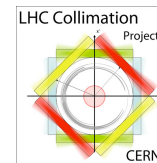


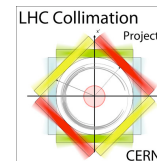
Collimator setting proposal for 3.5 TeV

RWA and AR



Aperture (n1) at 3.5 TeV

- Collimator settings must be adapted to the available aperture.
- Available aperture is given by n1 from MADX and aperture model.
- At the moment treat only the overall aperture bottleneck in x-y space. Cannot distinguish between n1 in x and y planes without manual analysis of aperture (limitation in MADX) → Conservative collimator settings (can open one plane more than shown here).
- Will work further on adapting x and y gaps independently.
- Assume as baseline: Intermediate Settings for Collimators as presented and approved at Chamonix and LMC.
- Do not distinguish between beam 1 and beam 2: these are close, we take the overall minimum.
- Optics used: 3.5 TeV, no external crossing, no separation,
 β^* : IP1&5 = 2m, IP2 = 10m, IP8 = 3m



Overall Available Aperture (Bottlenecks)

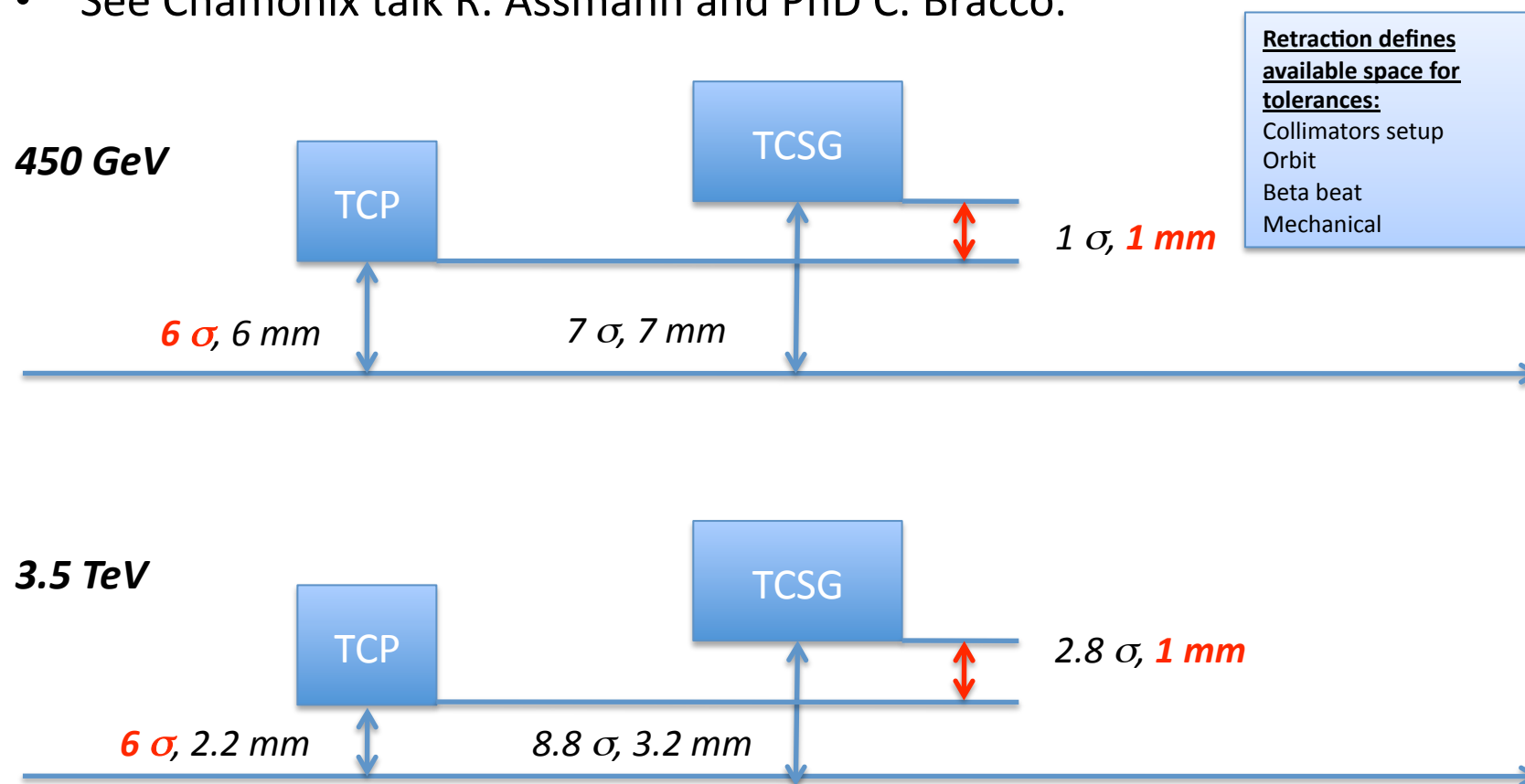
Location	Minimum n1 [σ]	Available x/y aperture [σ]	Maximum allowed TCT setting [σ]
Arcs	19.4		
LSS1, TCT to triplet	12.2	14.6	13.7
LSS1, DS	20.8	25.0	
LSS2, TCT to triplet	31.5	31.5	30.6
LSS2, DS	19.8	23.8	
LSS5, TCT to triplet	12.2	14.6	13.7
LSS5, DS	20.8	25.0	
LSS8, TCT to triplet	15.1	18.2	17.3
LSS8, DS	20.9	25.1	

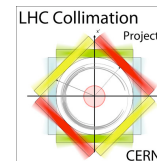
Take 0.9 σ safety margin

Overall ring aperture is given by triplet apertures in LSS1 and LSS5 → This defines overall collimator settings. Tertiary collimators, however, must be adjusted to local aperture.

Intermediate Collimator Settings

- Primary collimators kept at nominal setting (6σ).
- All other families keep same absolute distance to primary collimator (in mm) for all energies.
- See Chamonix talk R. Assmann and PhD C. Bracco.

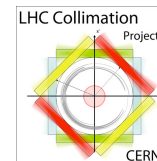




Intermediate Settings

Family	setting 450 GeV [sig]	setting 3.5 TeV [sig]
TCP IR7	6.0	6.0
TCSG IR7	7.0	8.8
TCLA IR7	10.0	17.2
TCDQ	8.0	11.6
TCS TCDQ	7.5	10.2
TCP IR3	8.3	8.3
TCSG IR3	9.6	11.9
TCLA IR3	10.3	13.9
TCLP	n/a	13.0

Minimal allowed TCT setting = TCDQ + margin → **12.5 σ** for 0.9 σ margin



	Family	setting 3.5 TeV [sig]
LSS7	TCP IR7	6.0
	TCSG IR7	8.8
	TCLA IR7	17.2
LSS6	TCDQ	11.6
	TCS TCDQ	10.2
LSS3	TCP IR3	8.3
	TCSG IR3	11.9
	TCLA IR3	13.9
LSS1	TCTH	13.1
	TCTV	13.1
	TCLP	14.0
LSS2	TCTH	30.0
	TCTV	30.0
LSS5	TCTH	13.1
	TCTV	13.1
	TCLP	14.0
LSS8	TCTH	16.7
	TCTV	16.7

INTERMEDIATE settings

TCTs 1.5 σ tolerance taken to have equal tolerances for protection of TCTs with TCDQs and protection of the triplets with TCTs (IP1 & 5)

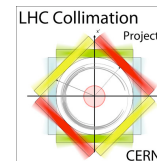
Early collimator setup, tertiary collimators as tight as necessary but not tighter

Collimator setting proposal for 3.5 TeV IP1

NAME	Dist. from IP1 [m]	n1 (sigma)	Collimator setting (sigma)
MQ.11L1.B1	-436.74	21.4	
MQML.10L1.B2	-383.88	20.9	
TCTVA.4R1.B2	145.84	37.8 *	13.1
TCTH.4R1.B2	147.02	37.4 *	13.1
MQXB.B2R1	39.65	12.2	
MQXB.B2L1	-39.65	12.2	
TCTH.4L1.B1	-147.02	37.4 *	13.1
TCTVA.4L1.B1	-145.84	37.8 *	13.1
MQML.10R1.B1	383.37	21.2	
MCBV.11R1.B2	439.20	20.8	

Agreed scenario: 3.5 TeV, early collimator setup, tertiary collimators as tight as necessary but not tighter, no crossing angle, β^* : IP1&5 = 2m, IP2 = 10m, IP8 = 3m

* n1 calculated with collimators fully open



Collimator setting proposal for 3.5 TeV IP5

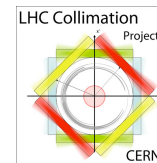
NAME	Dist. from IP5 [m]	n1 (sigma)	Collimator setting (sigma)
MQ.11L5.B1	-437.04	20.8	
MQML.10L5.B2	-383.88	20.9	
XRPV.B6L5.B2	-220.0	64.0	
XRPH.B6L5.B2	-219.55	64.0	
XRPH.A6L5.B2	-215.1	63.6	
XRPV.A6L5.B2	-214.63	63.6	
XRPV.B4L5.B2	-150.48	34.4	
XRPH.B4L5.B2	-150.03	34.1	
XRPH.A4L5.B2	-149.4	33.6	
XRPV.A4L5.B2	-148.94	33.2	
TCTVA.4L5.B1	-146.14	37.8 *	13.1
TCTH.4L5.B1	-147.32	37.4 *	13.1
MQXB.B2L5	-39.65	12.2	
MQXB.B2R5	39.35	12.2	
TCTVA.4R5.B2	145.84	37.8 *	13.1
TCTH.4R5.B2	147.02	28.6 *	13.1
XRPV.A4R5.B1	-148.63	33.2	
XRPH.A4R5.B1	-149.09	33.6	
XRPH.B4R5.B1	-149.72	34.1	
XRPV.B4R5.B1	-150.17	34.4	
XRPV.A6R5.B1	-214.32	60.1	
XRPH.A6R5.B1	-214.77	60.1	
XRPH.B6R5.B1	-219.25	60.0	
XRPV.B6R5.B1	-219.69	60.0	
MCBCV.10R5.B1	385.66	21.1	
MQTLI.11R5.B2	437.27	20.4	

Collimator setting proposal for 3.5 TeV IP2

NAME	Dist. from IP2 [m]	n1 (sigma)	Collimator setting (sigma)
MCBV.12L2.B1	-487.75	21.3	
MQM.B7L2.B2	-264.80	19.8	
MQML.6L2.B2	-241.35	25.8	
MQM.6L2.B1	-239.70	25.1	
TCTH.4L2.B1	-117.58	79.2 *	30
MQXB.B2L2	-39.65	26.2	
MQXB.B2R2	39.8	27.2	
TCTH.4R2.B2	117.73	68.7 *	30
MQM.A7R2.B1	264.07	20.3	
MCBV.12R2.B2	492.23	21.2	

Agreed scenario: 3.5 TeV, early collimator setup, tertiary collimators as tight as necessary but not tighter, no crossing angle, β^* : IP1&5 = 2m, IP2 = 10m, IP8 = 3m

* n1 calculated with collimators fully open



Collimator setting proposal for 3.5 TeV IP8

NAME	Dist. from IP8 [m]	n1 (sigma)	Collimator setting (sigma)
MCBV.12L8.B1	-476.53	21.1	
MQ.11L8.B2	-426.12	21.0	
TCTH.4L8.B1	-117.58	38.4 *	16.7
MQXB.B2L8	-39.50	15.1	
MQXB.B2R8	39.65	15.1	
TCTH.4R8.B2	117.73	35.8 *	16.7
MQML.6R8.B2	243.04	21.2	
MCBV.11R8.B1	450.14	20.9	

Agreed scenario: 3.5 TeV, early collimator setup, tertiary collimators as tight as necessary but not tighter, no crossing angle, β^* : IP1&5 = 2m, IP2 = 10m, IP8 = 3m

* n1 calculated with collimators fully open