



2024 BLM thresholds for Pb-Pb Run at 6.8 TeV

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Machine Protection Panel - 04/11/2024

TCT collimators

Thermo-mechanical simulations support this new limits

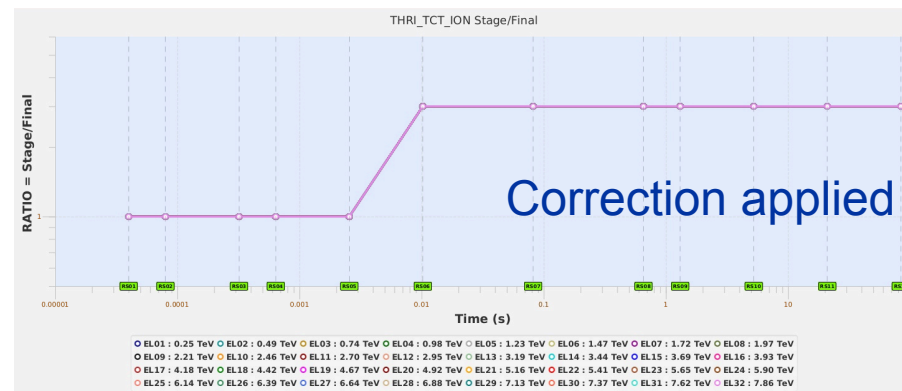
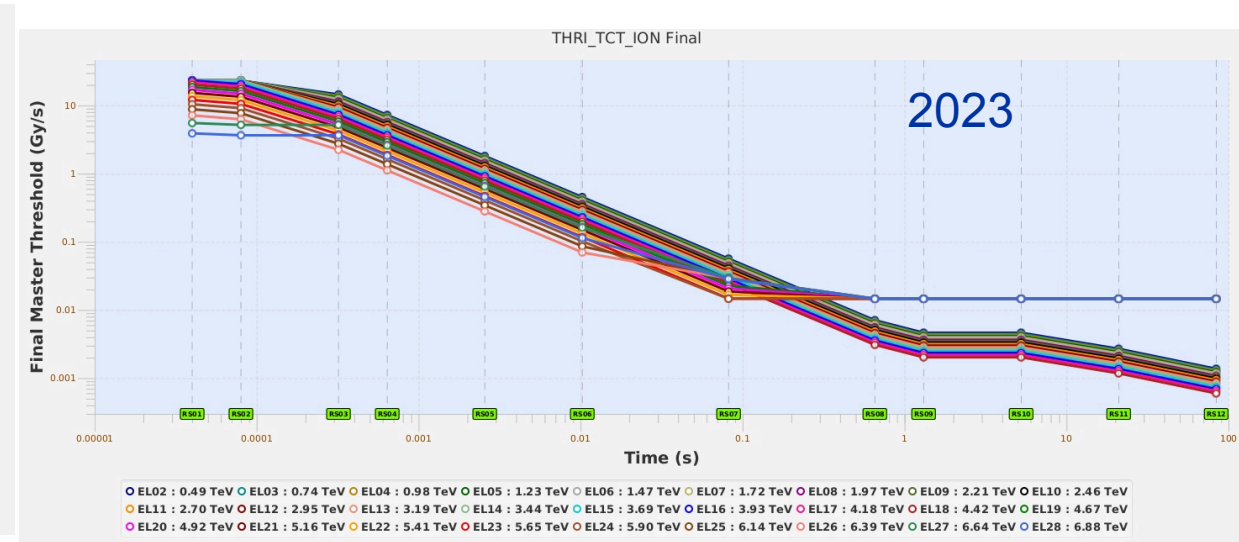
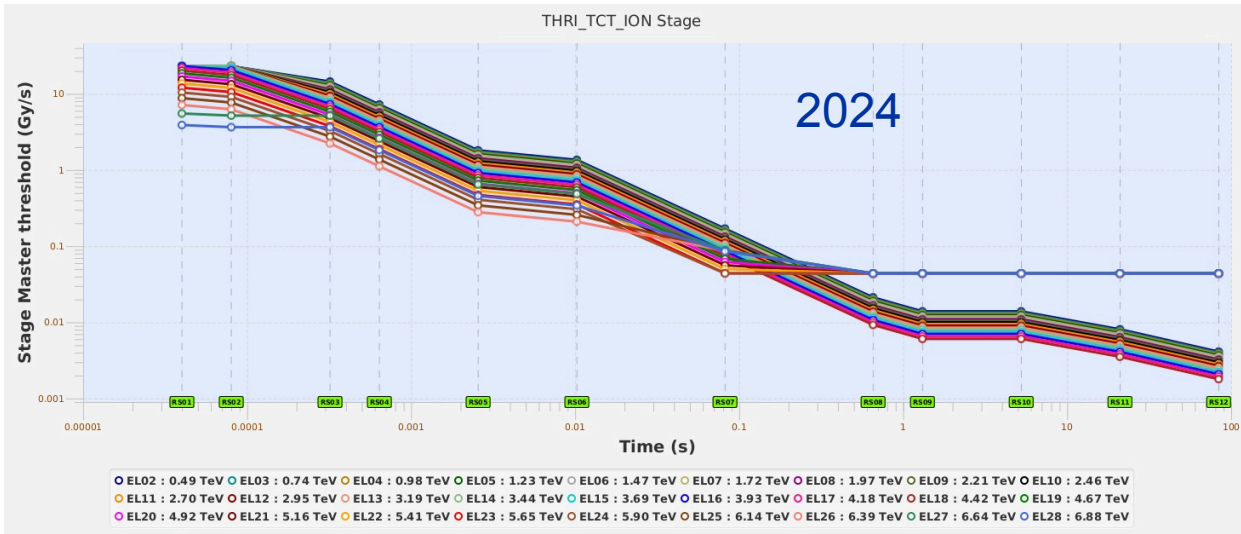
TCTs: Use again **THRI_TCT_ION** BLM threshold family, **but with a factor of 3 increase in RS06-12 in EL19-28 (>4.4 TeV)**

	Final 2023 master threshold	Proposed 2024 master threshold	Power deposition in impacted jaw 2024 master thr. (halo)	Power deposition in impacted jaw 2024 master thr. (scraping)
RS06 (10 ms)	0.11431 Gy/s	0.34293 Gy/s	20 kW	4.3 kW
RS07 (82 ms)	0.02859 Gy/s	0.08577 Gy/s	5 kW	1.1 kW
RS08-12 (0.6s-82s)	0.01457 Gy/s	0.04371 Gy/s	2.5 kW	0.5 kW

New TCT curves

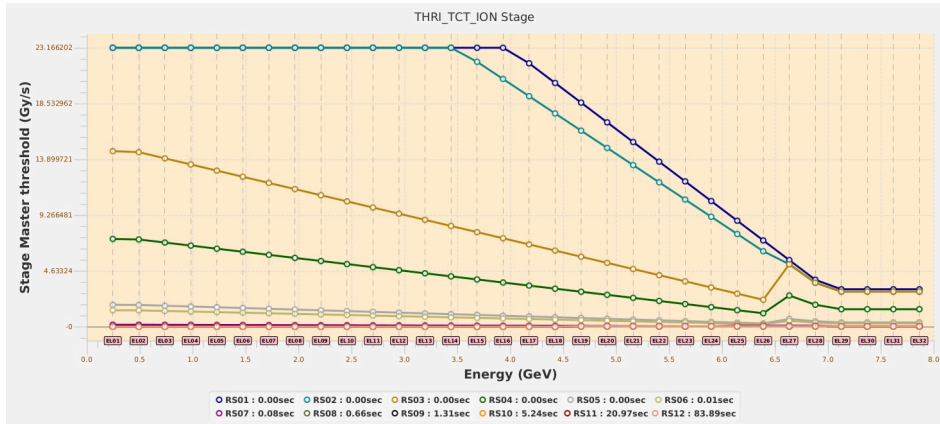
Monitor Factor = 0.4

All Energy Levels , RS06-RS12 increased by factor 3 wrt THRI_TCT_ION 2023



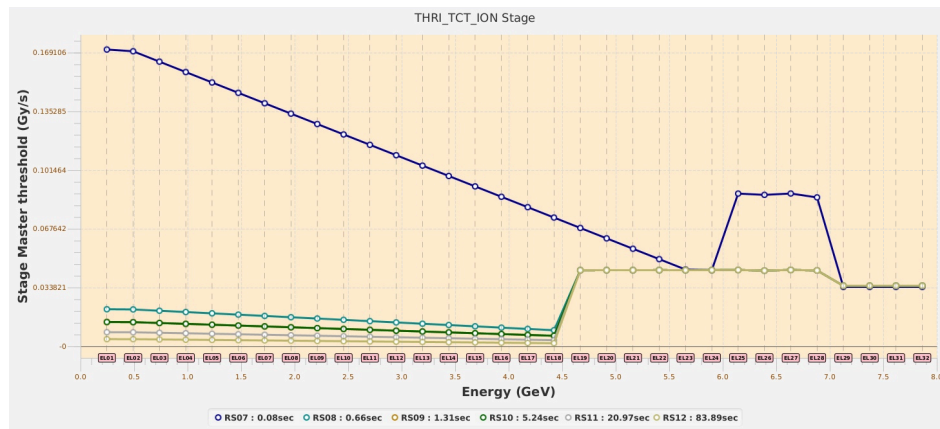
THRI_TCT_ION vs Energy

2024

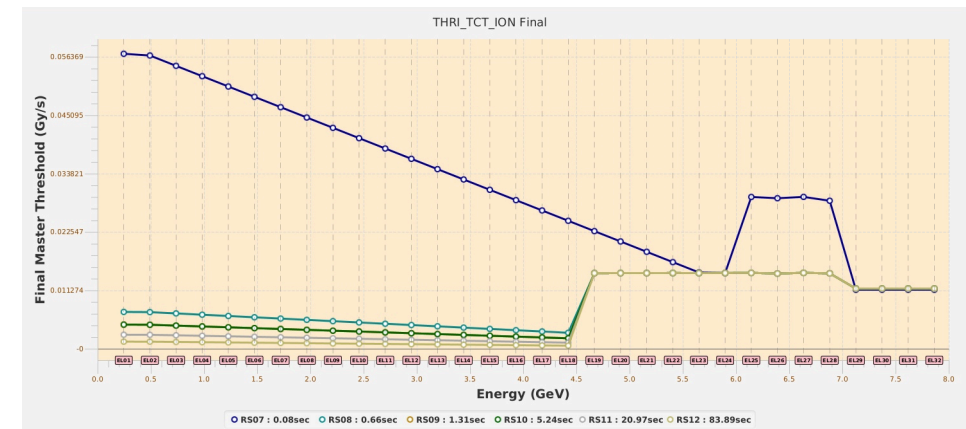


Attempt to smooth the thresholds curves with energy but there is not enough time to update the model.

Keep the same energy curves as 2024 with the factor of 3 applied to RS06-RS12 (all energies)



2023



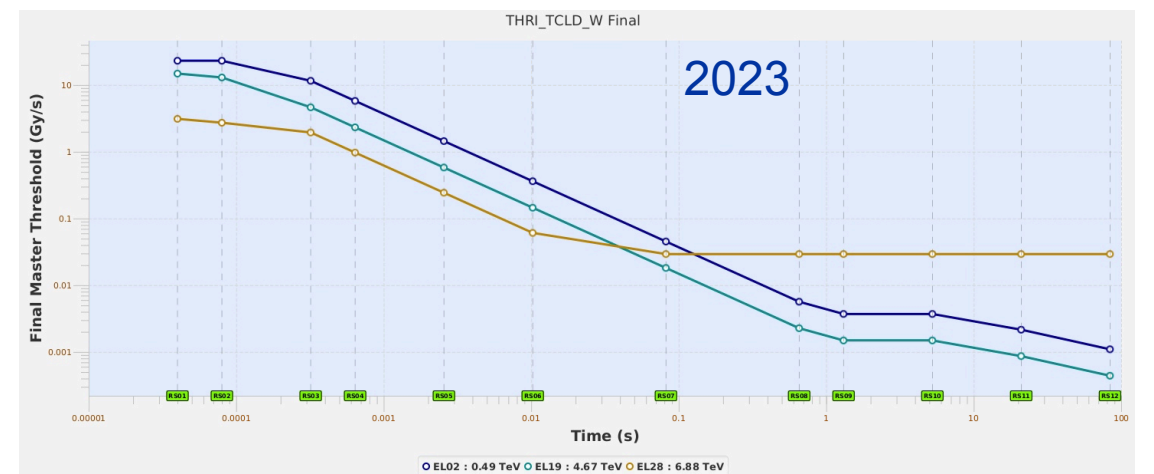
TCLD collimators

Monitor Factor = 0.4

New family created: THRI_TCLD_W

TCLDs: Derive new BLM threshold family **THRI_TCLD_W** from **THRI_TCL_W**, increase RS06-12 according to the table below (for EL28/6.8 TeV only since the TCLD is retracted before)

	Present master threshold	Possible new master threshold	Deposited power in impacted jaw at new master threshold
RS06 (10 ms)	0.06096 Gy/s	0.24384 Gy/s 4x	18 kW
RS07 (82 ms)	0.02935 Gy/s	0.073375 Gy/s 2.5x	5.5 kW
RS08-12 (0.6s-82s)	0.02935 Gy/s	0.044025 Gy/s 1.5x	3.3 kW

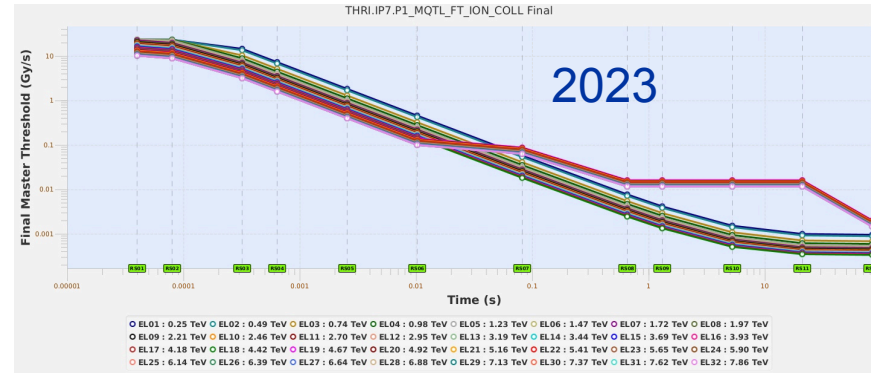
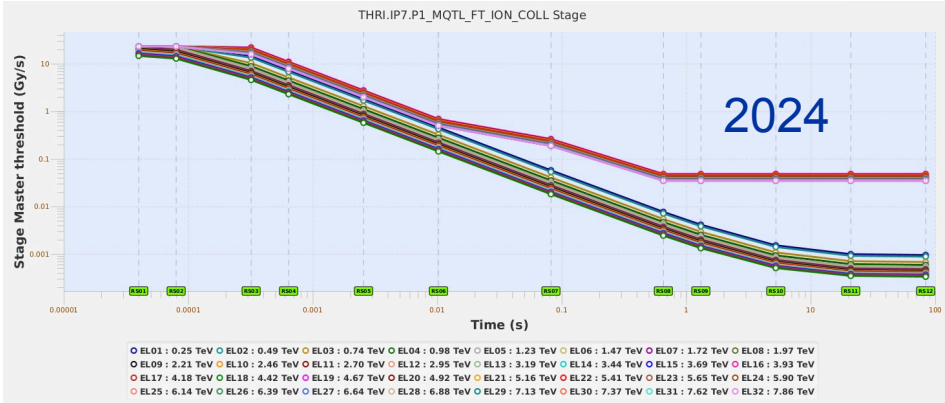


Q6

Monitor Factor = 0.6

Correction starting at EL19 (4.42 - 4.67 TeV)

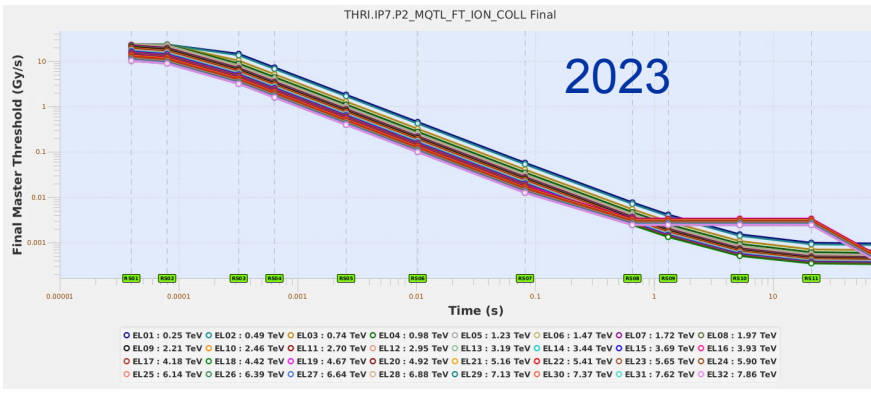
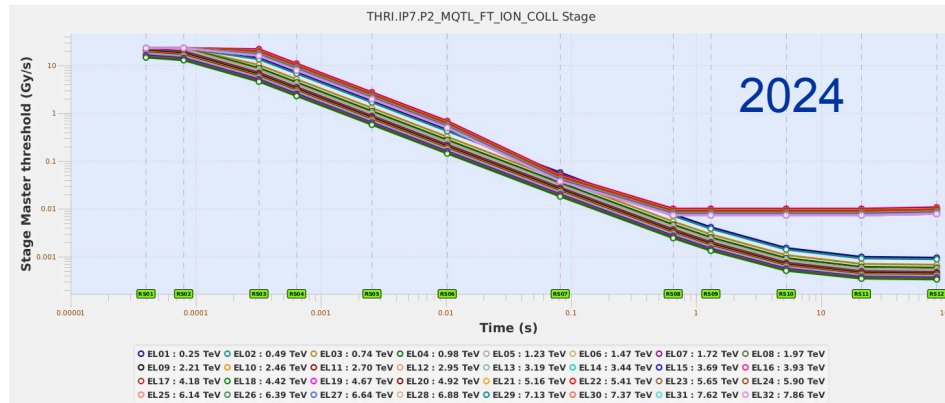
Could it be implemented for all energy levels?



Based on 2023 Q6 BLM families (P1 and P2), propose master thresh. increase:

	Increase factor
RS01-06 (40 us -10 ms)	5x
RS07-11 (82 ms-20s)	3x
RS12 (82s)	24x*

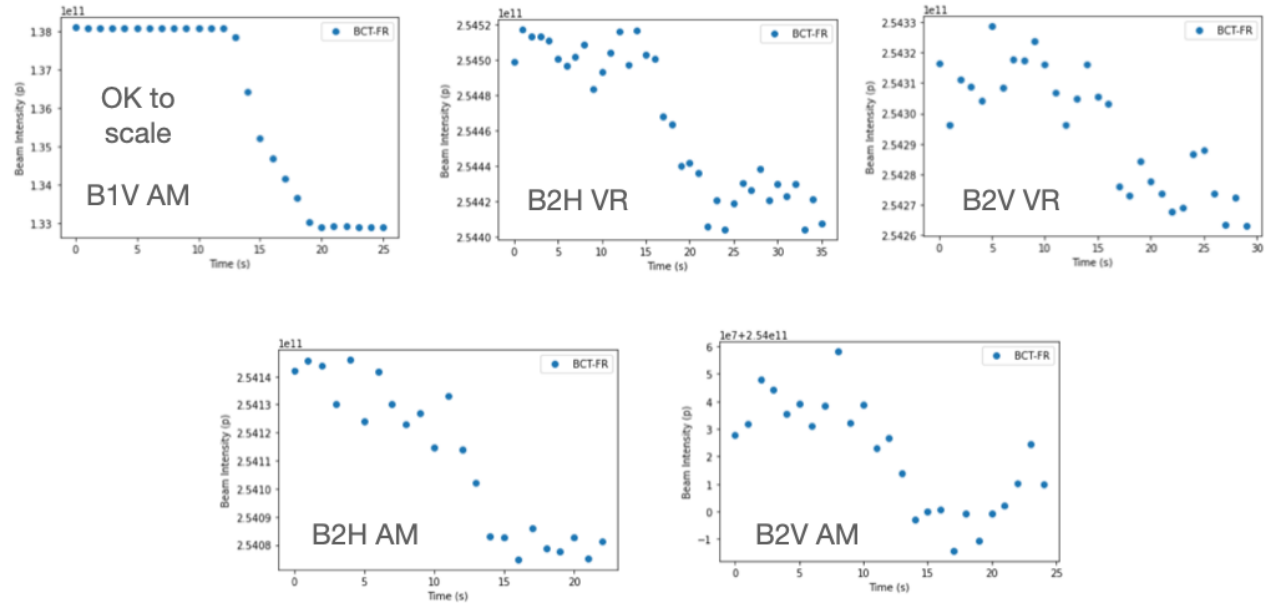
*Align RS12 to RS07-11



Collimation

Loss maps at 11 sigmas at Flat Top used for scaling

- Channeling:
 - 28th Oct 2am (FT)
- Volume reflection
 - 26th Oct 4:30am (FT)
- Amorphous :
 - B1 26 Oct 10:30 am (FT) (Natalia says that B2 is in channeling)
 - B2 26 Oct 4:40 am (FT)



2024 families for collimation

S. Morales

RS	Duration	kW channeling	kW amorphous/VR?
RS01	40 us	375000	93750
RS02	80 us	187500	46875
RS03	320 us	46875	11719
RS04	640 us	23438	5859
RS05	2.56 ms	5859	1465
RS06	10.24 ms	1465	366
RS07	81.92 ms	732	183
RS08	655 ms	91	23
RS09	1.3 s	60	15
RS10	5.2 s	60	15
RS11	21 s	29	7
RS12	84 s	24	6

Recovered the master thresholds for the ion families of last year

Calculated BLM responses (Gy/charge) from the loss maps in CH, AM, VR from 28/10/2024 -> best ones so far, but in some cases peak power loss still low -> will introduce errors in response

Can we use the same families from last year? Do we need to modify them?



31/10/2024

S.Morales - Ad-hoc BLM Thresholds WG

5



Collimation

Monitor Factor = 0.6

No loss maps at injection are done yet - we keep same thresholds as 2023

BLM Family	BLM names	
THRI_COLL_7_TCLA_LO_I0N	Same as 2023	RS07, RS08 X 2.14 (AM) RS09 X 1.4 - FIX RS12 X 2
THRI_COLL_7_TCSPM_LO_I0N_H_CH	Same as 2023	RS07 X 1.7 RS08 X 1.7 RS09-RS11 X 1.2 RS12 x 1.2 x 2
THRI_COLL_7_TCSPM_LO_I0N_V_CH	Same as 2023	RS06 x 1.4 RS07 x 2.2 RS08 x 2.2 RS09-RS11 X 1.4 RS12 x 1.4 x 2
THRI_COLL_7_TCSG_LO_I0N_H_CH	NEW: 'BLMTI.04R7.B2110_TCSG.B4R7.B2'	RS07-RS08 x 1.7 RS12 x 2
THRI_COLL_7_TCSG_ME_I0N_V_CH	Same as 2023	RS07-RS08 x 1.7 RS12 x 2
THRI_COLL_7_TCSG_ME_I0N_V_AM	bad loss maps	all RS x 0.6 But it will limit in VR I would not touch it
THRI_COLL_7_TCSPM_LO_I0N_H_AM	bad loss maps	all RS x 0.6 But it will limit in VR I would not touch it

60 kW for channeling
15 for amorphous and volume reflexion

Proton power loss scaled down with this factors for the rest of the running sums

Loss maps will be repeated today, in particular Amorphous and Volume Reflexion.

All the families show the need for a small factor wrt 2023

RS06-RS08 maximum of 2.2 factor

RS12 a factor 2 due to the change of proton power loss (100kW -> 200kW)

Dispersion Suppressor

Loss maps scaling was not possible.

We keep for the moment the same families and corrections as in 2024

Collisions

Still to be checked for 2024

Plan

- Implement this version of thresholds TODAY before the injection of trains - some time this afternoon.
- Repeat the loss maps at collisions for amorphous and volume reflexion TODAY and revisit the thresholds corrections.
 - If needed update the curves
- Make another iteration in the next 2-3 days.
 - Possible increase in RS06-RS07 for collimation and Q6.
 - Re-evaluation of DS