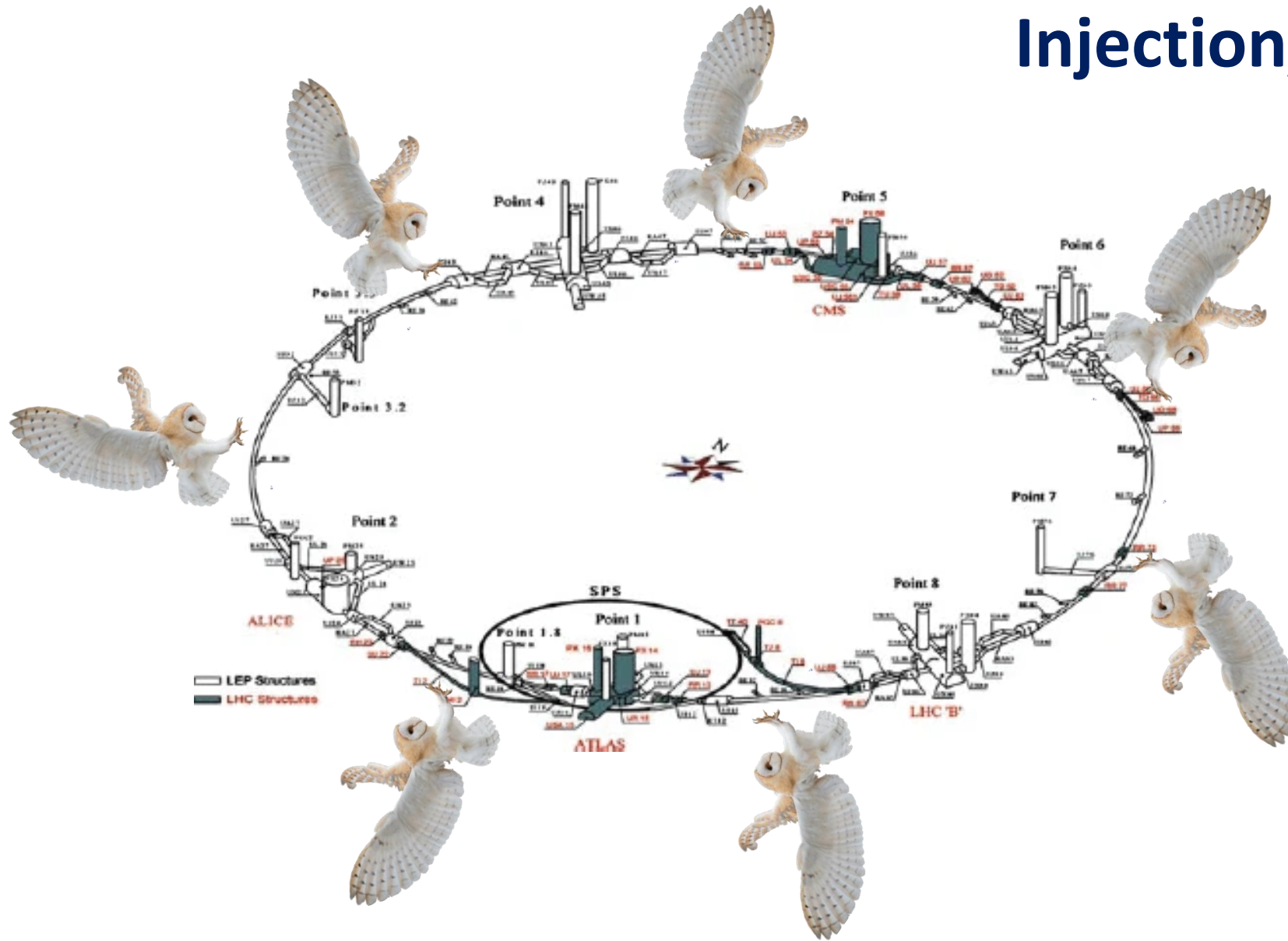
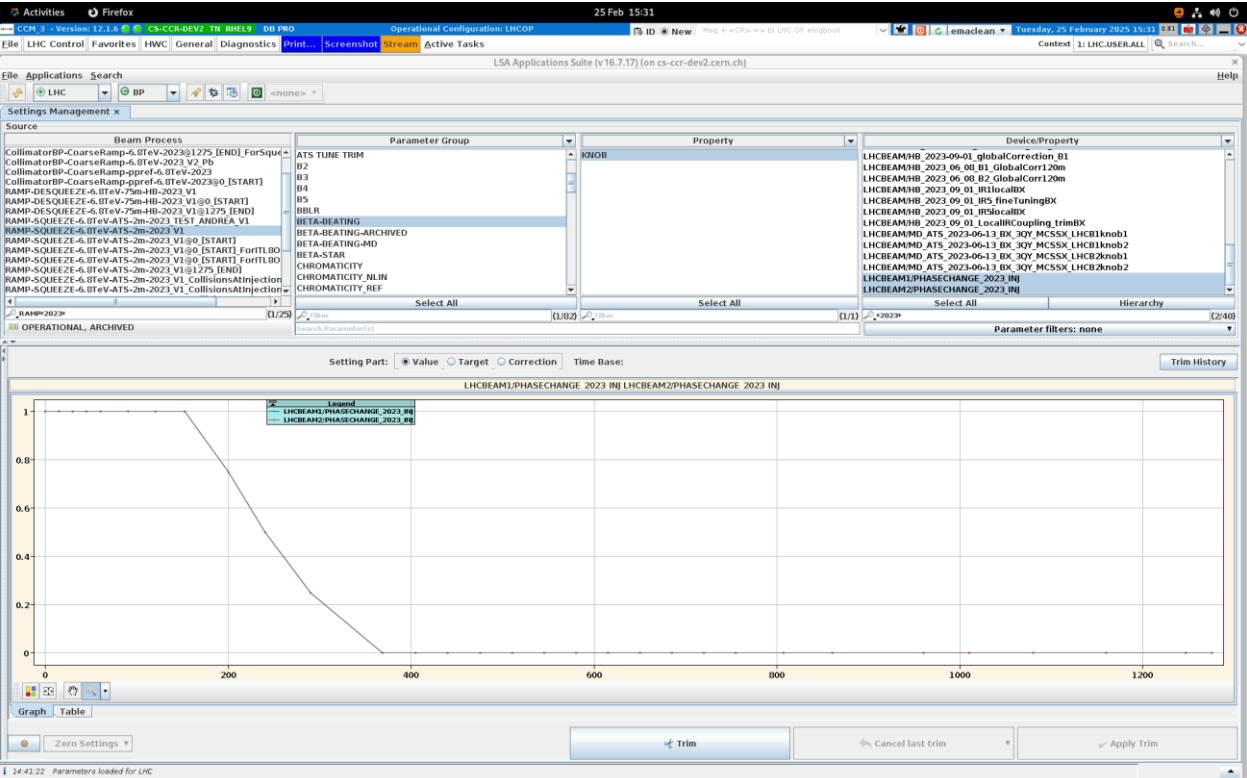
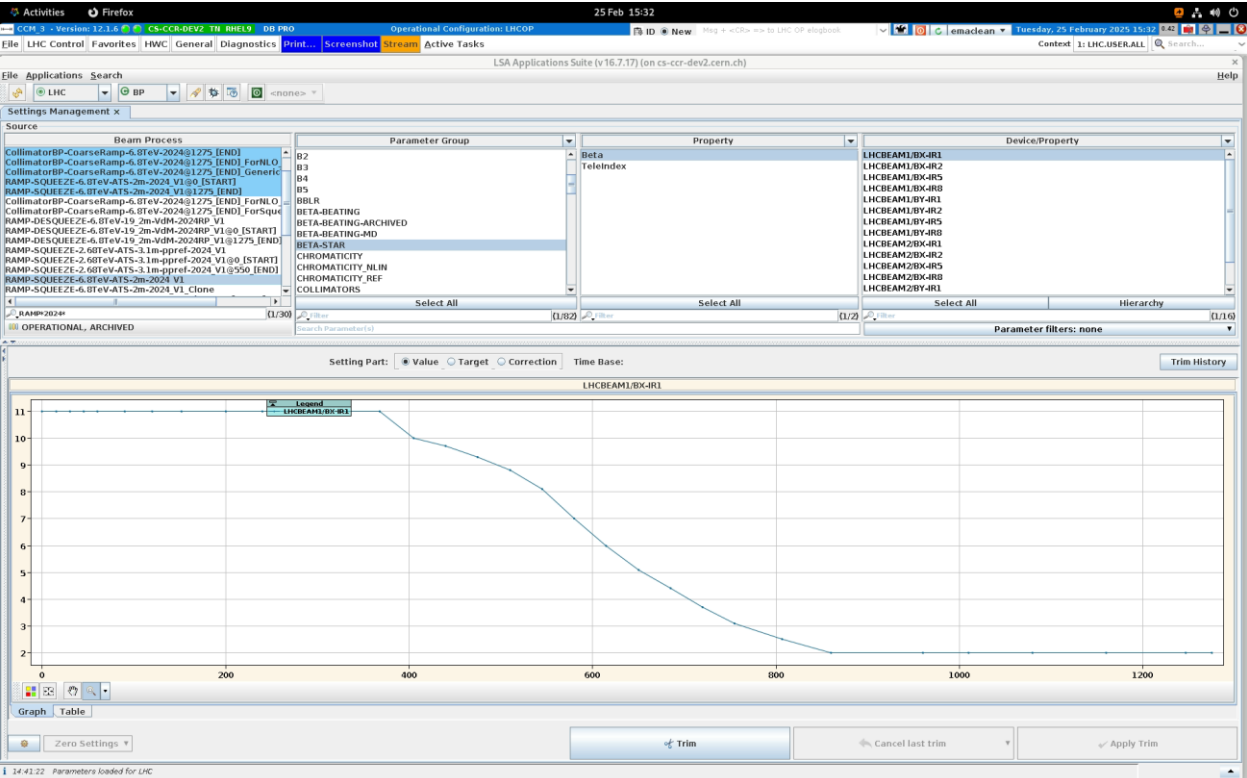


Injection/RAMP Knob recap



2024 RAMP/SQUEEZE knob incorporation - overview

- Ramp from 450GeV to 6.8TeV at **1270s**
- Beta* constant @ 11m to **368s**. Squeezed to 2m@**820s**
- (2023) phase knob constant to **152s**, then trimmed out to 0 at **368s**



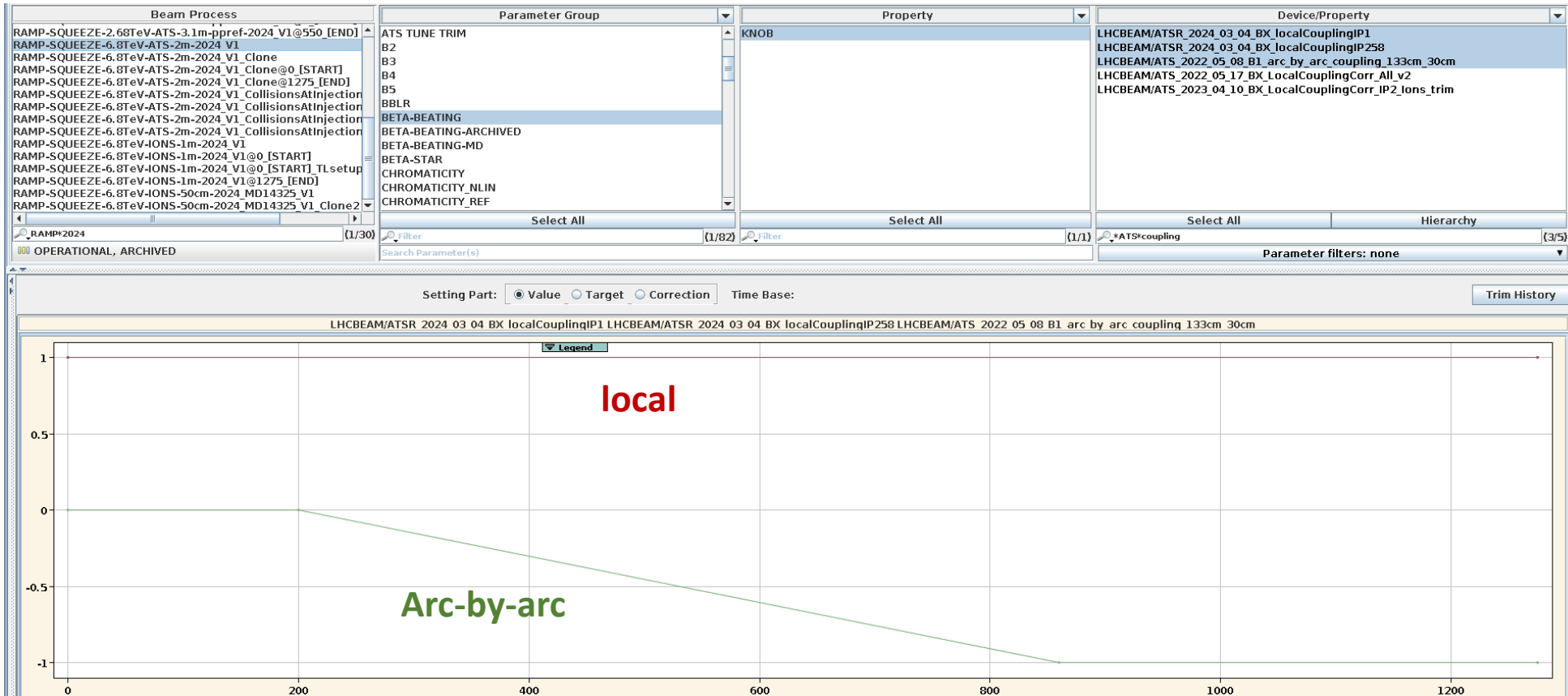
2024 RAMP/SQUEEZE knob incorporation - coupling

LOCAL [constant through cycle]

- LHCBEAM/ATSR_2024_03_04_BX_localCouplingIP1
- LHCBEAM/ATSR_2024_03_04_BX_localCouplingIP258

Arc-by-Arc [0 > 0@200s > -1@860s]

- LHCBEAM/ATS_2022_05_08_B1_arc_by_arc_coupling_133cm_30cm
- Why no arc-by-arc at injection? 200s trim just historical?



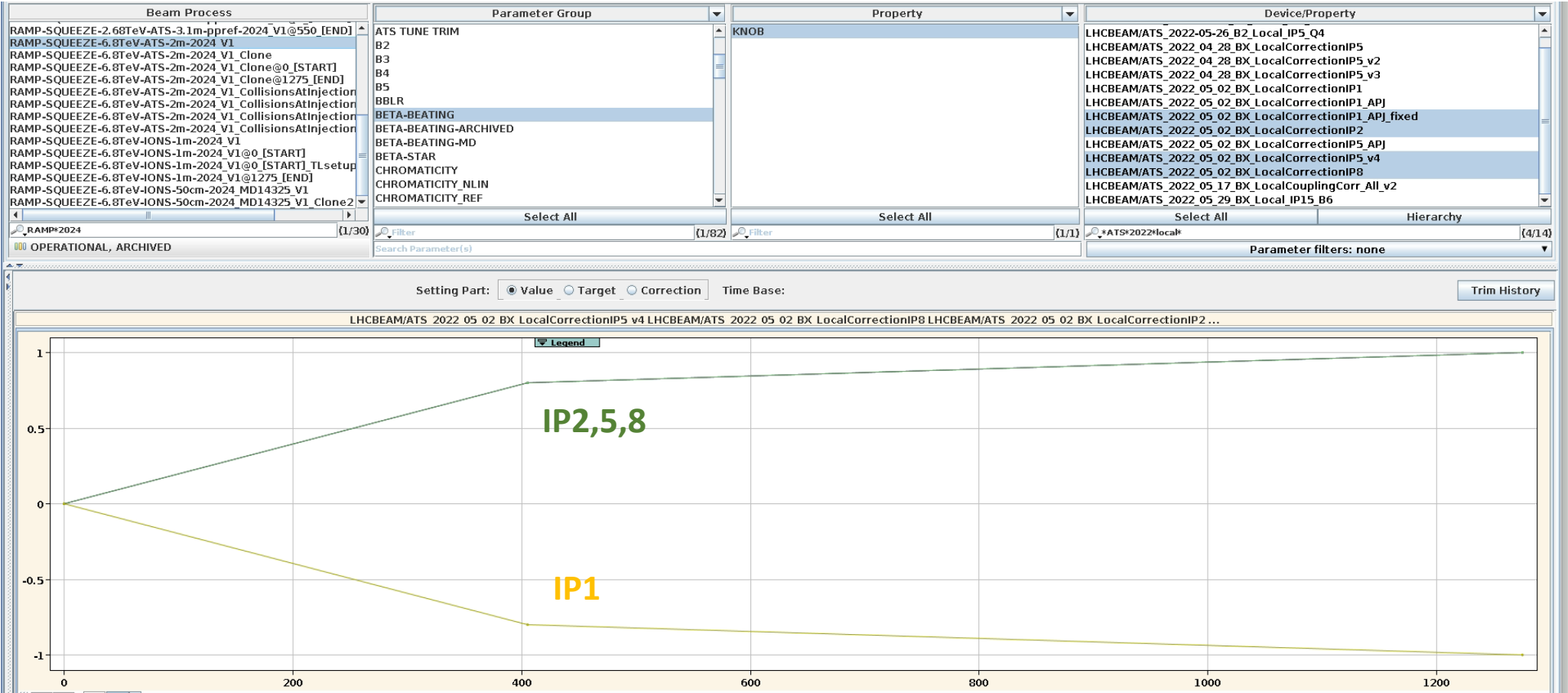
2024 RAMP/SQUEEZE knob incorporation - local

- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP1_APJ_fixed
- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP2
- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP5_v4
- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP8

IP1 inverted sign w.r.t. 2022/23

Trimmed in to +/-0.8 @405s then fully at EoR

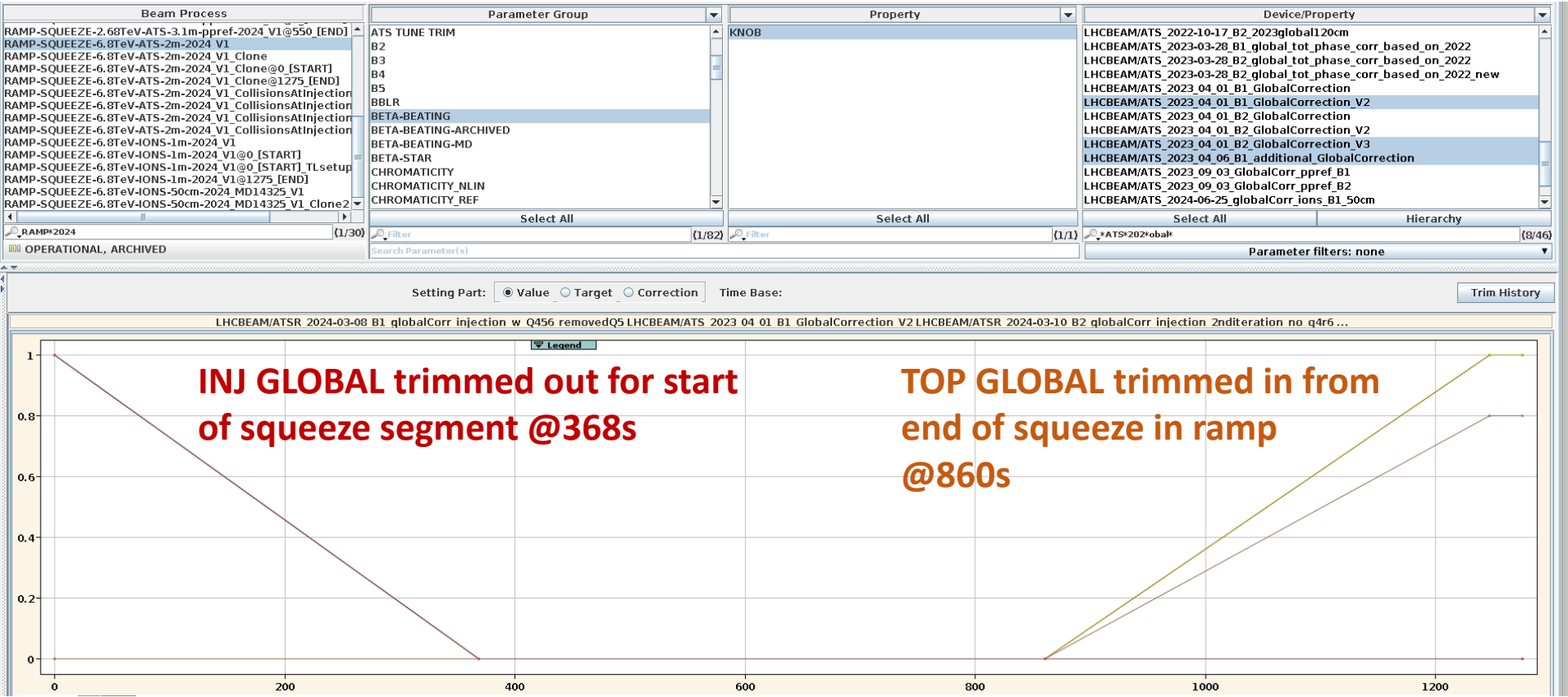
For 2025: just trim IP5_v4 to -1 and IP1_APJ_fixed to +1



2024 RAMP/SQUEEZE knob incorporation - global

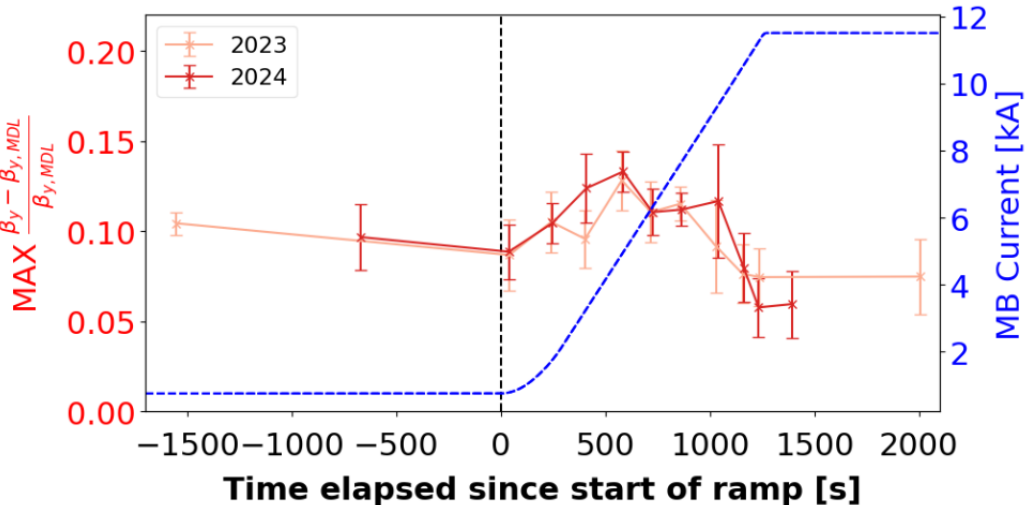
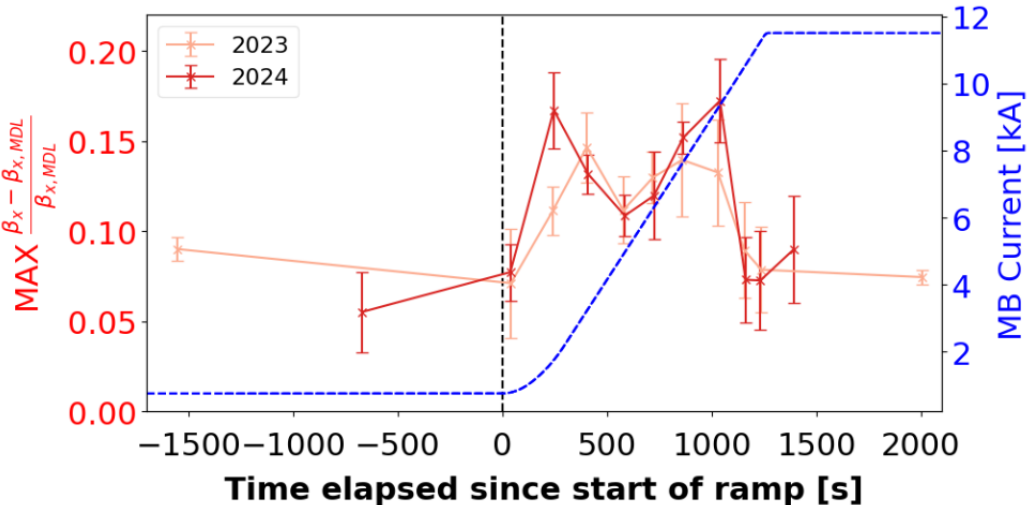
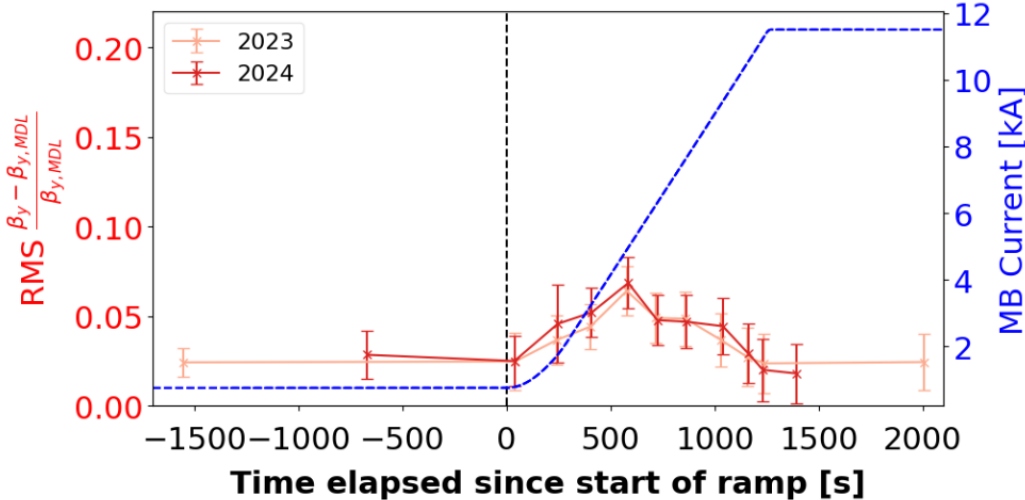
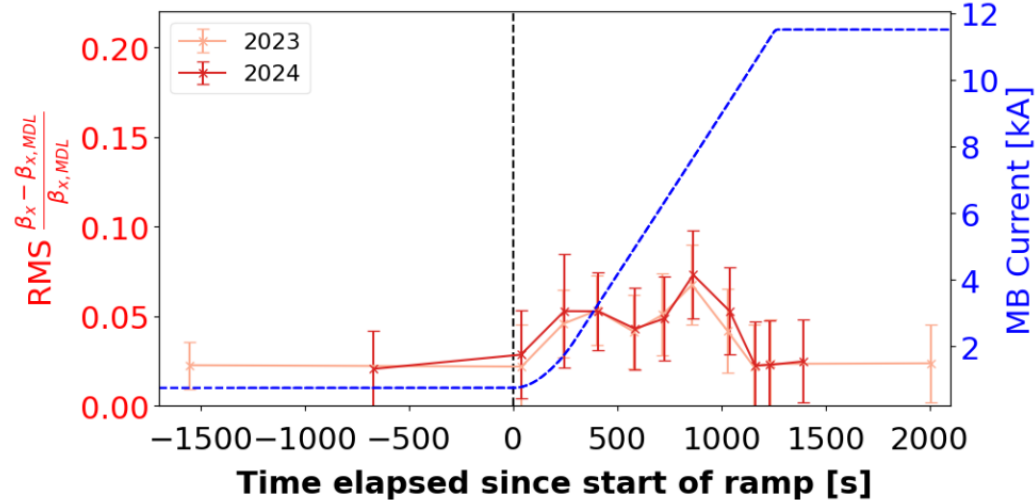
- INJ:**
- LHCBEAM/ATSR_2024-03-08_B1_globalCorr_injection_w_Q456_removedQ5
 - LHCBEAM/ATSR_2024-03-10_globalCorr_injection_2nditeration
 - LHCBEAM/ATSR_2024-03-13_B1_globalCorr_injection_after_q5removal
 - LHCBEAM/ATSR_2024-03-08_B2_globalCorr_injection_w_Q456
 - LHCBEAM/ATSR_2024-03-10_globalCorr_injection_2nditeration
 - LHCBEAM/ATSR_2024-03-10_B2_globalCorr_injection_2nditeration_no_q4r6

- TOP:**
- LHCBEAM/ATS_2023_04_01_B1_GlobalCorrection_V2
 - LHCBEAM/ATS_2023_04_06_B1_additional_GlobalCorrection [+0.8 instead of +1]
 - LHCBEAM/ATS_2023_04_01_B2_GlobalCorrection_V3



2024 RAMP/SQUEEZE knob incorporation - global

S.Horney LNO 24/05/24 <https://indico.cern.ch/event/1419803/contributions/5970048/attachments/2863342/5010298/LNO%20meeting%202024%20May%202024.pdf>

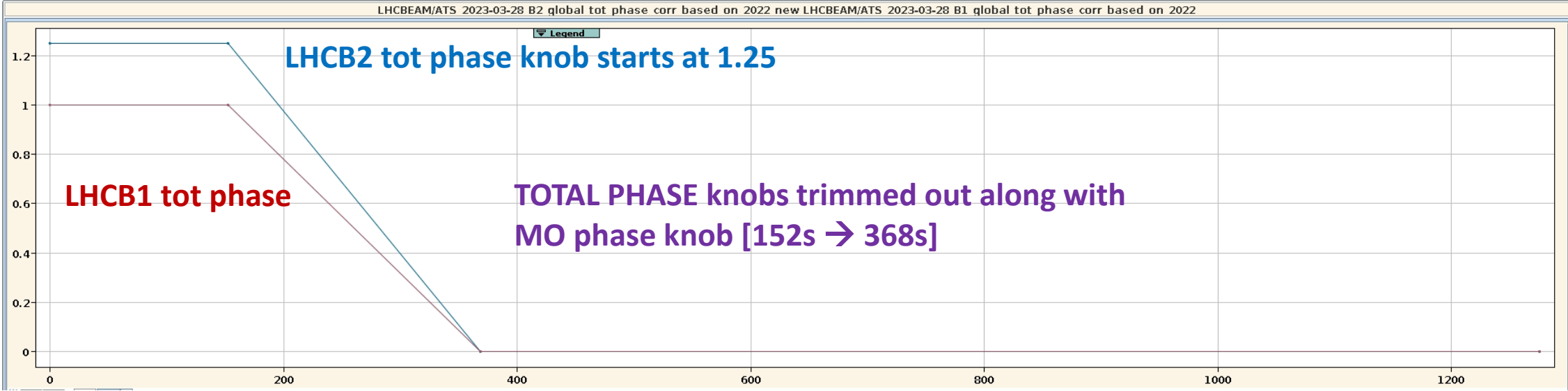


2024 RAMP/SQUEEZE knob incorporation – total phase

- LHCBEAM/ATS_2023-03-28_B1_global_tot_phase_corr_based_on_2022
- LHCBEAM/ATS_2023-03-28_B2_global_tot_phase_corr_based_on_2022_new

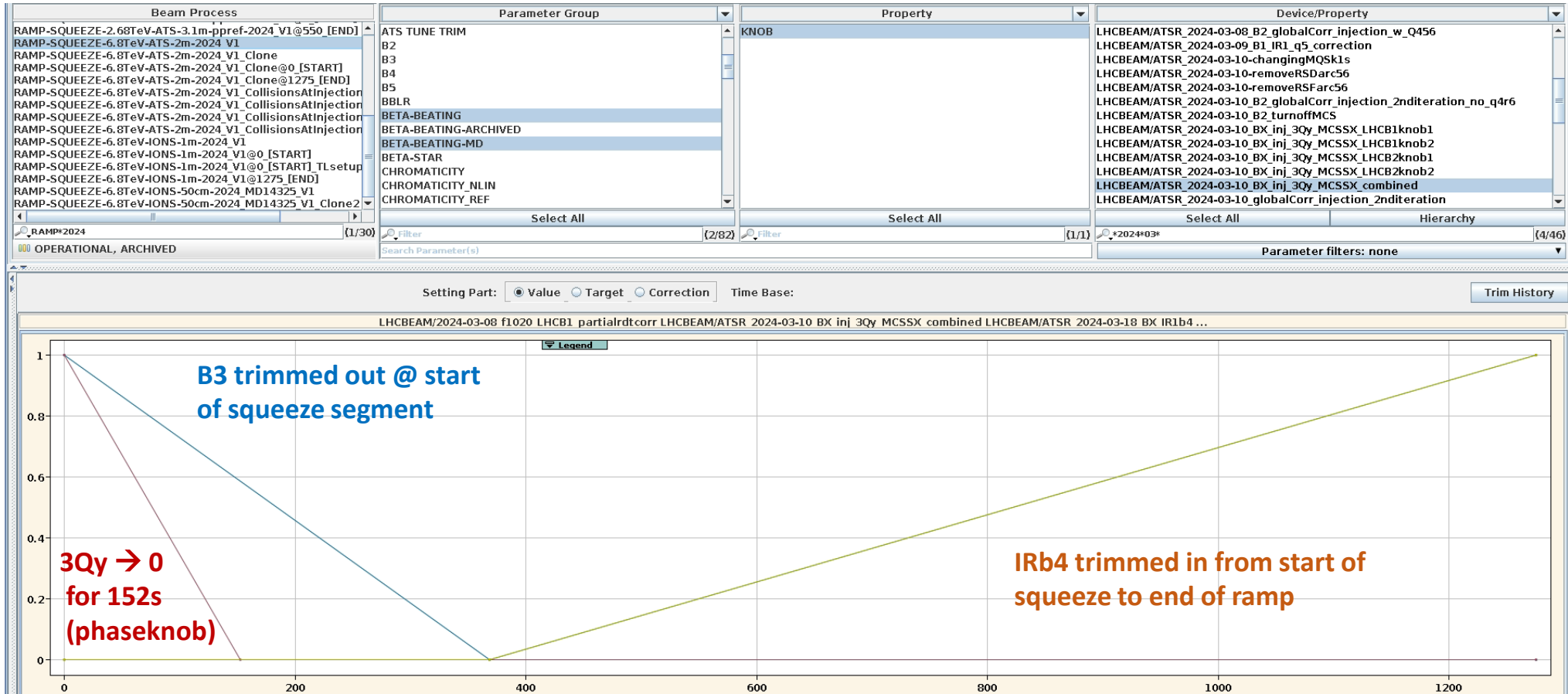
Beam Process	Parameter Group	Property	Device/Property
⌘AMP-SQUEEZE-2.68TeV-ATS-3.1m-ppref-2024_V1@550 [END]	ATS TUNE TRIM	↑ KNOB	LHCBEAM/ATS_2023-03-28_B1_global_tot_phase_corr_based_on_2022
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1	B2		LHCBEAM/ATS_2023-03-28_B2_global_tot_phase_corr_based_on_2022
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_Clone	B3		LHCBEAM/ATS_2023-03-28_B2_global_tot_phase_corr_based_on_2022_new
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_Clone@0 [START]	B4		
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_Clone@1275 [END]	B5		
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_CollisionsAtInjection	BBLR		
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_CollisionsAtInjection	BETA-BEATING		
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_CollisionsAtInjection	BETA-BEATING-ARCHIVED		
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_CollisionsAtInjection	BETA-BEATING-MD		
⌘AMP-SQUEEZE-6.8TeV-ATS-2m-2024_V1_CollisionsAtInjection	BETA-STAR		
⌘AMP-SQUEEZE-6.8TeV-IONS-1m-2024_V1	CHROMATICITY		
⌘AMP-SQUEEZE-6.8TeV-IONS-1m-2024_V1@0 [START]	CHROMATICITY_NLIN		
⌘AMP-SQUEEZE-6.8TeV-IONS-1m-2024_V1@0 [START] TLsetup	CHROMATICITY_REF		
⌘AMP-SQUEEZE-6.8TeV-IONS-1m-2024_V1@1275 [END]			
⌘AMP-SQUEEZE-6.8TeV-IONS-50cm-2024_MD14325_V1			
⌘AMP-SQUEEZE-6.8TeV-IONS-50cm-2024_MD14325_V1_Clone2			

Setting Part: Value Target Correction Time Base: Trim History



2024 RAMP/SQUEEZE knob incorporation – NL main process

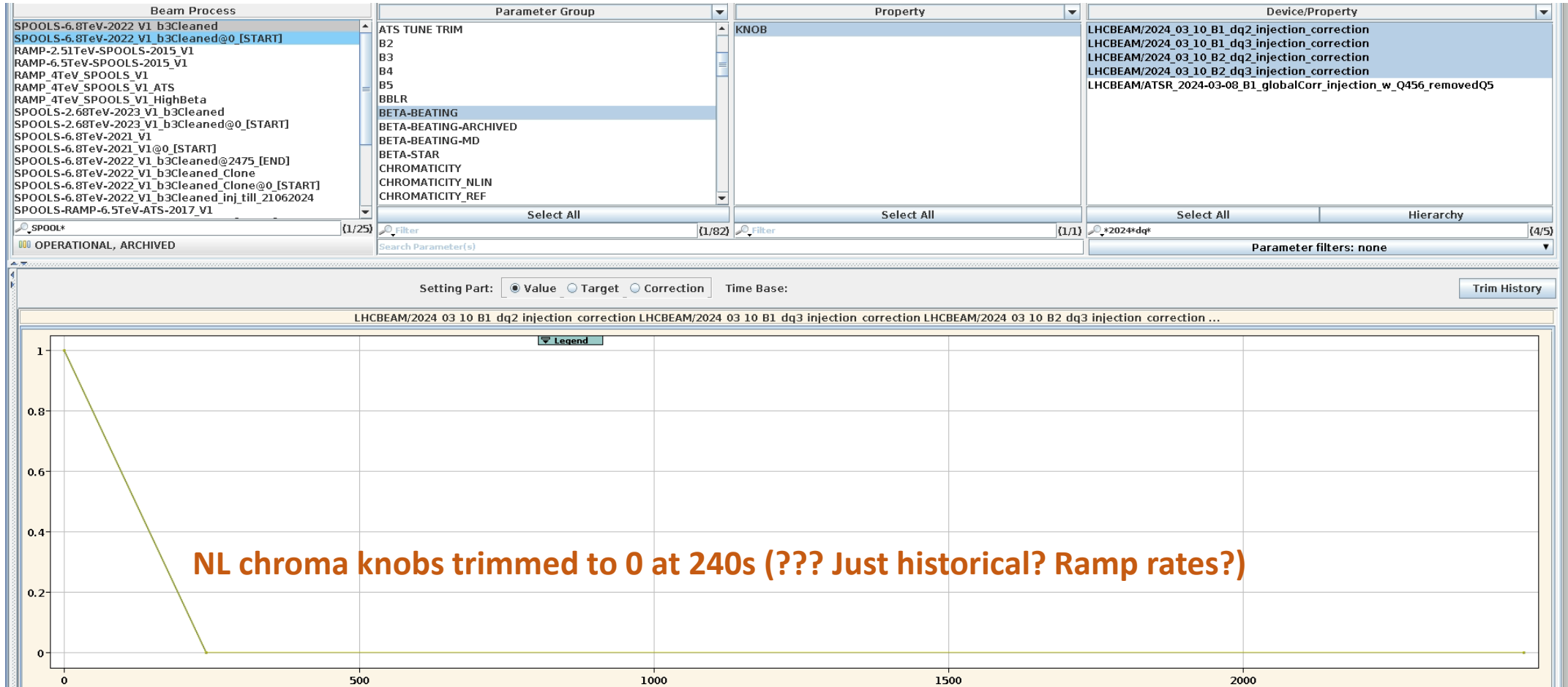
- **3Qy:** LHCBEAM/ATSR_2024-03-10_BX_inj_3Qy_MCSSX_combined
- **Lattice b3:** LHCBEAM/2024-03-08_f1020_LHCB1_partialrdtcorr
- **IRb4:** LHCBEAM/ATSR_2024-03-18_BX_IR1b4 / LHCBEAM/ATSR_2024-03-18_BX_b4_IP5



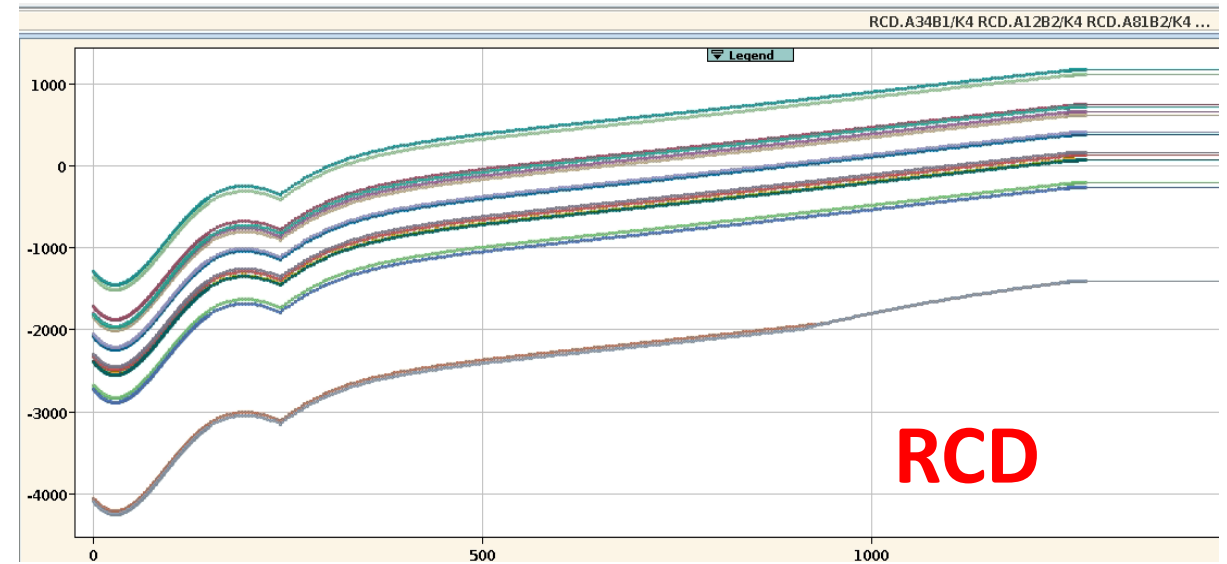
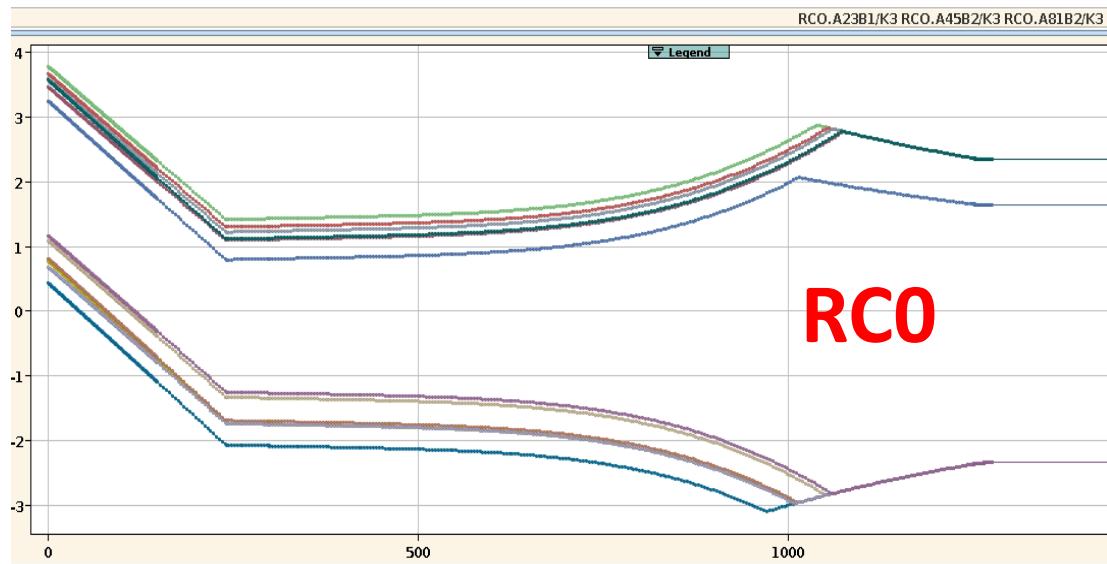
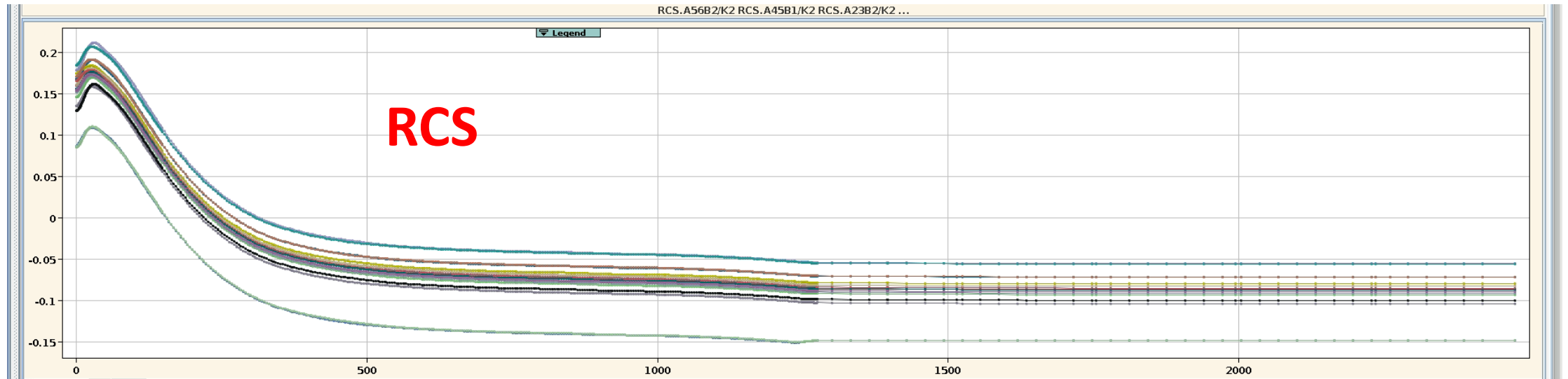
2024 RAMP/SQUEEZE knob incorporation – NL spool process

- Recall that Q'' and Q''' knobs are incorporated on the longer spools process, not ramp-squeeze
- Q'' : LHCBEAM/2024_03_10_B1_dq2_injection_correction / LHCBEAM/2024_03_10_B2_dq2_injection_correction
- Q''' : LHCBEAM/2024_03_10_B1_dq3_injection_correction / LHCBEAM/2024_03_10_B2_dq3_injection_correction

Spools
6.8TeV



2024 RAMP/SQUEEZE knob incorporation – NL spool process



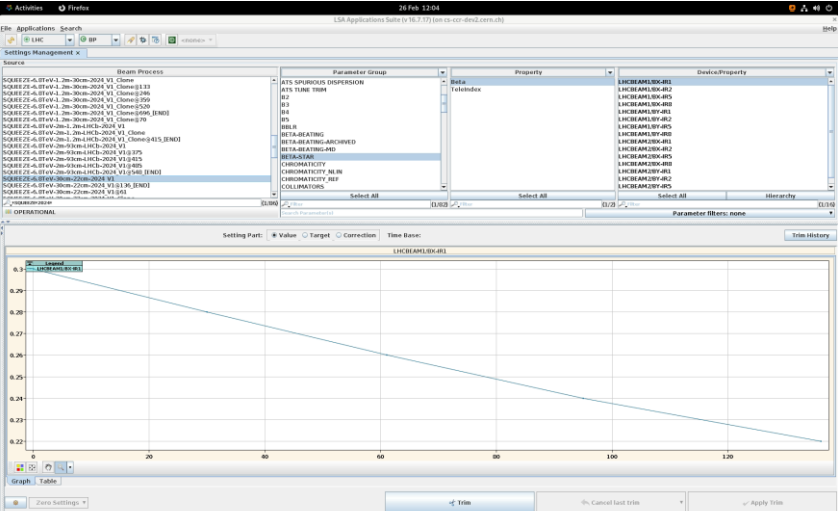
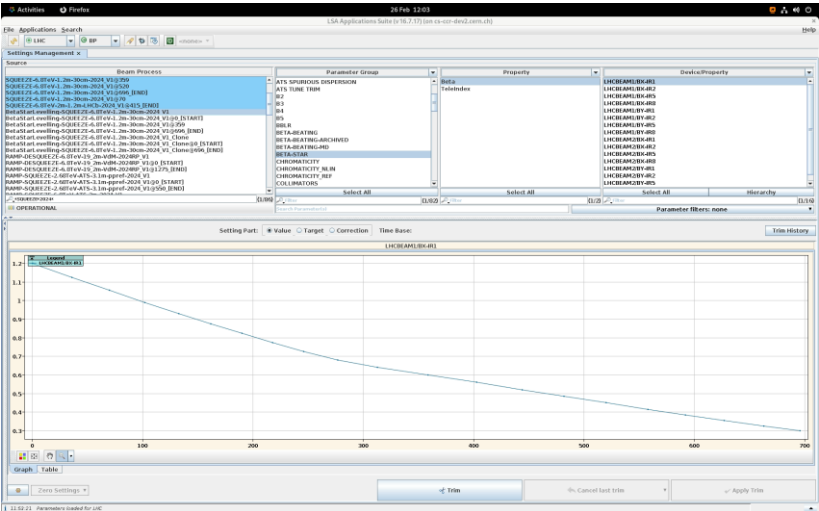
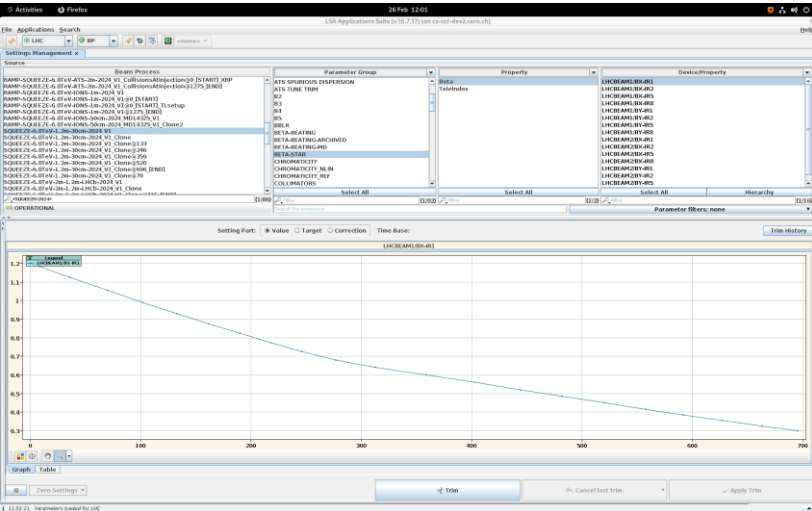
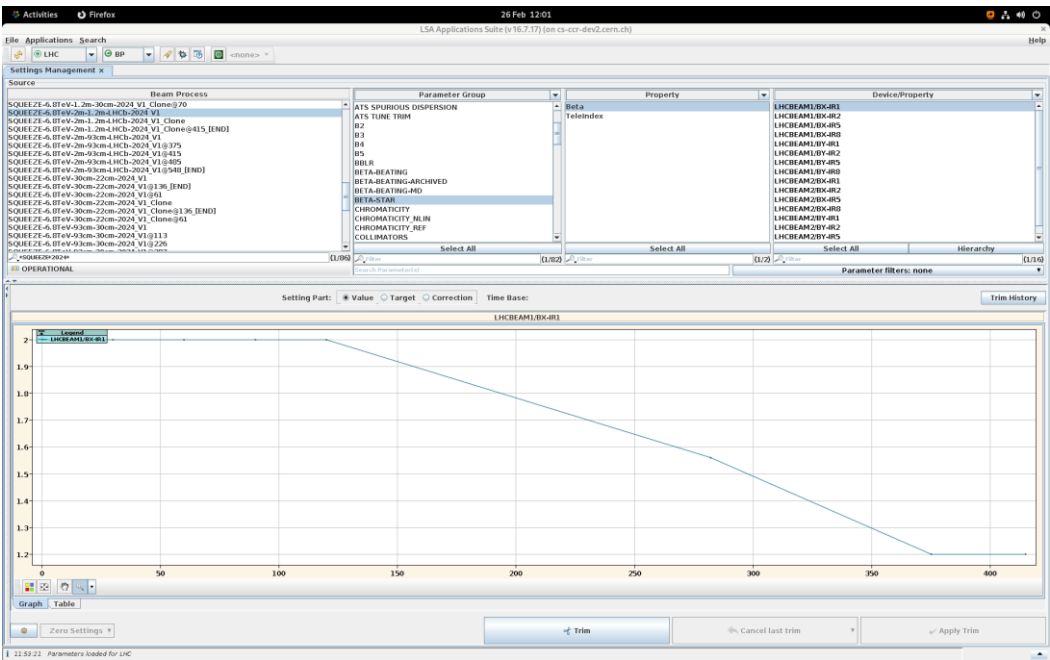
2024 RAMP/SQUEEZE knob incorporation

- Coupling:**
- Start with old/predicted local coupling knobs
 - No arc-by-arc coupling correction? Why not? Needed? Still valid?
- Local:**
- Start with old/predicted local optics knobs: IP1_APJ_fixed trimmed in to +1, IP5_v4 trimmed in to -1
- Global:**
- New corrs needed at injection. Start with all old global corrections removed
 - Test 2023 global corrs at end-of-ramp after local iterations done.
 - Same incorporation strategy as 2024?
- Tot phase:**
- Test 2022 knobs at end of first shift after global sorted (as 2023/24)? Or incorporate from start?
- NL:**
- Leave Q'' and Q''' corrections incorporated as 2024 (little impact on Nlchroma observed from RP)
 - 3Qy – complete redo
 - B3? To be checked.
 - Start with IR-b4 removed. Incorporated as in past once new IRb4 knobs found at 6.8TeV

2024 SQUEEZE knobs

2024 SQUEEZE knob incorporation - overview

- SQUEEZE-6.8TeV-2m-1.2m-LHCb-2024_V1
- SQUEEZE-6.8TeV-1.2m-30cm-2024_V1
- BetaStarLevelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1
- SQUEEZE-6.8TeV-30cm-22cm-2024_V1



2024 SQUEEZE knob incorporation - coupling

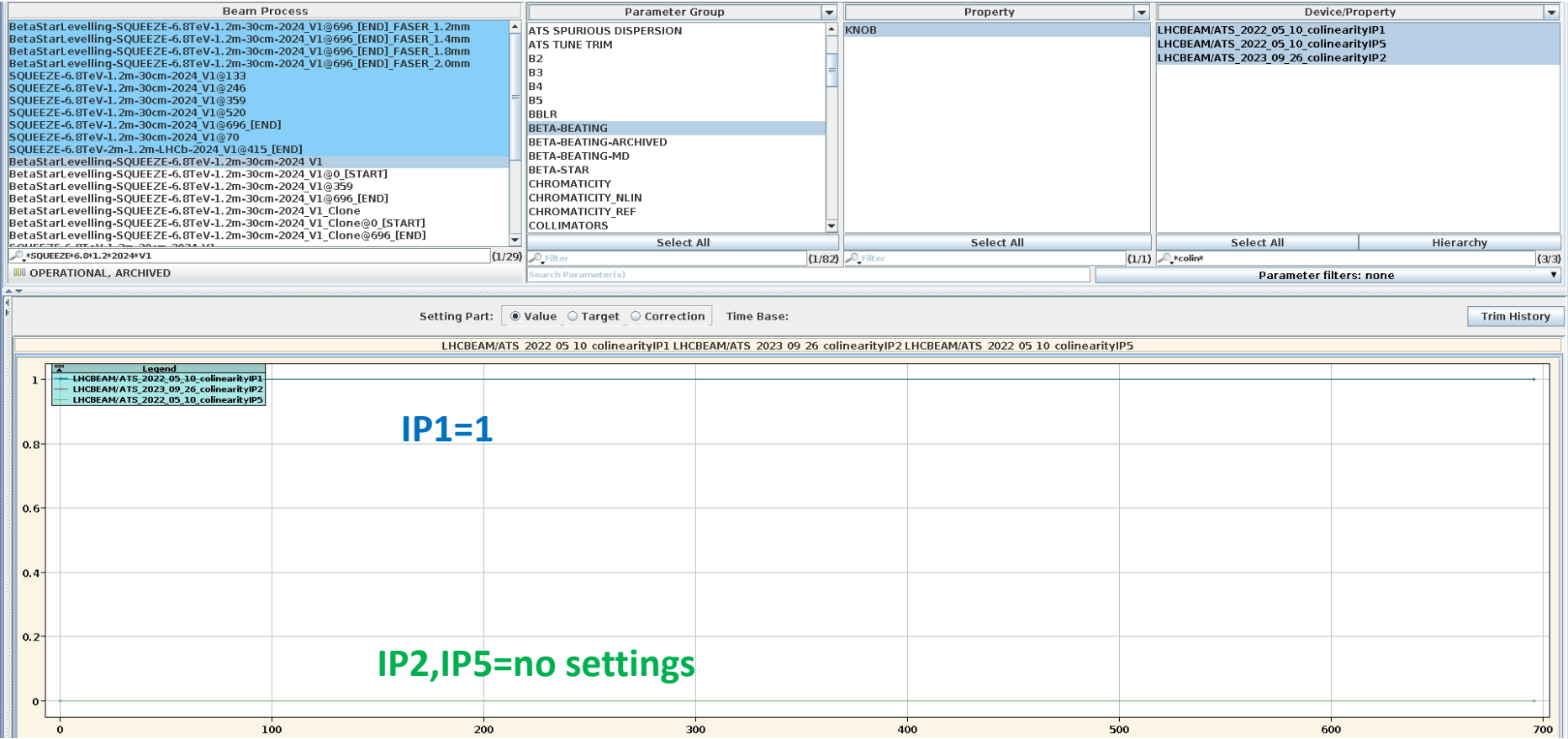
LOCAL Coupling knobs

[constant through squeeze – same settings as injection]

- LHCBEAM/ATSR_2024_03_04_BX_localCouplingIP1
- LHCBEAM/ATSR_2024_03_04_BX_localCouplingIP258

Colinearity

- LHCBEAM/ATS_2022_05_10_collinearity_IP1 +1 constant in beta* levelling process. **No settings in squeeze processes? No settings in injection? No collinearity in IP2/5? IP1 off in special FASER beta* levelling process?**



2024 SQUEEZE knob incorporation - coupling

LOCAL Coupling knobs

[constant through squeeze – same settings as injection]

- LHCBEAM/ATSR_2024_03_04_BX_localCouplingIP1
- LHCBEAM/ATSR_2024_03_04_BX_localCouplingIP258

Colinearity

- LHCBEAM/ATS_2022_05_10_collinearity_IP1 +1 constant in beta* levelling process. **No settings in squeeze processes? No settings in injection? No collinearity in IP2/5? IP1 off in special FASER beta* levelling process?**

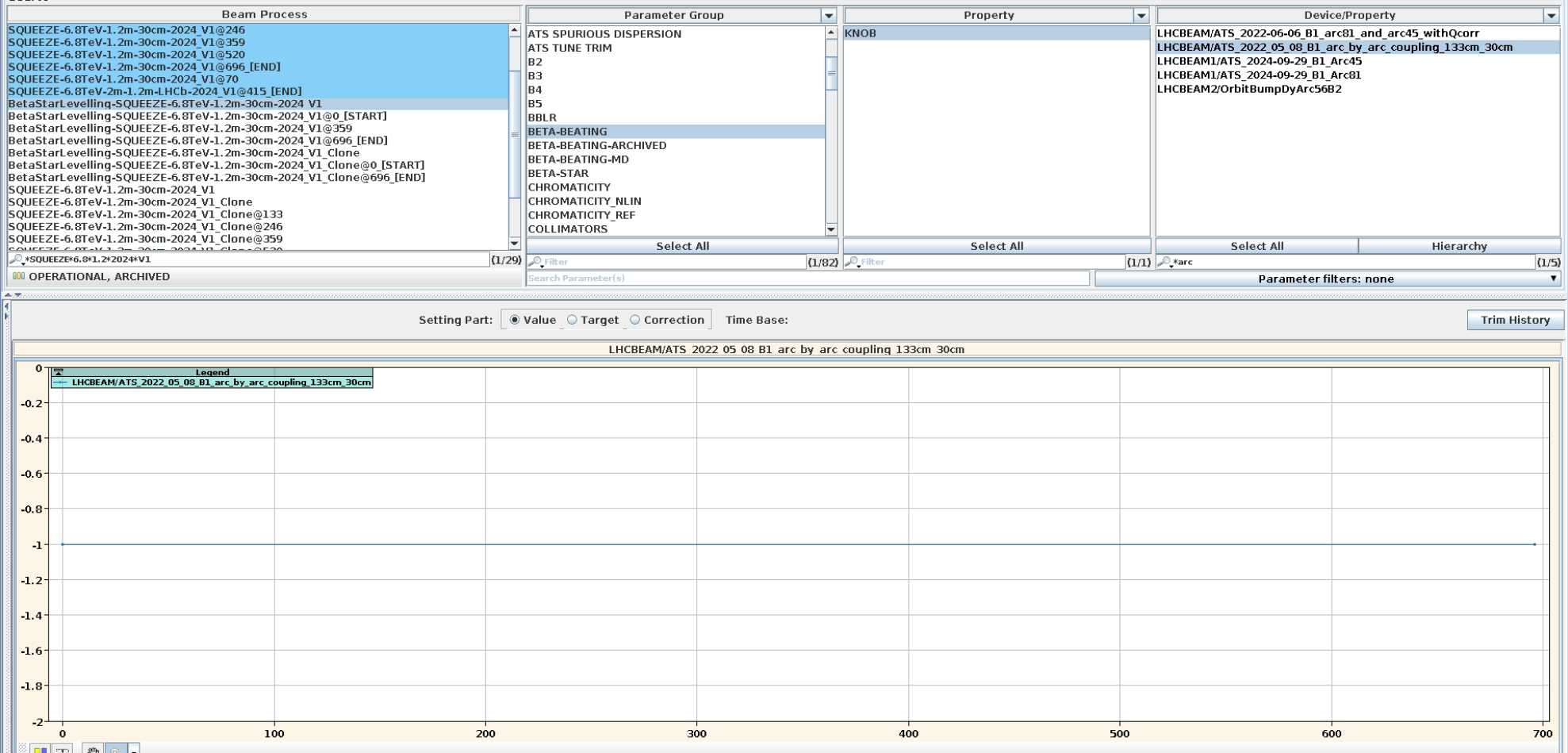
The screenshot shows the LHC parameter database interface. The top panel displays a list of beam processes on the left, a list of parameter groups in the middle, and a list of properties on the right. The bottom panel shows the search results for the query '*colin*'. The search results are empty, displaying the message "No Settings to display".

Beam Process	Parameter Group	Property	Device/Property
BetaStart.evelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1	ATS SPURIOUS DISPERSION	KNOB	LHCBEAM/ATS_2022_05_10_collinearityIP1
BetaStart.evelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@0 [START]	ATS TUNE TRIM		LHCBEAM/ATS_2022_05_10_collinearityIP5
BetaStart.evelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@359	B2		LHCBEAM/ATS_2023_09_26_collinearityIP2
BetaStart.evelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@696 [END]	B3		
BetaStart.evelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone	B4		
BetaStart.evelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@0 [START]	B5		
BetaStart.evelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@696 [END]	BBLR		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1	BETA-BEATING		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone	BETA-BEATING-ARCHIVED		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@133	BETA-BEATING-MD		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@246	BETA-STAR		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@359	CHROMATICITY		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@520	CHROMATICITY_NLIN		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@696 [END]	CHROMATICITY_REF		
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@70	COLLIMATORS		
SQUEEZE-6.8TeV-2m-1.2m-LHcb-2024_V1			
SQUEEZE-6.8TeV-2m-1.2m-LHcb-2024_V1_Clone			
SQUEEZE-6.8TeV-2m-1.2m-LHcb-2024_V1_Clone@415 [END]			

2024 SQUEEZE knob incorporation - coupling

Arc-by-Arc [constant at -1 through all squeeze processes]

- LHCBEAM/ATS_2022_05_08_B1_arc_by_arc_coupling_133cm_30cm

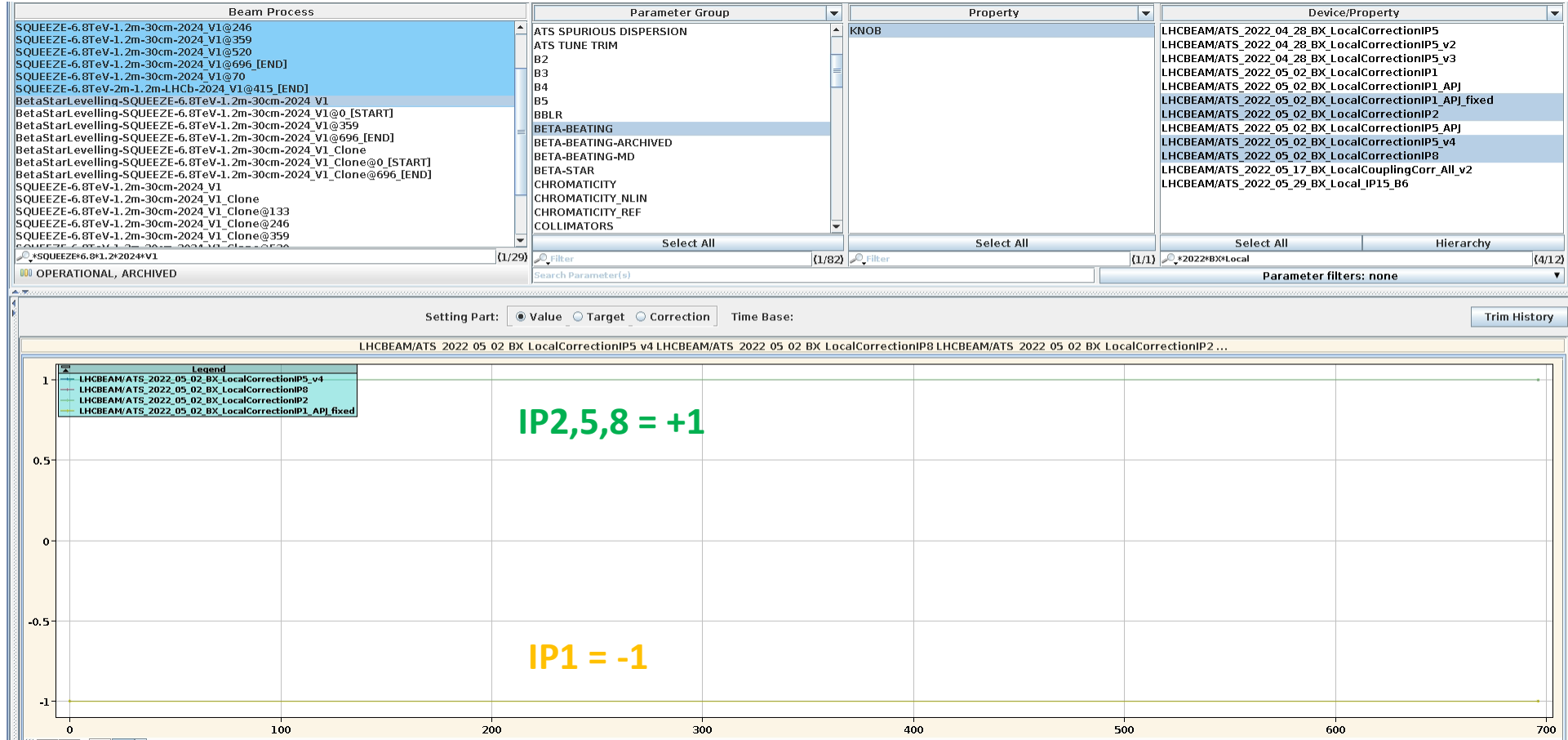


2024 SQUEEZE knob incorporation – local IP

- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP1_APJ_fixed
- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP2
- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP5_v4
- LHCBEAM/ATS_2022_05_02_BX_LocalCorrectionIP8

[constant at +/-1 through all squeeze processes]

[for 2025 swap signs of IP1 and IP5]

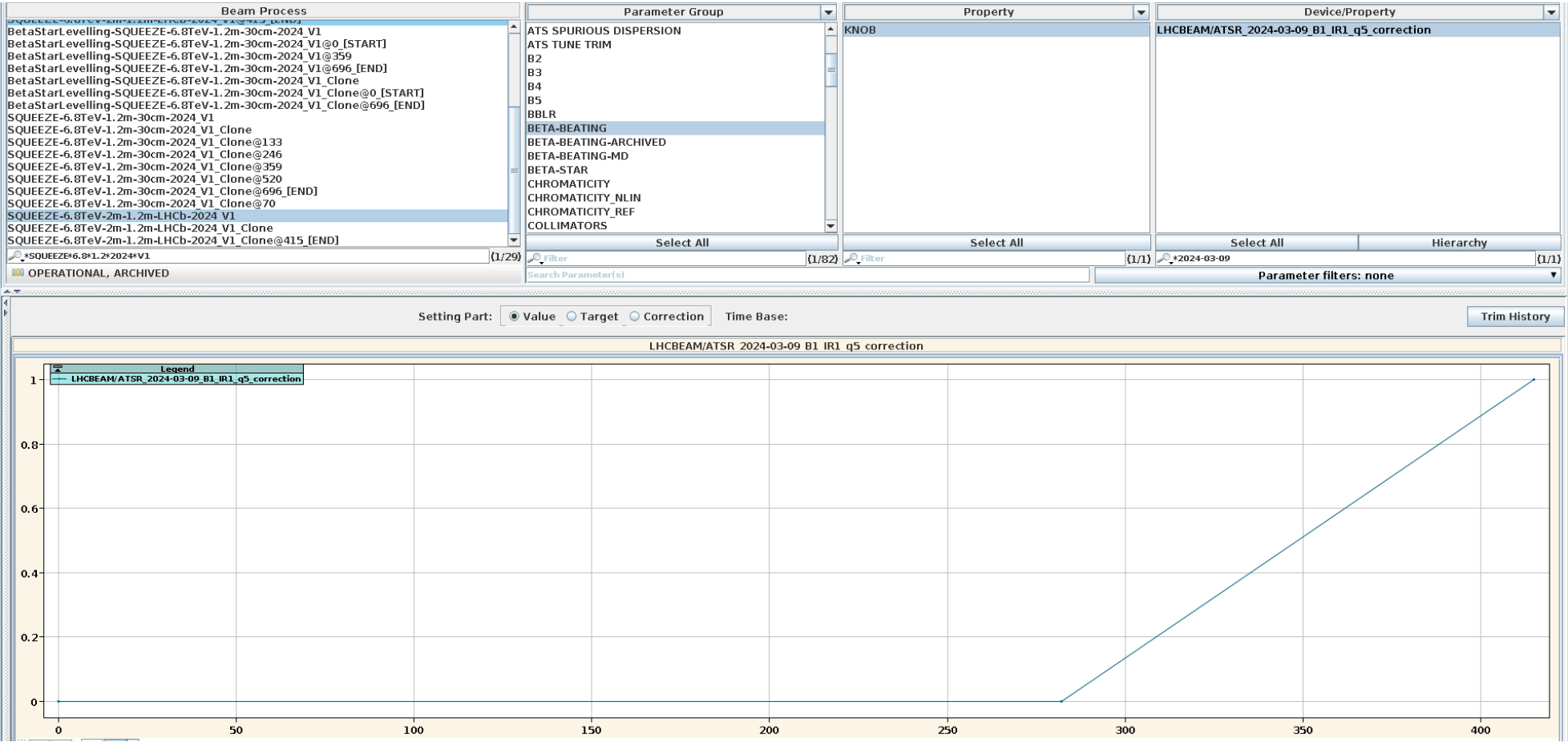


2024 SQUEEZE knob incorporation – local IP

Extra 2024 iteration:

- LHCBEAM/2024-03-09_B1_IR1_q5_correction

Trimmed in during squeeze from 2m-1.2m (actually starts about 1.65m) → remove for 2025

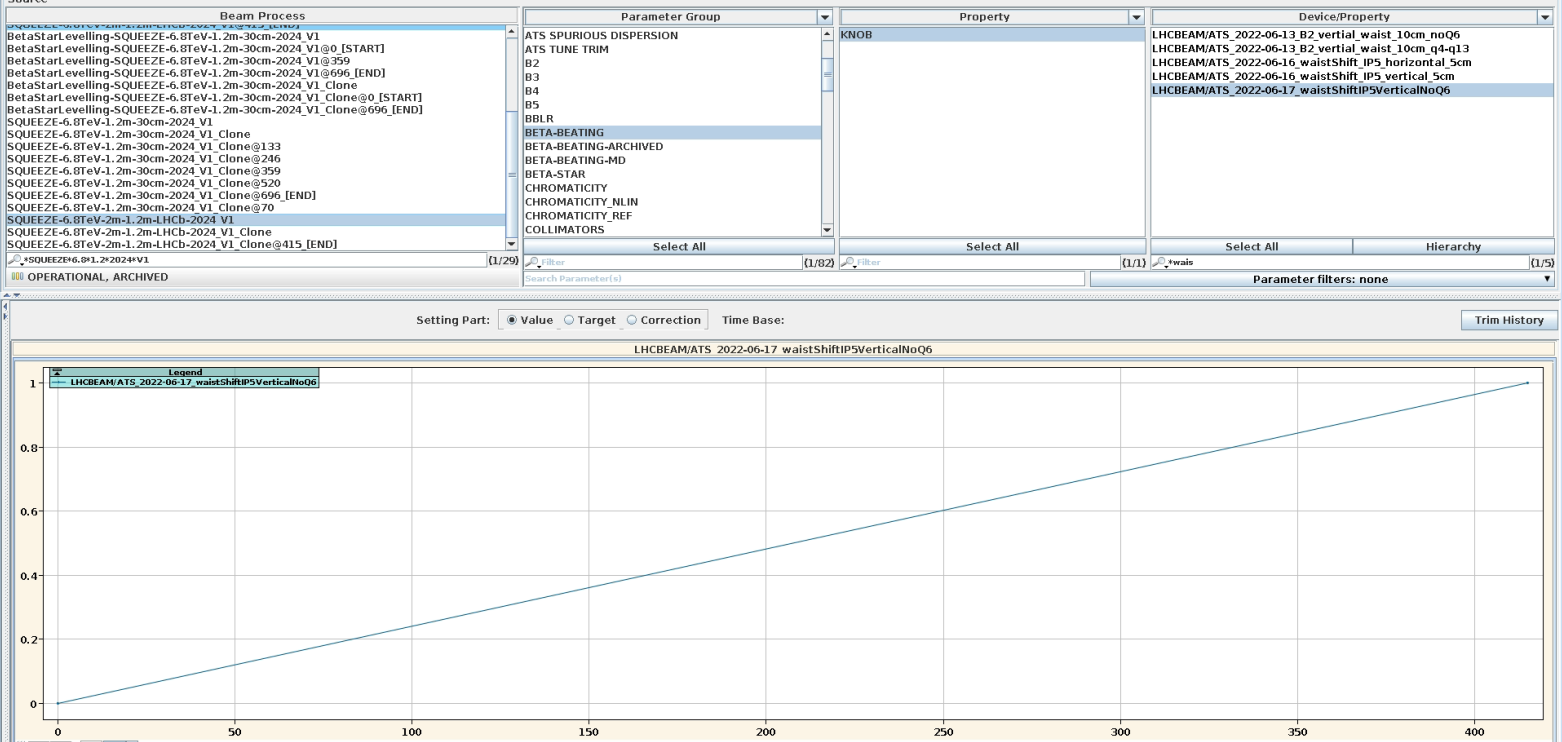


2024 SQUEEZE knob incorporation – local IP

Extra 2024 iteration:

- LHCBEAM/ATS_2022-06-17_waistShiftIP5VerticalNoQ6

Trimmed in during squeeze through 2m-1.2m seq
Then constant through rest of squeeze



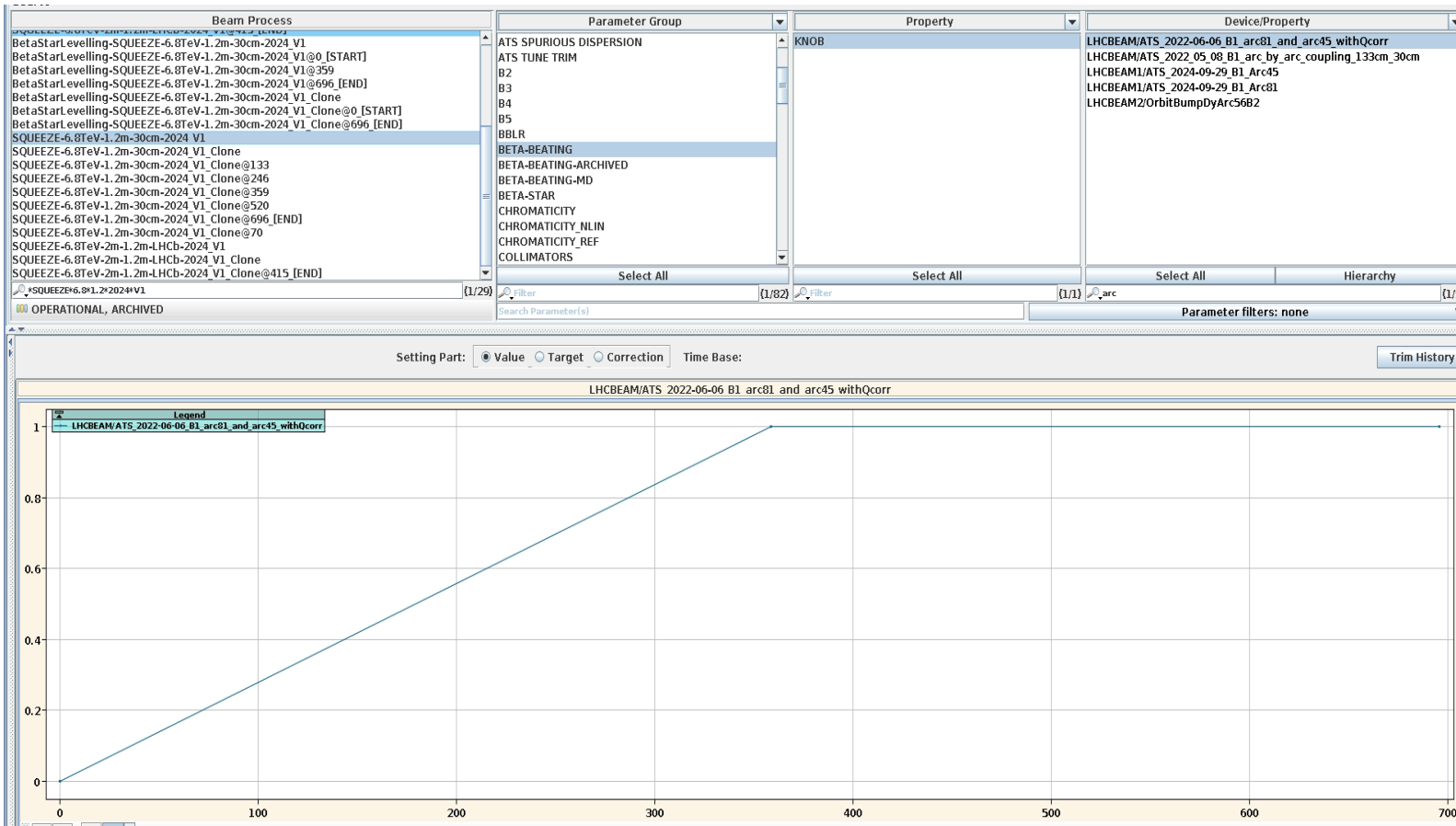
Remove for 2025? Or invert sign?

I thought we had more waist shift knobs – but this is all I see? Were they edited directly in the local?

2024 SQUEEZE knob incorporation – local arc

■ LHCBEAM/2022-06-06_B1_arc81_and_arc45_withQcorr

Off during 2m-1.2m squeeze, then trimmed in from 1.2m to 60cm



From last meeting:

- Arc81 still okay in 2025 MD
- Arc45 bump should be doubled or check shifting by 1 MS
- Arc56 large error – to be checked also with back propagation

2024 SQUEEZE knob incorporation – global

+1@1.2m → 0@60cm → 0@30cm

[0@1.2m → +1@60cm → 0@30cm]

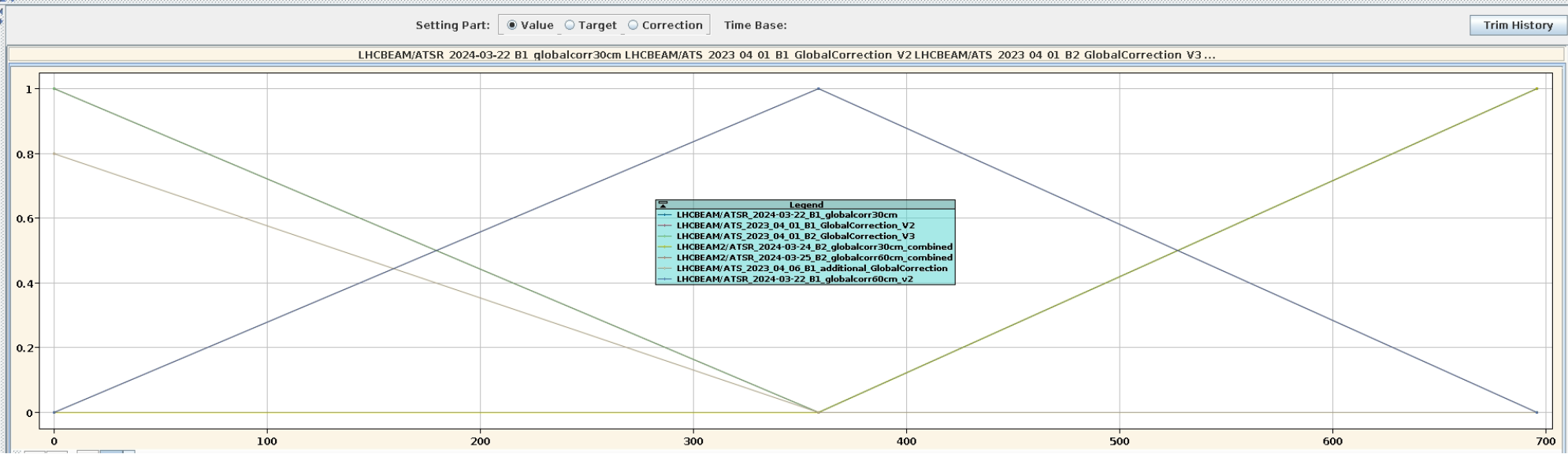
[0@1.2m → 0@60cm → +1@30cm]

- LHCBEAM/ATS_2023_04_01_B1_GlobalCorrection_V2
- LHCBEAM/ATS_2023_04_06_B1_additional_GlobalCorrection **[+0.8]**
- LHCBEAM/ATS_2023_04_01_B2_GlobalCorrection_V3
- LHCBEAM /ATSR_2024-03-22_B1_globalcorr60cm_v2
- LHCBEAM2/ATSR_2024-03-25_B2_globalcorr60cm_combined
- LHCBEAM /ATSR_2024-03-22_B1_globalcorr30cm
- LHCBEAM2/ATSR_2024-03-24_B2_globalcorr30cm_combined

Beam Process	Parameter Group	Property	Device/Property
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@696_[END]	ATS SPURIOUS DISPERSION	KNOB	LHCBEAM/ATSR_2024-03-08_B2_globalBetaDisp_injection
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@70	ATS TUNE TRIM		LHCBEAM/ATSR_2024-03-08_B2_globalCorr_injection_w_Q456
SQUEEZE-6.8TeV-2m-1.2m-LHCb-2024_V1@415_[END]	B2		LHCBEAM/ATSR_2024-03-10_B2_globalCorr_injection_2nditeration_no_q4r6
BetaStartEvelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1	B3		LHCBEAM/ATSR_2024-03-10_globalCorr_injection_2nditeration
BetaStartEvelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@0_[START]	B4		LHCBEAM/ATSR_2024-03-13_B1_globalCorr_injection_after_q5removal
BetaStartEvelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@359_[END]	B5		LHCBEAM/ATSR_2024-03-22_B1_globalcorr30cm
BetaStartEvelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1@696_[END]	BBLR		LHCBEAM/ATSR_2024-03-22_B1_globalcorr60cm
BetaStartEvelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone	BETA-BEATING		LHCBEAM/ATSR_2024-03-22_B1_globalcorr60cm_v2
BetaStartEvelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@0_[START]	BETA-BEATING-ARCHIVED		LHCBEAM/ATSR_2024-03-22_B2_globalcorr30cm
BetaStartEvelling-SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@696_[END]	BETA-BEATING-MD		LHCBEAM/ATSR_2024-03-22_B2_globalcorr30cm_additional
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1	BETA-STAR		LHCBEAM/ATSR_2024-03-22_B2_globalcorr60cm
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone	CHROMATICITY		LHCBEAM/ATSR_2024-03-25_B2_globalcorr60cm_additional
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@133	CHROMATICITY_NLIN		LHCBEAM/ATSR_2024-04-01_B1_globalcorr22cm
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@246	CHROMATICITY_REF		LHCBEAM/ATSR_2024-04-01_B2_globalcorr22cm
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@359	COLLIMATORS		LHCBEAM/ATSR_2024-09-19_B1_global_corr_ppRef
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@520			
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@696_[END]			
SQUEEZE-6.8TeV-1.2m-30cm-2024_V1_Clone@70			

Remove for 2025

- Test 2023 correction at 1.2m after new local established
- 30cm global knobs were removed for the 2025 MD



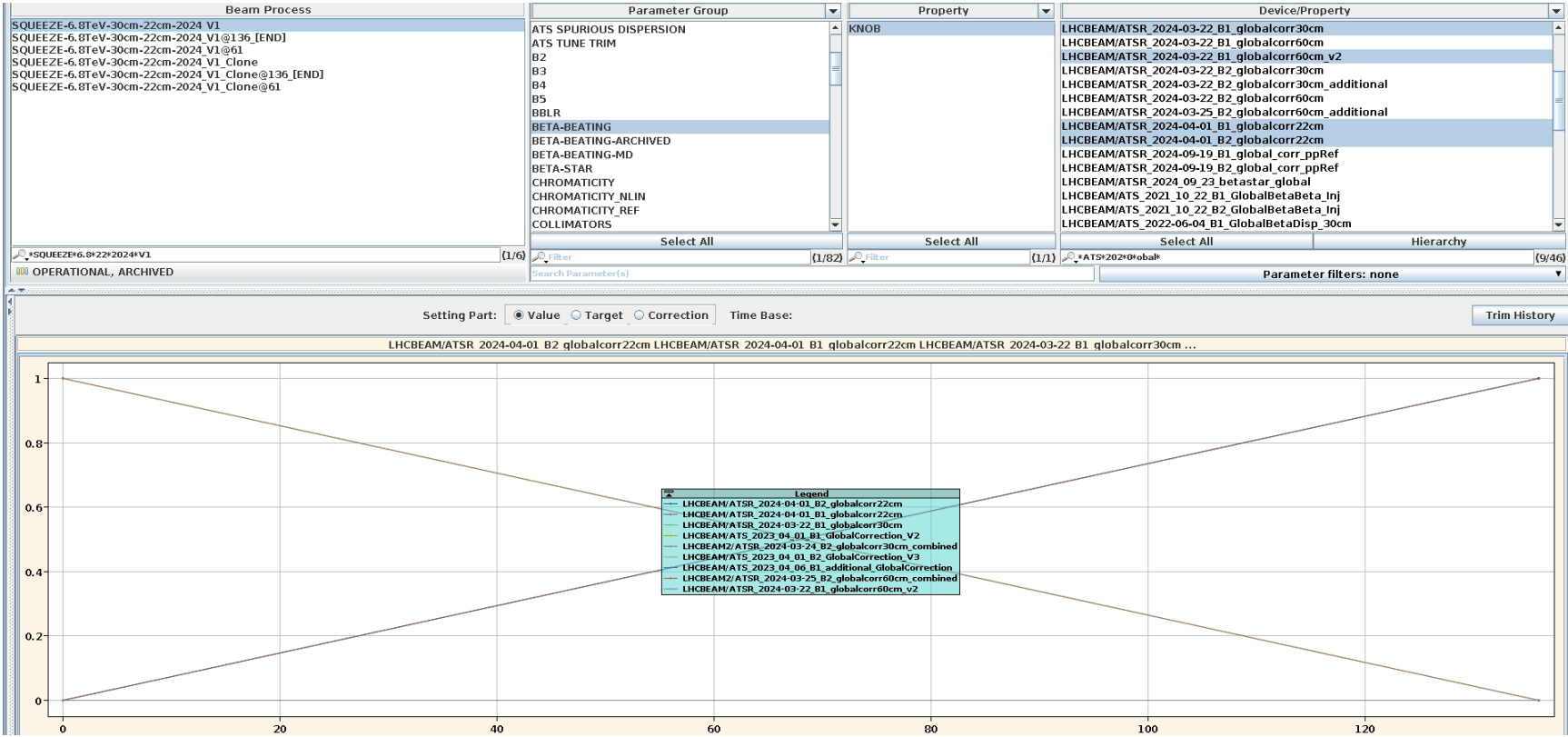
2024 SQUEEZE knob incorporation – global to 22cm

[0@1.2m → 0@60cm → +1@30cm → 0@22cm]

- LHCBEAM /ATSR_2024-03-22_B1_globalcorr30cm
- LHCBEAM2/ATSR_2024-03-24_B2_globalcorr30cm_combined

[0@1.2m → 0@60cm → 0@30cm → +1@22cm]

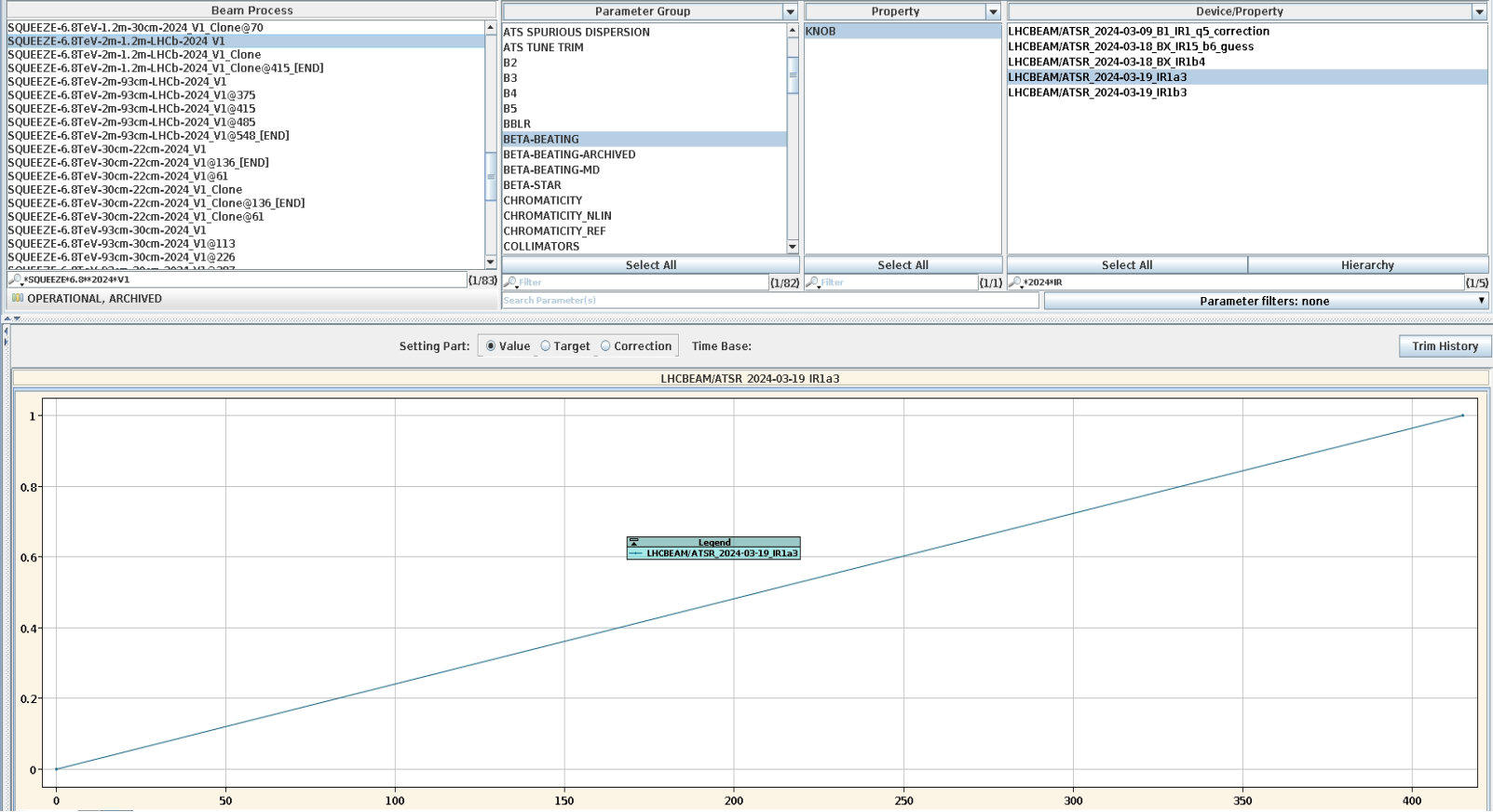
- LHCBEAM/ATSR_2024-04-01_B1_globalcorr22cm
- LHCBEAM/ATSR_2024-04-01_B2_globalcorr22cm



For 2025 expect global corrections at: 2m-1.2m → 60/60cm → 60/30cm → 60/18cm with validations at intermediate steps

2024 SQUEEZE knob incorporation – IRNL

- **IRb4:** LHCBEAM/ATSR_2024-03-18_BX_IR1b4 / LHCBEAM/ATSR_2024-03-18_BX_b4_IP5 [constant through whole squeeze]
- **IRsextupole:** LHCBEAM/ATSR_2024-03-19_IR1a3 etc [trimmed in from 2m→1.2m]



Remove for 2025

- Expect completely new sextupole and skew-octupole corrections.
- IRb4 extrapolation didn't work in 2024 so just make new virgin correction? Otherwise can make approximate guess and iterate
- LRBB?