installed in phase 2 collimator locations.

Simulation scenarios

* The halfgaps in the table are calculated for $\Delta p/p=\delta=0$.

Available results

	TCPH [σ_β]	TCPV [σ_β]	TCPS [σ_β]	TCSH [σ_β]	TCSV [σ_β]	TCLAH [σ_β]	TCLAV [σ_β]	Halo
scenario0	15	6	-	18	-	20	10	vert
scenario1	15	6	-	18	7	20	10	vert
scenario2	6	6	-	7	7	10	10	vert/hor
scenario3	8	6	-	7	7	13	10	vert/hor
scenario4	8	6	6	7	7	13	10	vert/hor

Simulations vertical halo : Thomas Weiler

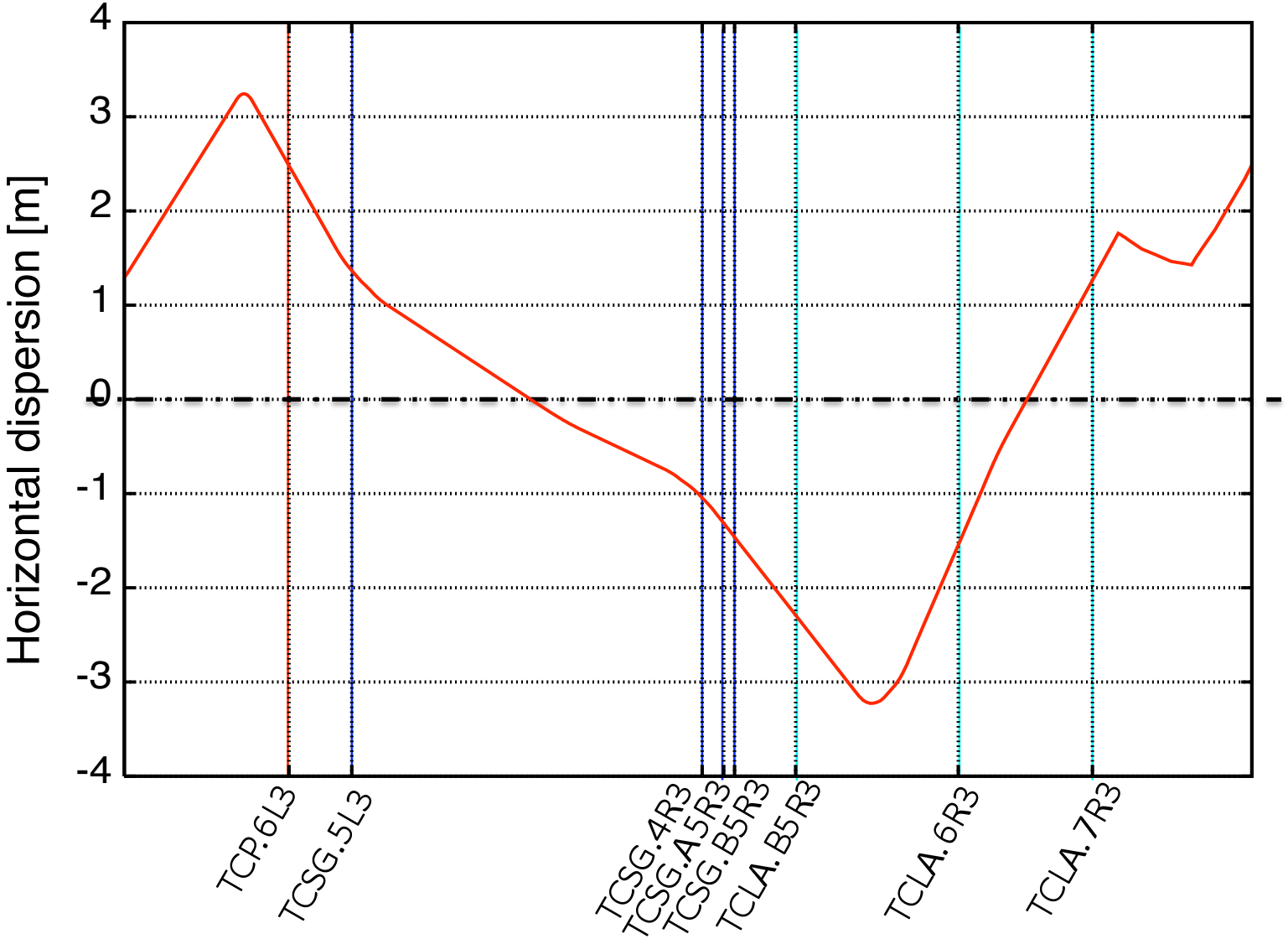
horizontal halo : Chiara Bracco

More scanraios:

- Secondary skew collimators
- One side momentum cleaning plus one side betatron cleaning
- ……

Horizontal halo

The contribution of the dispersion must be taken into account



Effective betatron amplitude cut

The jaws "cut" all the particles oscillating with an amplitude $A_x \geq |x_{cut}|$.

$$x_{cut}(i_{coll}) = n_{\beta_x cut}(i_{coll}, \delta)\sqrt{\varepsilon_x \beta_x(i_{coll}, \delta)} + D_x(i_{coll}, \delta)\delta$$

Betatron oscillation amplitude

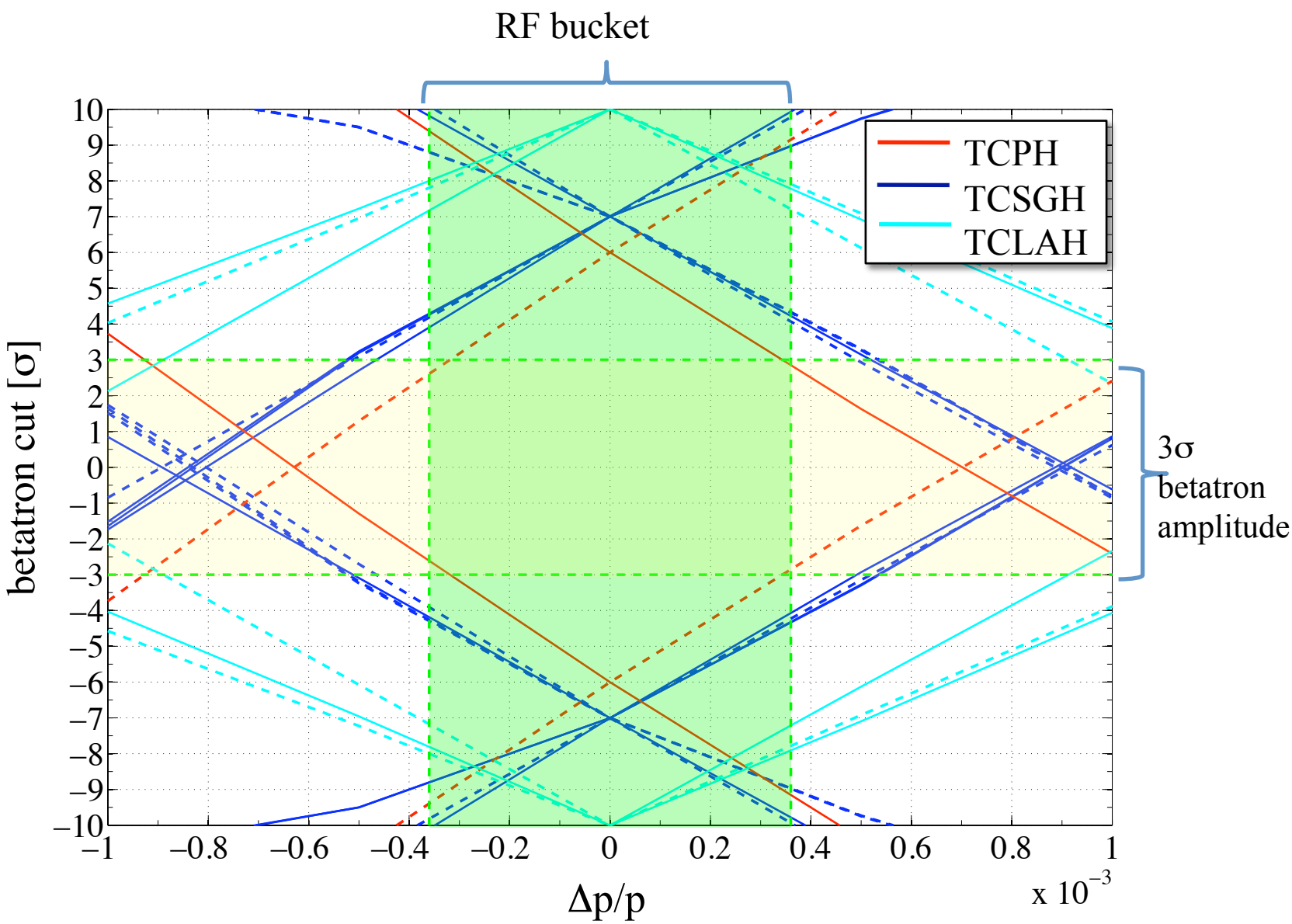
Dispersion function

x_{cut} is the half gap in mm calculated for $\delta=0$. From this equation it is possible evaluate the effective betatron amplitude cut as function of δ*:

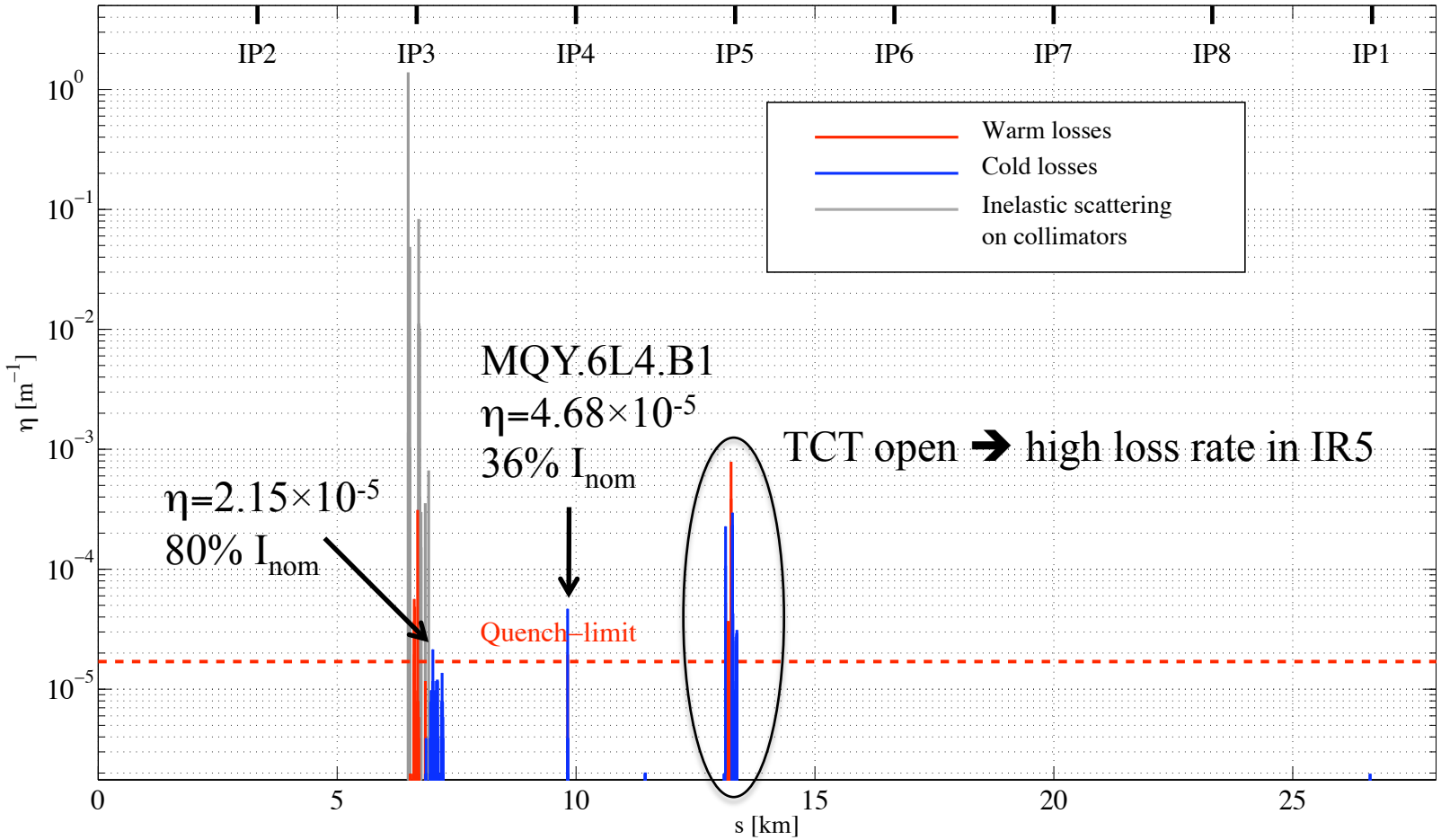
$$n_{\beta_x cut}(i_{coll}, \delta) = \frac{\pm x_{cut}(i_{coll}) - D_x(i_{coll}, \delta)\delta}{\sqrt{\varepsilon_x \beta_x(i_{coll}, \delta)}}$$

*For details refer to: 05/11/07 LCU meeting "Chromatic phase space cuts for collimation" C.Bracco

Phase space cut for scenario2: TCPH@6σ_β



Scenario2 horizontal halo loss map



Energy spread on ➔ first particle impacts against TCS, TCLA and also TCPV!!

New simulations for pure horizontal halo case are running!

Losses in IR4

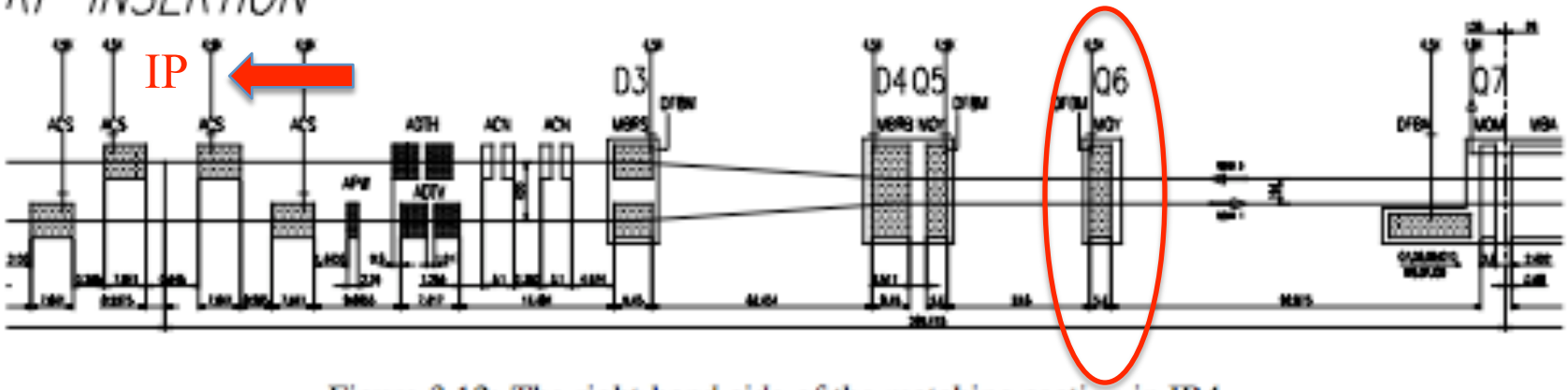
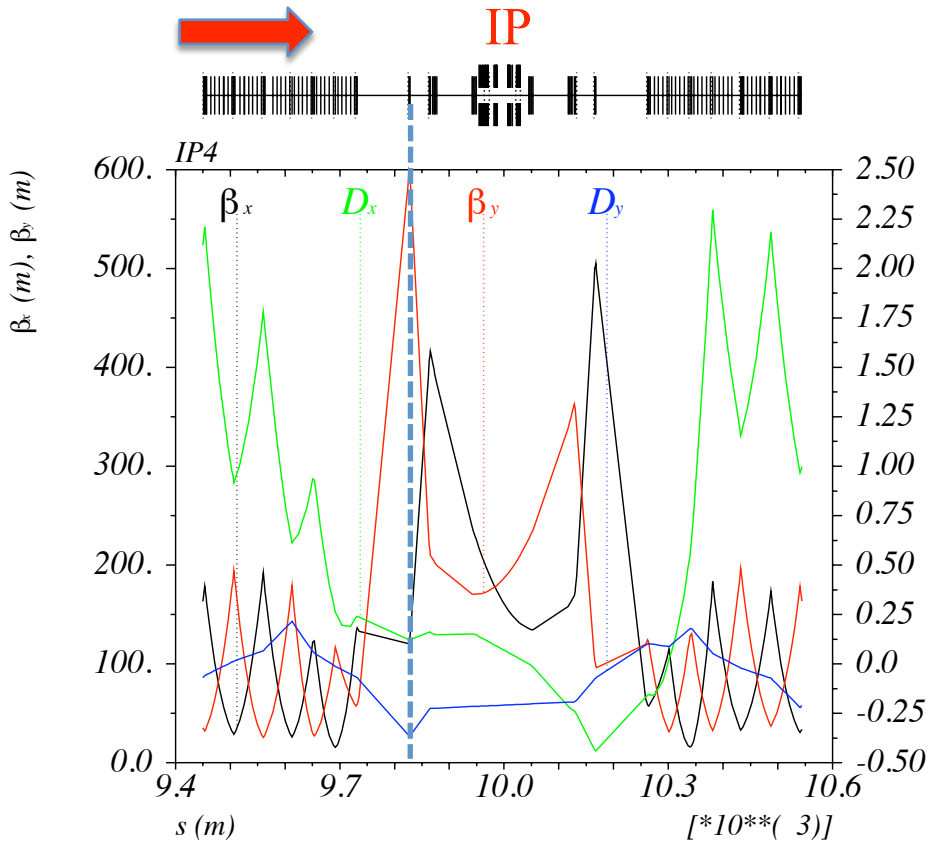
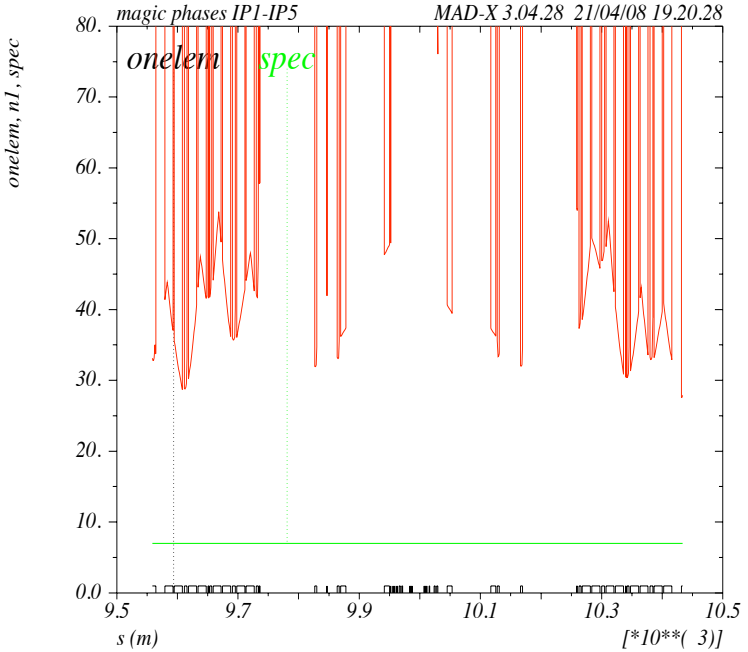


Figure 3.12: The right-hand side of the matching section in IR4.

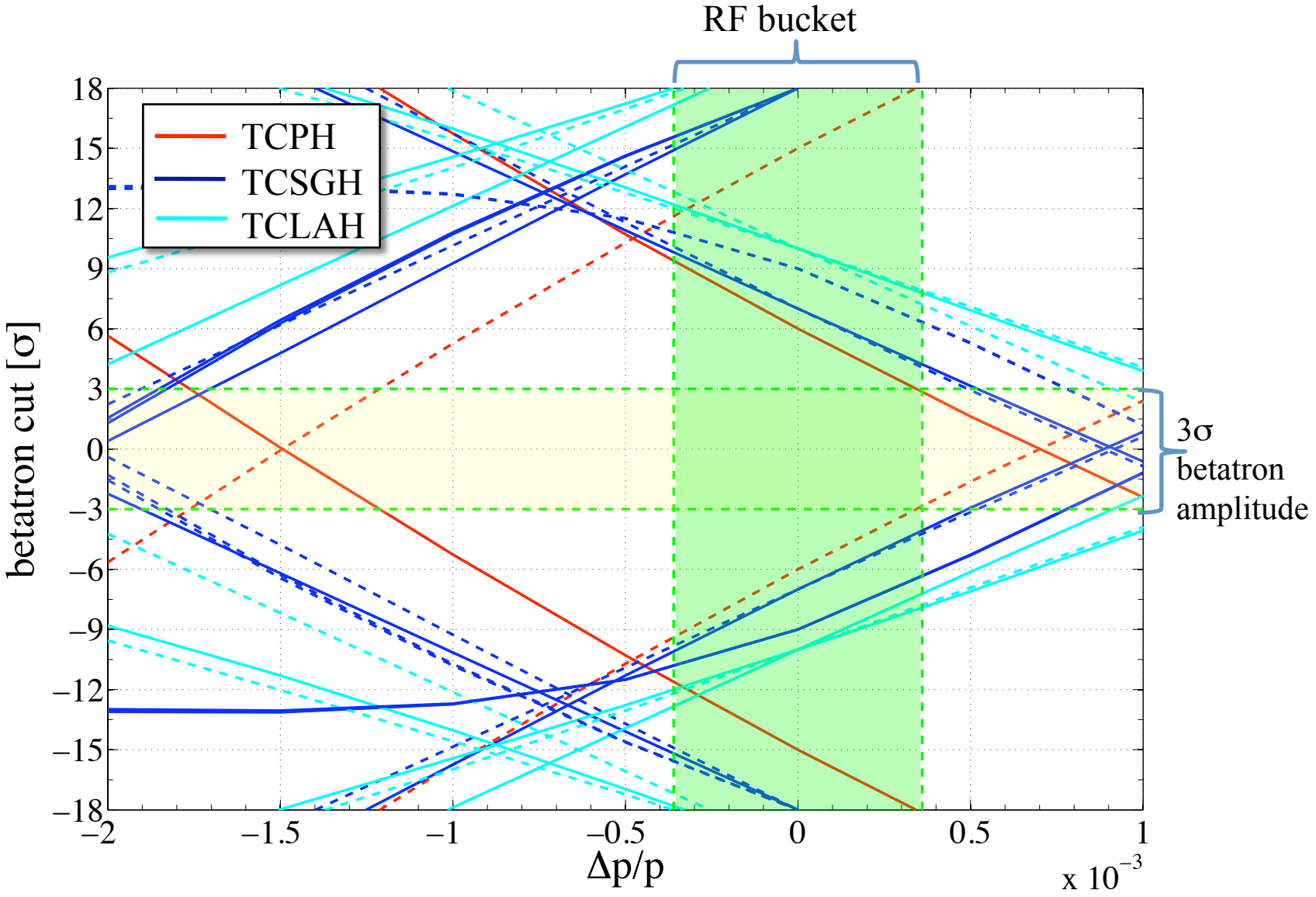




One side momentum – One side betatron cleaning

Collimator	Left jaw [s]	Right jaw [s]	Dx [m]
TCP.6L3.B1	6	15	2.272
TCSG.5L3.B1	7	18	1.267
TCSG.4R3.B1	18	7	- 0.948
TCSG.A5R3.B1	18	**9**	- 1.201
TCSG.B5R3.B1	18	**9**	- 1.341
TCLA.B5R3.B1	20	10	- 2.121
TCLA.6R3.B1	20	10	- 1.452
TCLA.7R3.B1	10	20	1.130

One side momentum – One side betatron cleaning
Phasespace cut



Skew secondary collimators

S. Redaelli suggested the following setting based on phase advance optimization

"TCP.6L3.B1" -> Unchanged
"TCP.D6L3.B1" -> TCP-V
"TCSG.5L3.B1" -> TCSG-Skew (+45) (?)
"TCSM.5L3.B1" -> TCSG-Skew (-45)
"TCSG.4R3.B1" -> Unchanged
"TCSM.4R3.B1" -> TCSG-V
"TCSG.A5R3.B1 " -> Unchanged
"TCSM.A5R3.B1" -> TCSG-Skew (+45)
"TCSG.B5R3.B1" -> Unchanged
"TCSM.B5R3.B1" -> TCSG-Skew (-45)
"TCLA.A5R3.B1" -> Unchanged
"TCLA.B5R3.B1" -> Unchanged
"TCLA.6R3.B1" -> Unchanged
"TCLA.7R3.B1" -> Change to vertical?

Better not to change the already installed collimators (TCSG)