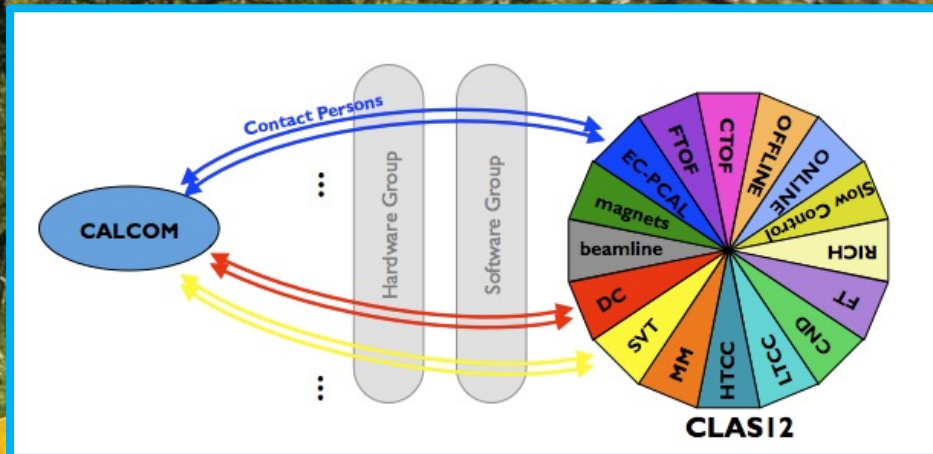


CALCOM Status and Plans



Topics:

- Calibration activities: RG-A, B, C, D
- "Online" calibrations: RG-K, RG-E
- Alignment and DC updates
- Summary

Active Run Groups in Calibration Mode - March 2024

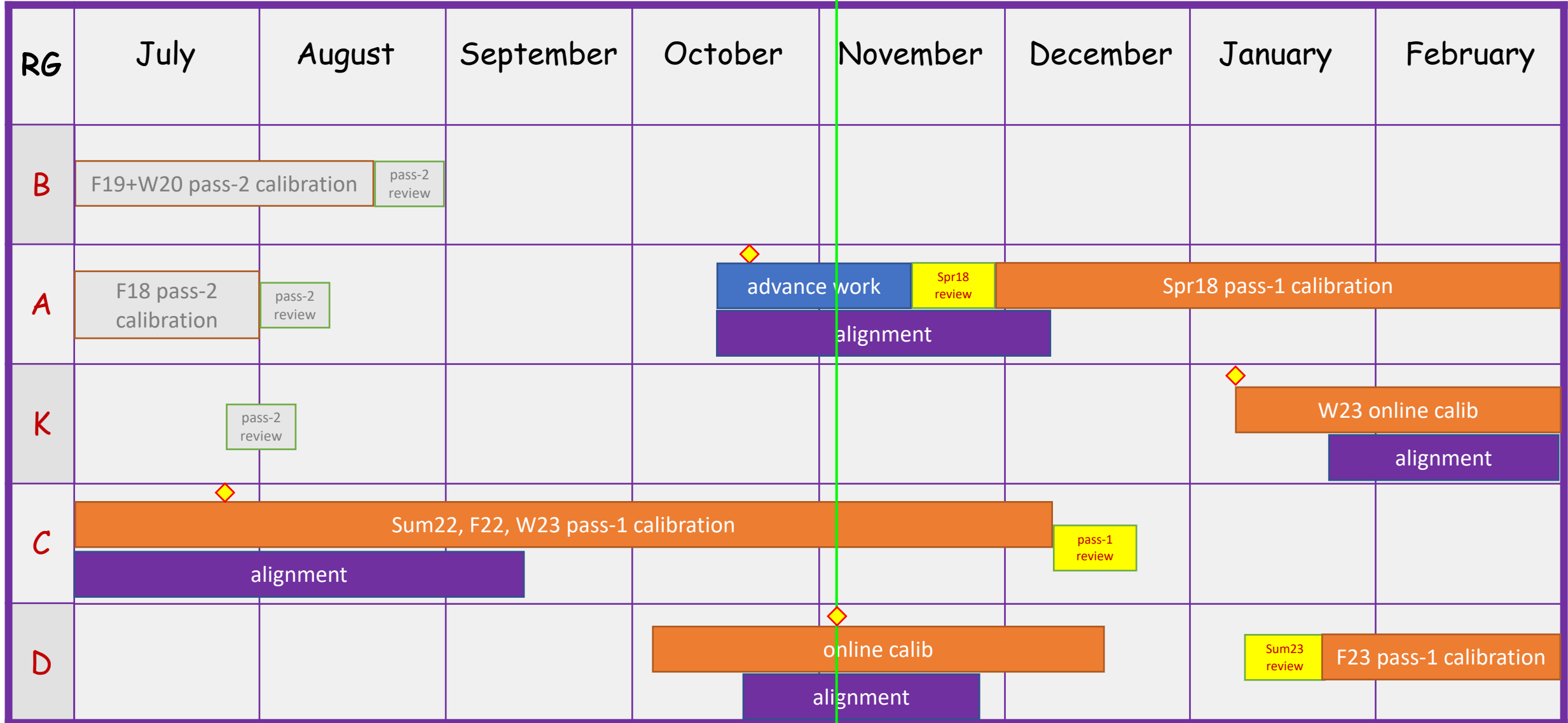
#	Run Group	Dataset	Conditions	Run Range	Stage
1	RG-A	Spr18	LH2 6.4, 10.6 GeV, inbending+outbending (+ 2.2 GeV zero-field from engineering run)	3029 - 4325	Pass-1
2	RG-C	F22/W23	Polarized NH3, ND3, 10.5 GeV, inbending; FT-On/FT-Off	16843 - 17811	Pass-1
3	RG-D	F23	LD2, C, Cu, Sn 10.6 GeV inbending+outbending	18329 - 19130	Pass-1
4	RG-E	Spr24	LD2, C, Cu, Al, Sn, Pb 10.5 GeV	TBD	"Online" calibration
5	RG-K	Spr24	LH2 6.4, 8.5 GeV outbending	19220 - TBD	"Online" calibration

Five different datasets are being calibrated in parallel

	Analysis Coordinator	Chef
RG-A	Latifa Elouadrhiri/Timothy Hayward	Nick Trotta
RG-C	Silvia Niccolai	Kayleigh Gates/Li Xu
RG-D	Lamiaa El Fassi	Mikhail Yurov
RG-E	Hayk Hakobyan/Antonio Radic	Sebouh Paul
RG-K	Annalisa D'Angelo	Lucilla Lanza

Calibration Timeline: July 2023 - February 2024

November 3, 2023



With pass-2 work behind us, life will be so much easier ...



DONE

Calibration Status I

DONE

[1] RG-A F18 - Pass-2 calibration review Dec. 16, 2022

[2] RG-B F19/W20 - Pass-2 calibration review Nov. 18, 2022

1. Day -1: Initial pass-0 (can run over holiday break)
2. Day 1-2: Beam-offset (forward and central; maybe over holiday break)
3. Day 3-7: Pass 0-v1 cooking with beam-offset
4. Day 7: Pass 0-v1 timelines Milestone 1
5. Day 8-19: Cook ~15 full runs for TOF calibration
6. Day 20-31: TOF calibration, begin DC calibrations
7. Day 32-36: Pass 0-v2 with TOF calibration
8. Day 37: Pass 0-v2 timelines Milestone 2
9. Day 38-40: RF calibration using pass 0 v2
10. Day 41-44: Pass 0-v3 with RF calibration
11. Day 45: Pass 0-v3 timelines Milestone 3
12. Day 46-57: Cooking of ~15 full runs for subsystem calibration (DC, ECAL, FT, HTCC, LTCC, RICH, ...)
13. Day 58-69: Subsystem calibration (done in parallel)
14. Day 70-73: Pass 0-v4 with subsystem calibrations, cook of ~4 full runs to check high-level physics
15. Day 74-75: Pass 0-v4 timelines, final check of specs, investigation of full runs Milestone 4

- Calibrations sequence:**
- 1) DC and beam-offset calibrations + pass-0 cooking → monitors & timelines to establish runs to process
 - 2) FTOF calibration
 - 3) RF calibration: run-by-run calibration after FTOF calibrations using pass-0 files + pass-0 cooking → monitors & timelines to make sure FTOF is OK before moving to the next step
 - 4) CLAS12 subsystem calibration: DC, CND, CTOF, ECAL, FT (Hodo, Cal), HTCC, RICH?
 - 5) Pass-0 cooking → monitors & timelines; check of calibration quality vs run – AI training in parallel
 - 6) Reiterate, if necessary (for specific run ranges and/or detector subsystems)
- Calibration timeline (conservative estimates):**
- For 1) cooking needs: ~2 runs → 1 day
 - For 1) duration of DC calibration: ~2 days
 - For 1) beam offset calibration: 1 day
 - For 1) pass-0 cooking & timelines: ~3 days (MILESTONE 1)
 - For 2) and 4) ~15 runs should be cooked for calibration → ~5 days
 - For 2) FTOF calibration of ~15 runs → ~10 days
 - For 3) RF calibration requires a pass0 cooking: ~2 days + ~1 day for the calibration itself → 3 days
 - For 3) pass-0 cooking & timelines: ~3 days (MILESTONE 2)
 - For 4) Recooking of the ~10 runs → ~4 days
 - For the calibrations 4) of ~10 runs → ~10 days (done in parallel)
 - For 5) 3 days – ideally the monitoring part will be included in the cooking workflow (MILESTONE 3)
 - For 6) ~10 days including cookings, recalibrations, and further monitoring passes (MILESTONE 4)
 - + 2 weeks to account for delays in cooking due to resource limitations.
- **TOTAL: ~69 days**

Timeline:

- Original calibration window:
 - Jan. 16 - Mar. 31, 2023
 - beam offset calibration (1 month)
 - DC calibrations (1.5 months)
 - subsystem calibrations (1 month)
 - AI validation (2 months)
- Pass-2 review: Sep. 22, 2023
- Cooking: Oct. 2 - Nov. 13, 2023

Timeline:

- Original calibration window:
 - Jan. 1 - Mar. 17, 2023
 - beam offset calibration and CVT alignment (3.5 months)
 - DC calibrations (3 months)
- Pass-2 review: Nov. 1, 2023
- Cooking: Dec. 8, 2023 - Jan. 31, 2024

Calibration Status II

[3] RG-C Sum22 - Pass-1 calibration review Jun. 23, 2023

Calibrations sequence:

- 1) Complete beam-offset calibrations, DC calibration + pass-0 cooking → monitors & timelines to establish runs to process
- 2) FTOF calibration
- 3) RF calibration: run-by-run calibration after FTOF calibrations using pass-0 files + pass-0 cooking → monitors & timelines to make sure FTOF is OK before moving to the next step
- 4) CLAS12 subsystem calibration: DC, CND, CTOF, ECAL, FT (Hodo, Cal), HTCC (timing), RICH?
- 5) Pass-0 cooking → monitors & timelines; check of calibration quality vs run – AI training in parallel
- 6) Reiterate, if necessary (for specific run ranges and/or detector subsystems)

Calibration timeline (tentative estimates):

- For 1) cooking needs: ~2 runs → 1 day
- For 1) duration of DC calibration: ~2 days
- For 1) beam offset calibration: 1 day
- For 1) pass-0 cooking & timelines: ~3 days (MILESTONE 1)
- For 2) and 4) ~7 runs should be cooked for calibration → ~3 days
- For 2) FTOF calibration of ~7 runs → ~7 days
- For 3) RF calibration requires a pass0 cooking: ~2 days + ~1 day for the calibration itself → 3 days
- For 3) pass-0 cooking & timelines: ~3 days (MILESTONE 2)
- For 4) Recooking of the ~7 runs → ~3 days
- For the calibrations 4) of ~7 runs → ~7 days (done in parallel)
- For 5) 3 days – ideally the monitoring part will be included in the cooking workflow (MILESTONE 3)
- For 6) ~10 days including cookings, recalibrations, and further monitoring passes (MILESTONE 4)
- + 2 weeks to account for delays in cooking due to resource limitations.

→ TOTAL: ~57 days

Timeline:

- Original calibration window:
 - Jul. 1 – Aug. 31, 2023
 - alignment (3 months)
 - beam offset calibration (1 month)
 - calibration - run range extension (1 month)
- Pass-1 review: Jan. 26, 2024
- Cooking: TBD
 - Delayed - update CD materials/fix z_{vtx} cuts

[4] RG-C F22 - Pass-1 calibration review Feb. 23, 2024

Calibrations sequence:

- 1) DC calibration + pass-0 cooking → monitors & timelines to establish runs to process
- 2) FTOF calibration
- 3) RF calibration: run-by-run calibration after FTOF calibrations using pass-0 files + pass-0 cooking → monitors & timelines to make sure FTOF is OK before moving to the next step
- 4) CLAS12 subsystem calibration: DC, CND, CTOF, ECAL, FT (Hodo, Cal), HTCC (timing), RICH?
- 5) Pass-0 cooking → monitors & timelines; check of calibration quality vs run – AI training in parallel (do we need to redo it or can we use the network used for Summer2022?)
- 6) Reiterate, if necessary (for specific run ranges and/or detector subsystems)

Calibration timeline (tentative estimates):

- For 1) cooking needs: ~2 runs → 1 day
- For 1) duration of DC calibration: ~10 days
- For 1) pass-0 cooking & timelines: ~3 days (MILESTONE 1)
- For 2) and 4) ~30 runs should be cooked for calibration → ~20 days
- For 2) FTOF calibration of ~30 runs → ~15 days
- For 3) RF calibration requires a pass0 cooking: ~2 days + ~1 day for the calibration itself → 3 days
- For 3) pass-0 cooking & timelines: ~3 days (MILESTONE 2)
- For 4) Recooking of the ~7 runs → ~3 days
- For the calibrations 4) of ~7 runs → ~7 days (done in parallel)
- For 5) 3 days for pass0 + timelines (MILESTONE 3)
- For 6) ~10 days including cookings, recalibrations, and further monitoring passes (MILESTONE 4)
- + 2 weeks to account for delays in cooking due to resource limitations.

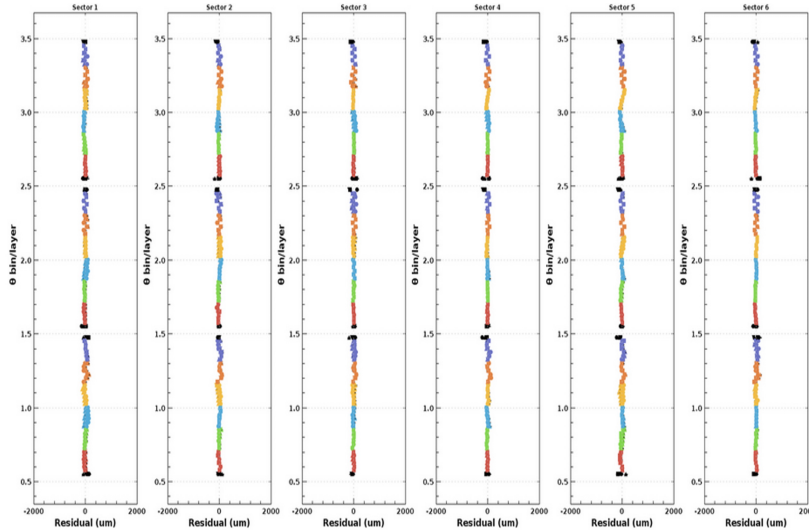
→ TOTAL: ~92 days

Timeline:

- Original calibration window:
 - Aug. 15 – Oct. 31, 2023
- Updated calibration window:
 - Mar. 1 – May 31, 2024
 - Necessity to learn lessons from Sum22 work forced delay in start of work
- Pass-1 review: TBD
- Cooking: TBD

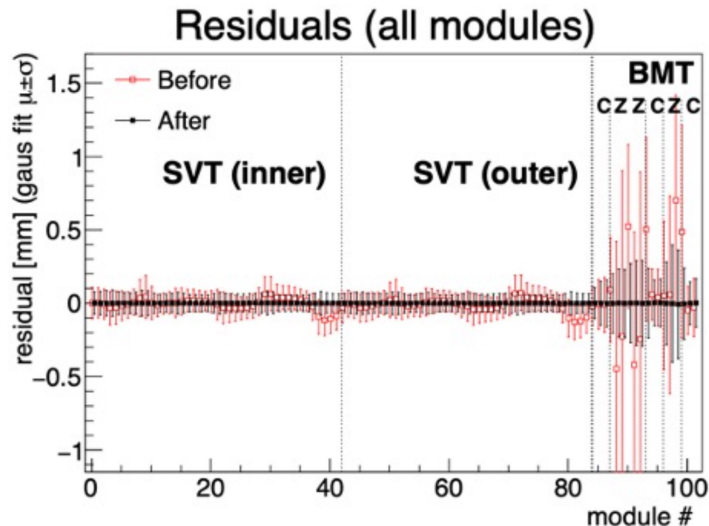
RG-C F22 - Status

Forward Detector - DC



Noémie Pilleux

Central Detector - CVT



Yuri Gotra

Where do things stand?

- CALCOM "ready for calibration" review complete (Feb. 23, 2024)
- DC alignment in complete
- CVT internal alignment complete (DC-CVT offset remains)
- Beam offset calibration (first iteration) complete
- Raster calibration studies in progress
- Global timing shifts studied
- Initial pass-0/timelines will run shortly
- Subsystem calibrations to commence after pass-0/timelines

Calibration timeline (tentative estimates):

- For 1) cooking needs: **~2 runs** → **1 day**
- For 1) duration of DC calibration: **~10 days**
- For 1) pass-0 cooking & timelines: **~3 days (MILESTONE 1)**
- For 2) and 4) **~30 runs** should be cooked for calibration → **~20 days**
- For 2) FTOF calibration of **~30 runs** → **~15 days**
- For 3) RF calibration requires a pass0 cooking: **~2 days** + **~1 day** for the calibration itself → **3 days**
- For 3) pass-0 cooking & timelines: **~3 days (MILESTONE 2)**
- For 4) Recooking of the **~7 runs** → **~3 days**
- For the calibrations 4) of **~7 runs** → **~7 days** (done in parallel)
- For 5) **3 days** for pass0 + timelines (**MILESTONE 3**)
- For 6) **~10 days** including cookings, recalibrations, and further monitoring passes (**MILESTONE 4**)
- + **2 weeks** to account for delays in cooking due to resource limitations.

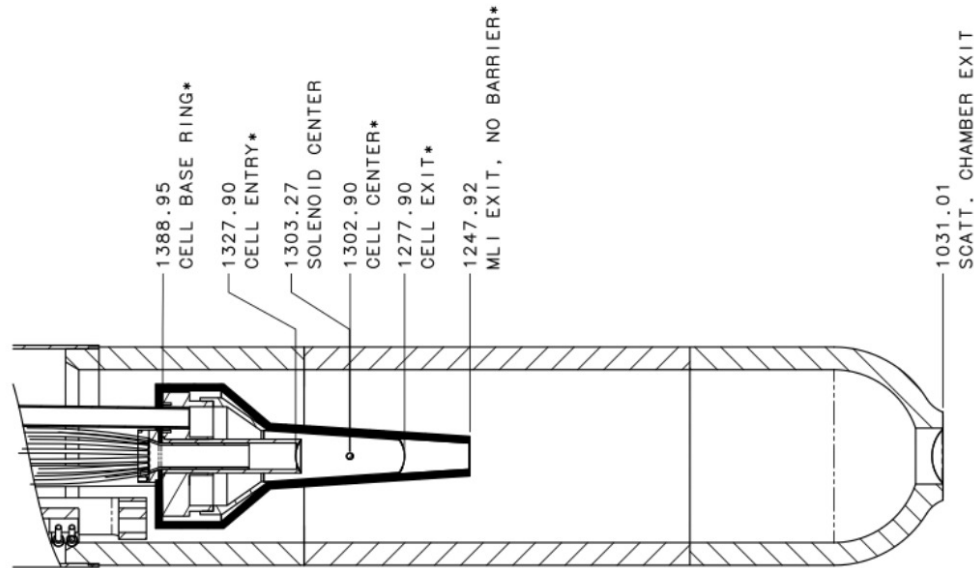
→ **TOTAL: ~92 days**

RG-C W23 status: CVT alignment complete, DC alignment in progress; "Ready for Calibration" review at CALCOM - TBA

DC Alignment

Standard procedure: DC alignment done with empty target (cold) with torus & solenoid @ zero field

- Target "foils": cryotarget entrance + exit windows, scattering chamber exit window



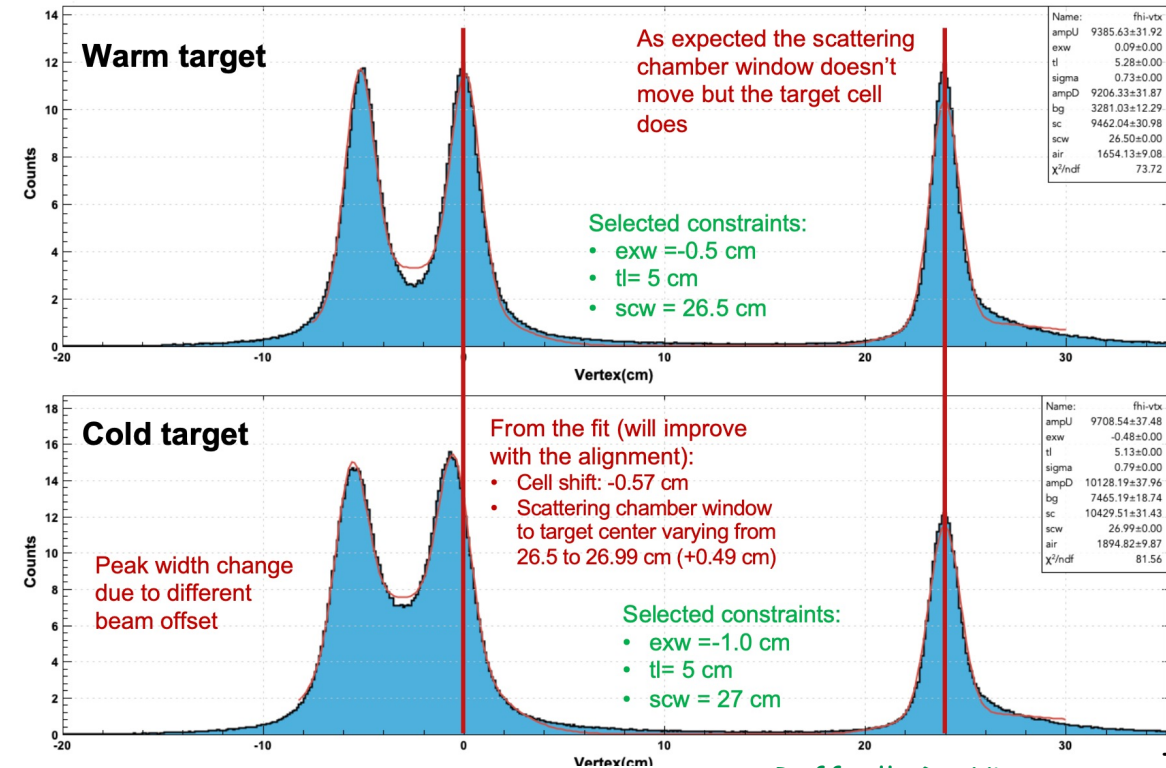
Alignments have not taken thermal contraction of cryo-target system into account

- FEA computed upstream shift of cell by 5 mm
- Data agree with engineering calculation and survey

Calibrations of RG-A (Spr18), RG-D, and RG-K delayed to complete validation and optimize alignment procedure

At start of RG-K run, 1 full day was dedicated to alignment runs

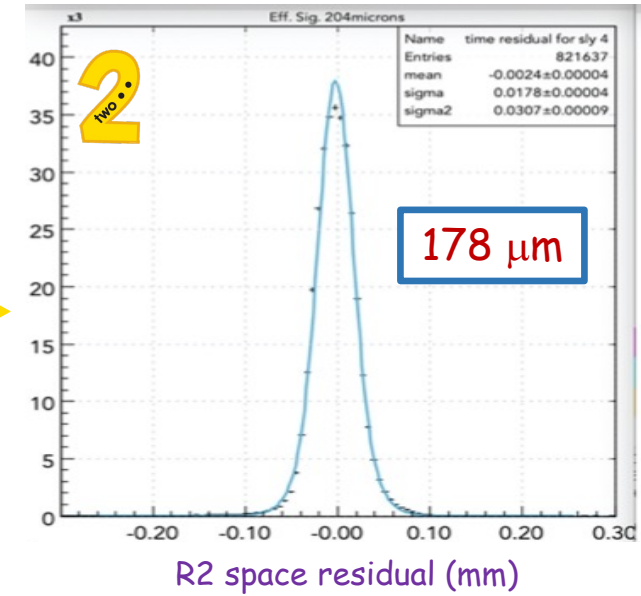
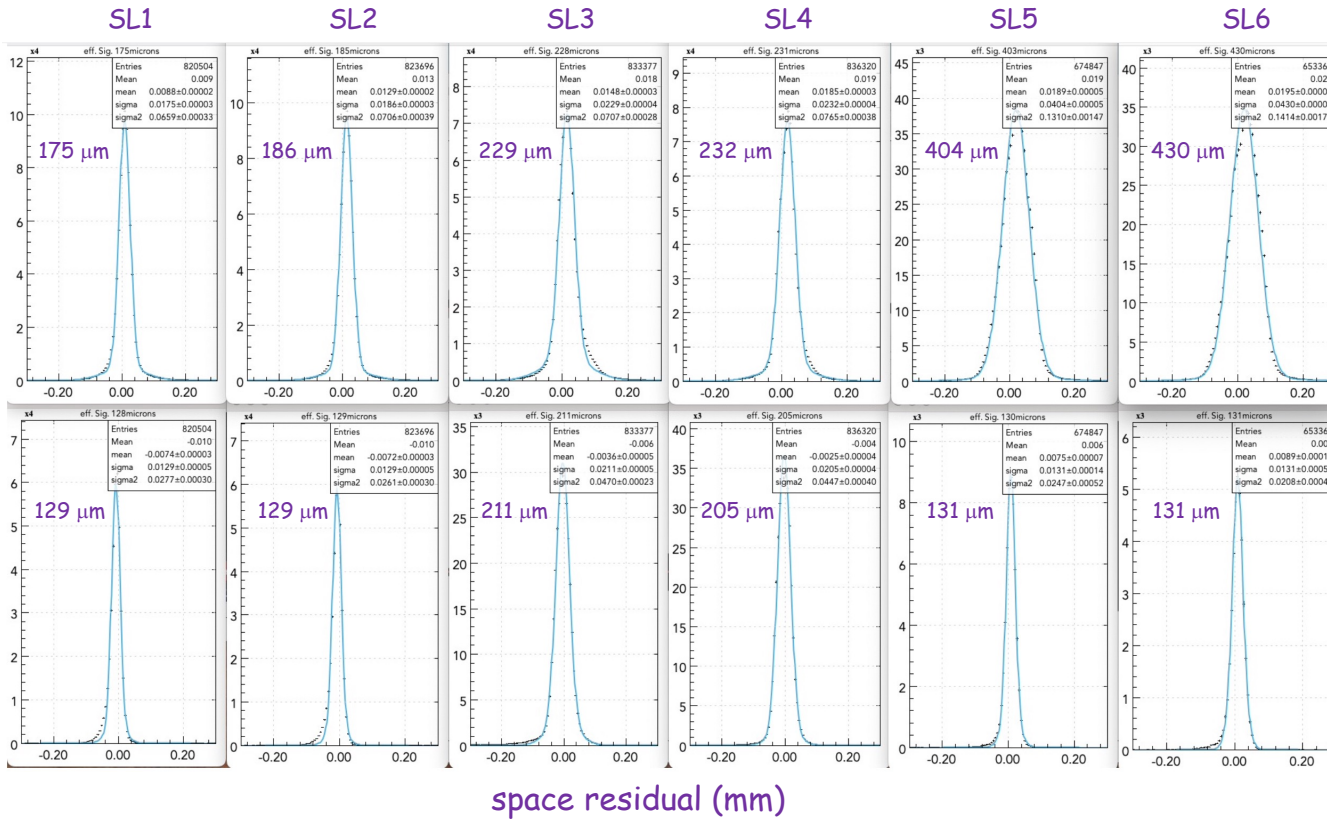
- 12 hr with empty/warm target (*first time*)
- 12 hr with empty/cold target



DC Calibration Suite

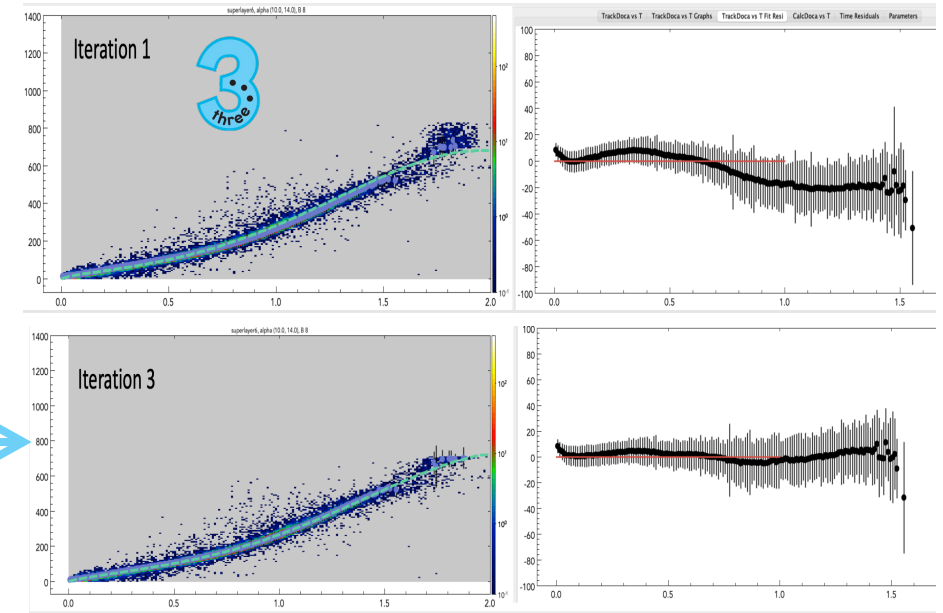
Iteration #1

Iteration #3



time (ns) vs. DOCA

Δtime (ns) vs. DOCA

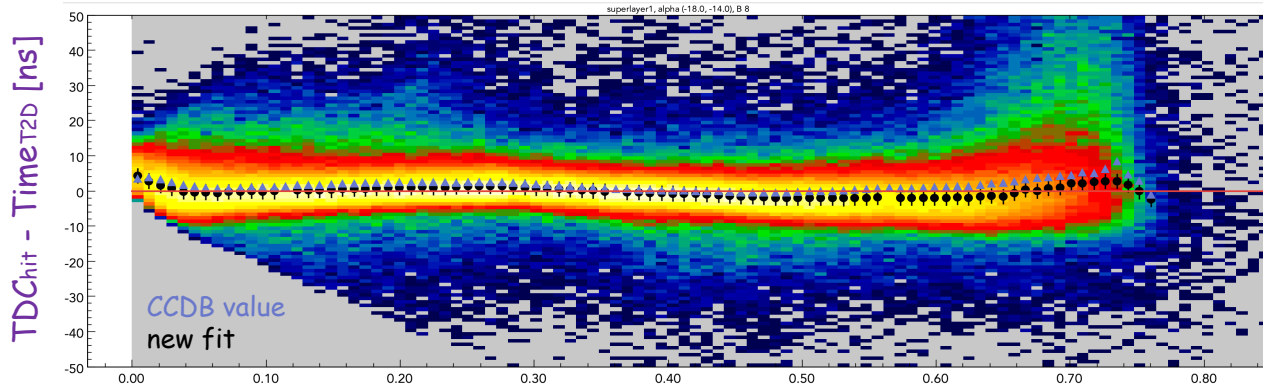


Recent improvements in the DC calibration suite:

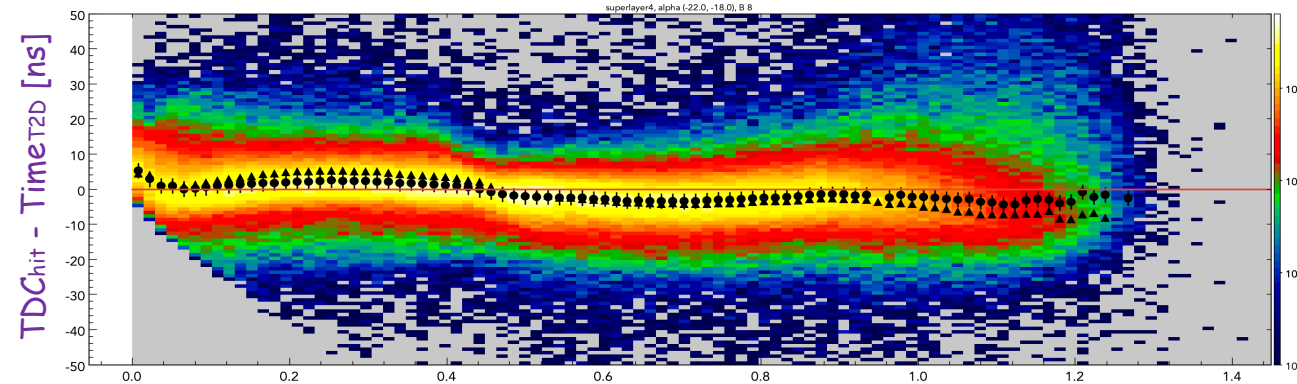
- 1) Improve algorithmic approach to account for time-walk correction
- 2) Improve B-field dependent parameterization for R2
- 3) Add improved metrics for calibration convergence
- 4) Improve event selection + fitting approach

Now working on validation studies and data calibration

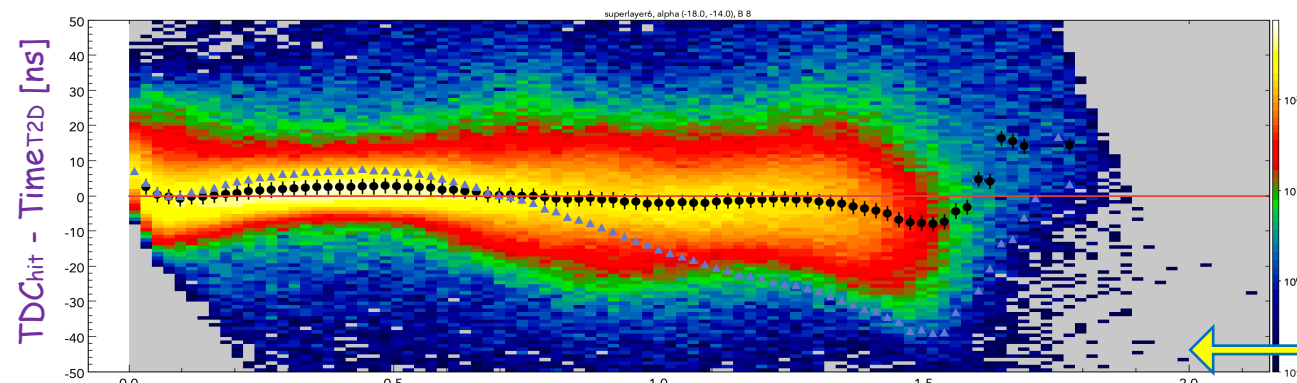
DC Residual Improvements for Zero-Field RG-K



Region 1:
local angle bin



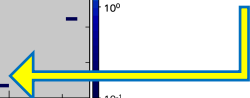
Region 2:
local angle bin



Region 3:
local angle bin

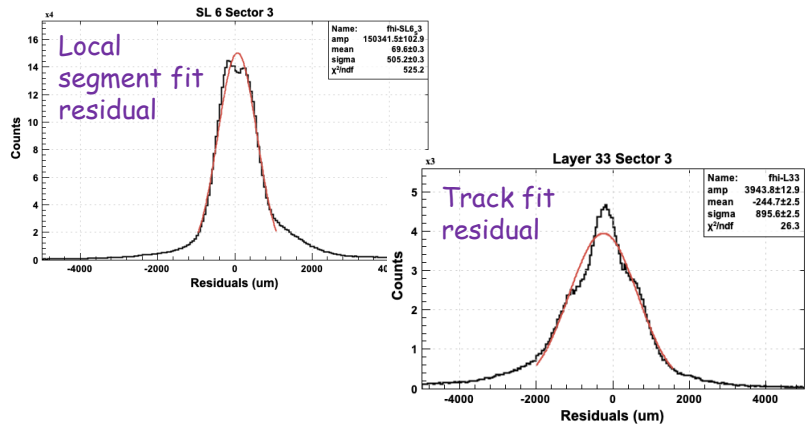
Optimizing quality of zero-field DC time-to-distance calibrations leads to best convergence of alignment fits

- large improvement
- initial calibration 30-40 ns off for large DOCAs

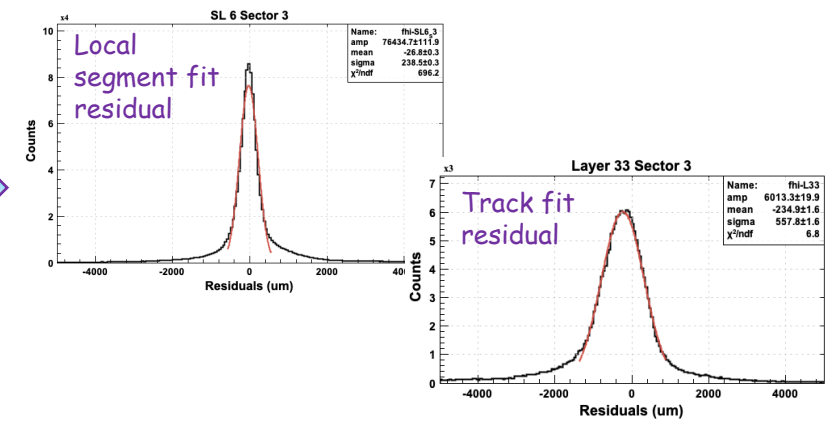


DOCA [cm]

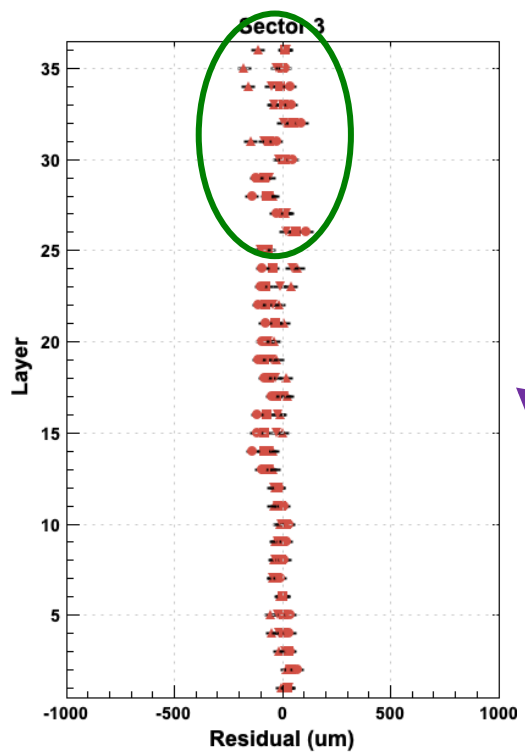
DC T2D Improvements for Zero-Field RG-K



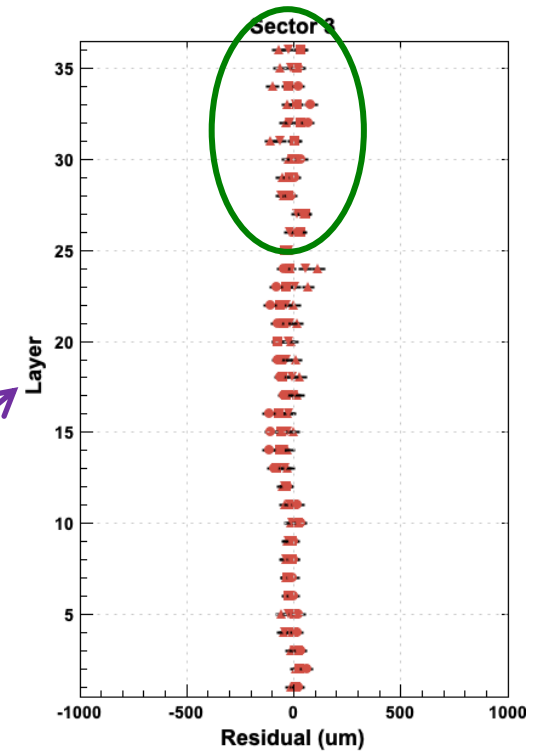
Longstanding issue with multi-modal time and fit residuals in R3 resolved in latest T2D calibration



Artificial pattern in fit residuals that could lead to false alignment results now much reduced already at first iteration

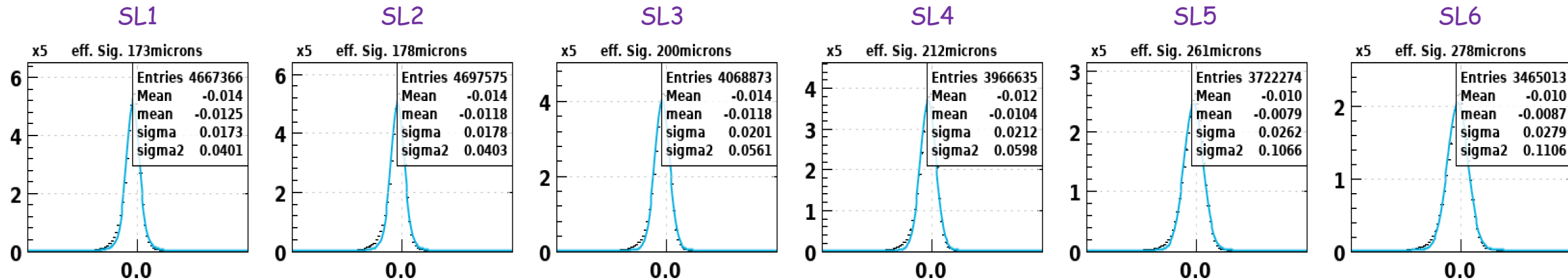


Plots show fit residuals for $\theta=6-8^\circ$ from first iteration different symbols correspond to different ϕ ranges



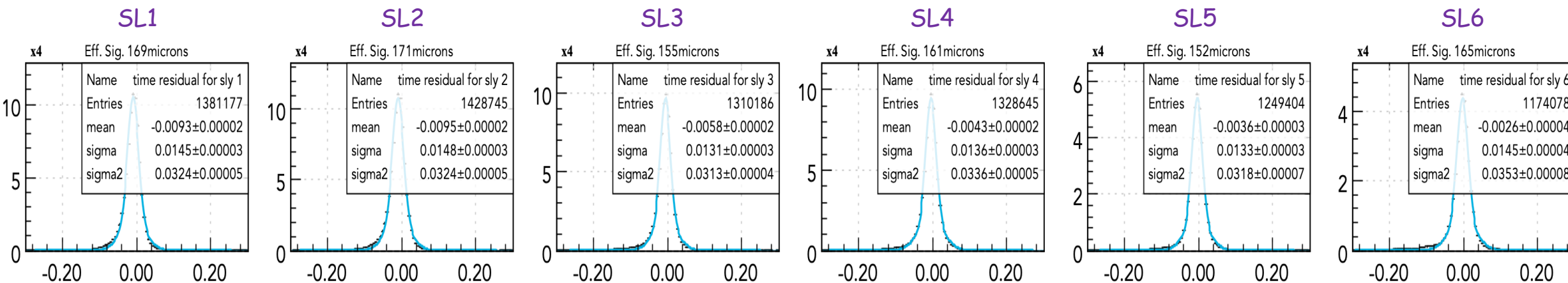
DC T2D Improvements for Zero-Field RG-K

Old software and calibration protocol - calibration from Jan. 2024



New software and calibration protocol (*still in development*)

Florian Hauenstein



Significant improvement in R2 (~25%) and in R3 (~40%)

Calibration Status III

[6] RG-A Spr18 - Pass-1 calibration

	Run range	Beam	Torus	Solenoid
1	3000-3069	6.4 GeV	-100%	-100%
2	3070-3087	6.4 GeV	-75%	-100%
3	3097-3105	6.4 GeV	75%	-100%
4	3131-3293	10.6 GeV	100%	-100%
5	3304-3551	10.6 GeV	-100%	-100%
6	3698-3817	10.6 GeV	-100%	-100%
7	3819-3834	6.4 GeV	75%	-100%
8	3839-3853	6.4 GeV	100%	-100%
9	3855-3857	6.4 GeV	100%	-50%
10	3862-3987	10.6 GeV	100%	-100%
11	4001-4325	10.6 GeV	-100%	-100%

Note: DC HV was reduced for this run compared to F18 settings; "massive" version of FMT installed

Status:

- CALCOM "ready for calibration" review: Dec. 1, 2023
- Dataset "archaeology" in progress
 - Lots of trigger/condition changes
 - Entire run range has not been calibrated/explored to date
- Alignment:
 - *Awaiting new systematic studies and new DC calibrations*
 - CVT internal alignment done
 - FMT alignment in progress (functionality ???)
- DC calibration:
 - *Awaiting updated DC suite*
- Adjusting global timing offsets
- Pass-0/timelines to run after alignment for initial assessment
- Goal: **Calibrations complete by the fall 2024**

1. Day 0 (January 8th): Initial CCDB tables set by Florian for engineering runs
2. Day 1-21: DC and central alignment (central nominally completed)
3. Day 22-32: Beam-offset (forward and central; cooking needed)
4. Day 1-32: Pass 0-v0, Mini-timelines for initial DC calibrations
5. Day 32-35: Pass 0-v1 cooking with beam-offset and initial DC calibrations
6. Day 36: Pass 0-v1 timelines *Milestone 1*

1. Day 37-45: Cook ~12 runs for FTOF calibration
2. Day 46-59: FTOF calibration, extra DC calibrations ongoing
3. Day 60-63: Pass 0-v2 with FTOF calibration
4. Day 64: Pass 0-v2 timelines
5. Day 65-69: Cook ~6 runs for FTOF contingency calibration
6. Day 70-74: FTOF contingency calibration
7. Day 75-79: Pass 0-v3 with FTOF contingency calibration
8. Day 80: Pass 0-v3 timelines *Milestone 2*

1. Day 81-83: RF calibration using pass-0 v3
2. Day 84-87: Pass 0-v4 with RF calibration
3. Day 88: Pass 0-v4 timelines *Milestone 3*

1. Day 89-100: Cooking of ~20 full runs for subsystem calibration
2. Day 101-115: Subsystem calibrations and AI training/denoising validation
3. Day 116-119: Pass 0-v5 with initial subsystem calibrations
4. Day 120: Pass 0-v5 timelines
5. Day 121-126: Cooking of ~10 full runs for subsystem contingency calibration
6. Day 127-133: Subsystem contingency calibrations
7. Day 133-136: Pass 0-v6 with subsystem contingency calibrations
8. Day 137: Pass 0-v6 timelines
9. Day 138-143: Cooking of ~12 full runs for physics analysis validation
10. Day 143-172: Misc contingency *Milestone 4*

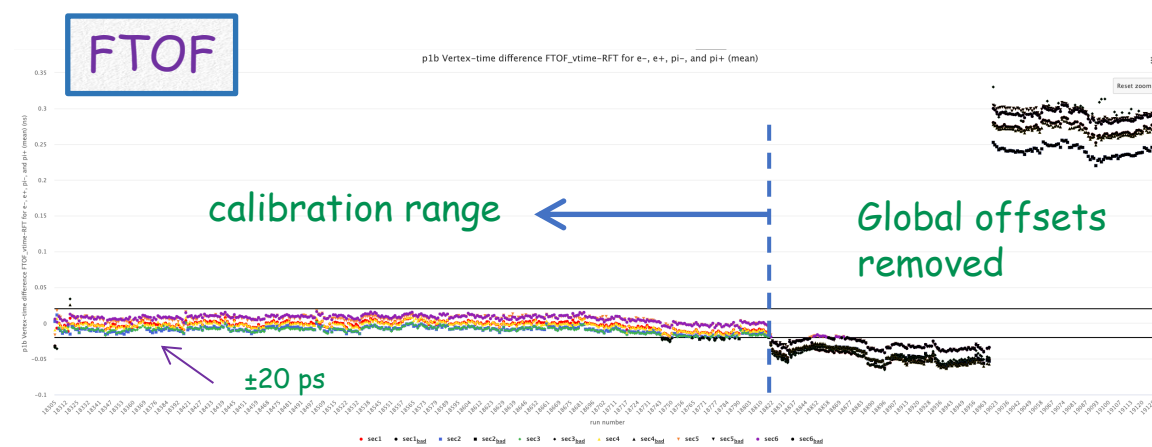
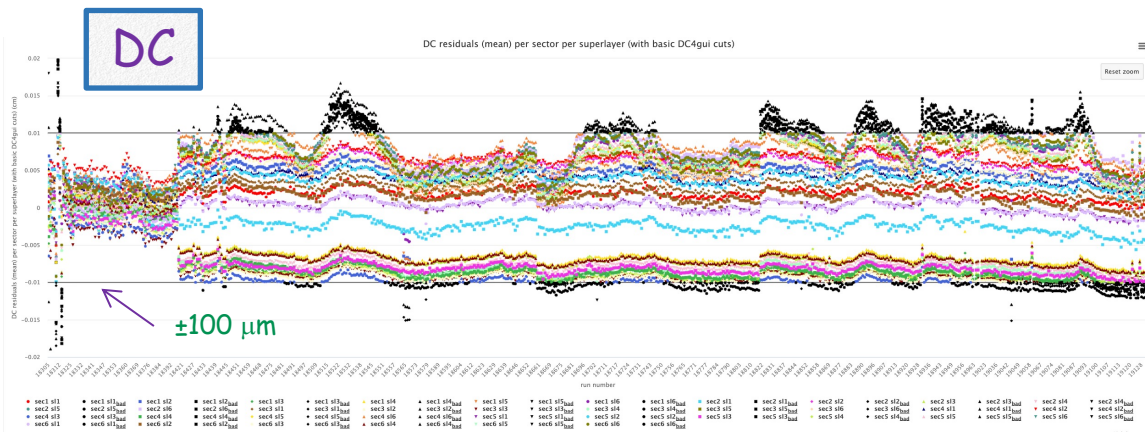
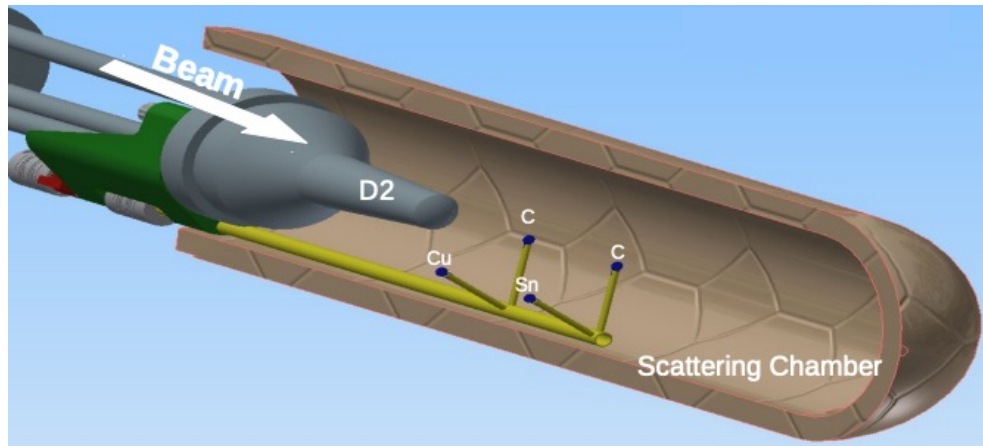
Calibration Status IV

[5] RG-D F23 - Pass-1 calibration

Status:

- Online reference runs calibrated
- DC Alignment:
 - First analysis completed by end of Oct.
 - Revisited due to 7 mm sag of Moller cone
 - Redo after new alignment procedure
- DC calibration:
 - Preliminary work on fixing time offsets
 - Awaiting updated DC suite
- FTOF calibration: 15 runs calibrated
- CALCOM calibration review: Upcoming soon
- Goal: **Complete calibrations by summer 2024**

Target	Schedule
LD ₂	3
⁶³ Cu/ ¹¹⁸ Sn	8
LD ₂	3
¹² C/ ¹² C	7
LD ₂	2
⁶³ Cu/ ¹¹⁸ Sn	9
LD ₂	3
¹² C/ ¹² C	7
LD ₂	3
⁶³ Cu/ ¹¹⁸ Sn	11



Calibration Status V

[6] RG-K Spr24 - Online calibration

Calibration details:

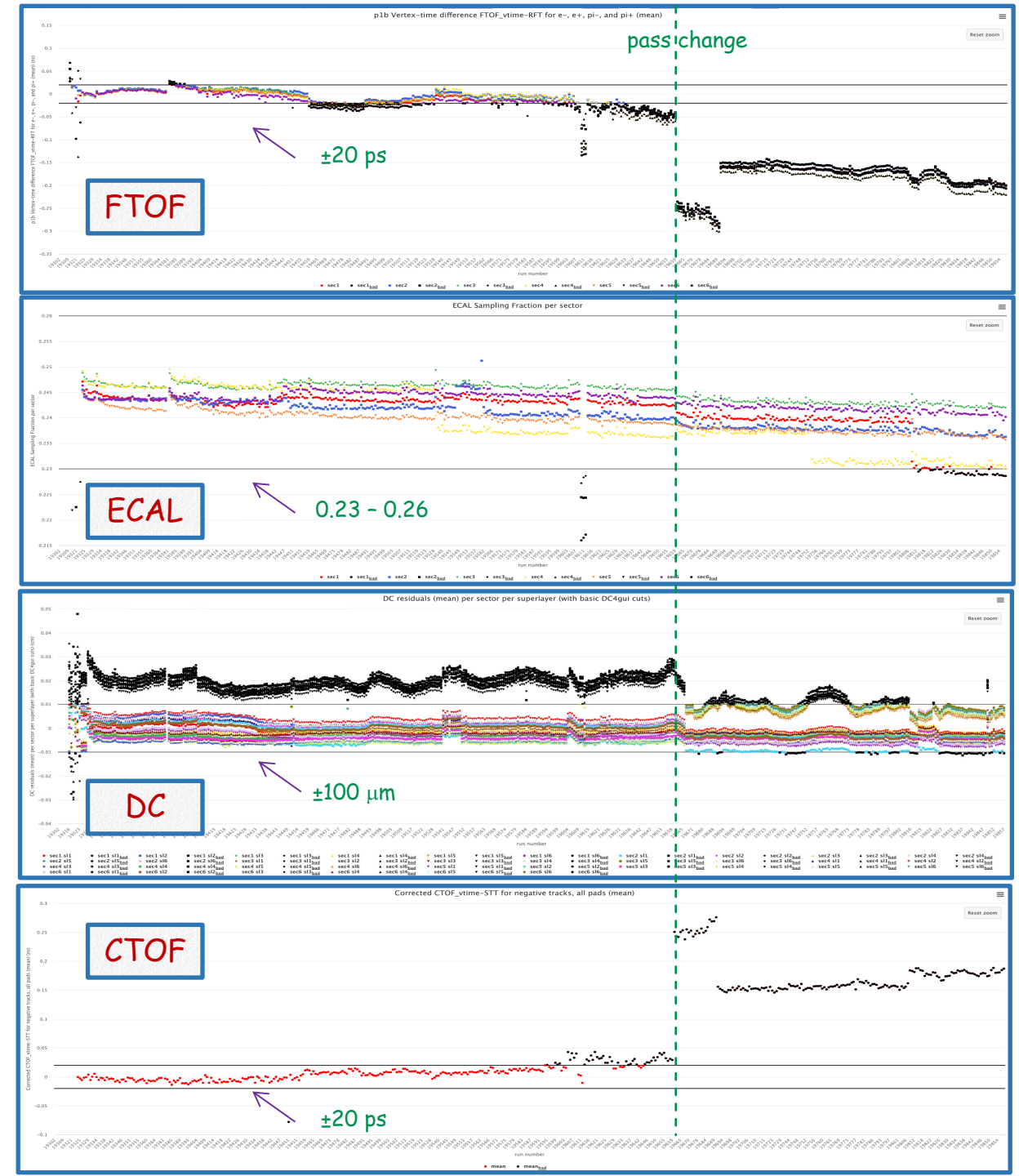
- Zero-field run warm/cold empty target (12 hrs each!)
- Luminosity scans for AI training
- Empty target data (10% of LH2 charge)
- Run with no HTCC in trigger
- Completed calibration of 6.4 GeV and 8.5 GeV reference runs
- DC 6.4 GeV: (11, 12, 12), 8.5 GeV: (10, 12, 11)

Goal: Complete calibrations by fall

Next step:

"Ready for calibration" review at CALCOM

- Review dataset "archaeology"
- Prepare calibration schedule with trackable milestones

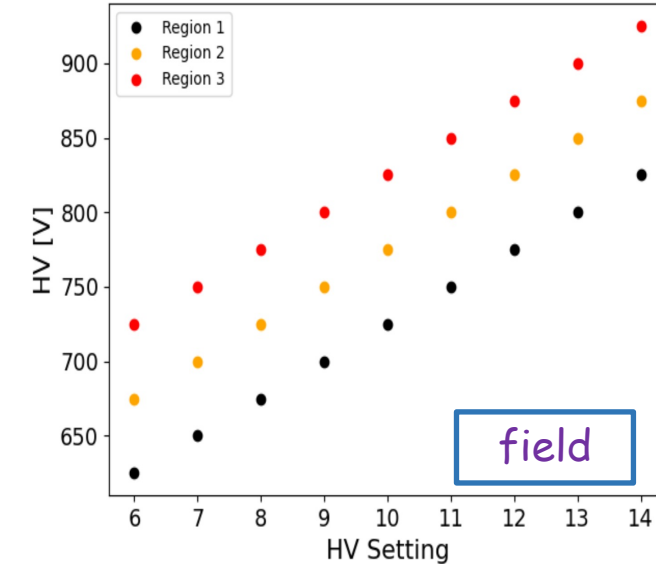
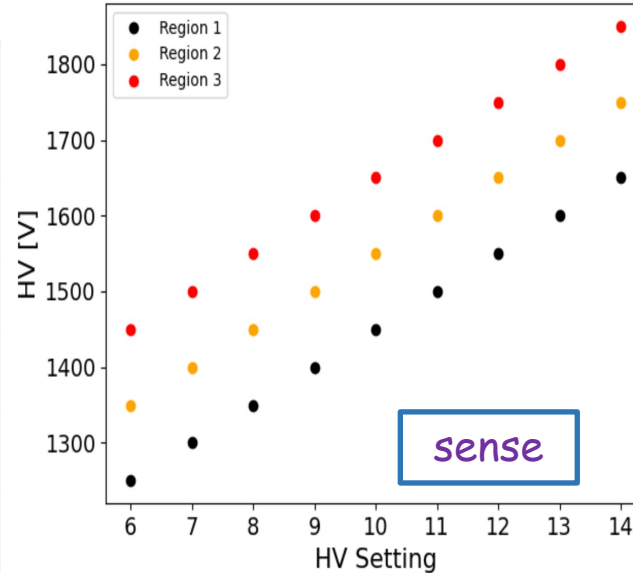


Dec. 2023 RG-K Commissioning Run

START	STOP	FRIDAY, DEC 15	SATURDAY, DEC 16	SUNDAY, DEC 17	MONDAY, DEC 18	TUESDAY, DEC 19
0000	0100		"	TGT issue 60 nA	75 nA r19249	r19260 200 MeV, 60 nA
0100	0200		lumi scan runs:	TGT issue 300 MeV no DC roads		solenoid trip
0200	0300		r19209 - 19218	TGT issue r19233 - 19234	300 MeV no DC roads	
0300	0400		10, 20, 30 nA	TGT issue 75 nA	75 nA	
0400	0500		40, 50, 60 nA	TGT issue "	r19250	
0500	0600		75, 90 nA	TGT issue 300 MeV no DC roads	300 MeV no DC roads	
0600	0700		DC HV scan 10 11 11	TGT issue r19235	90 nA	
0700	0800	beam off	r19219 - 19220	TGT issue 90 nA	r19251 - 19252	
0800	0900	pass change; tgt work	"	TGT issue Streaming Test	Solenoid POS to NEG	
0900	1000	"	DC HV scan 11 12 12	TGT issue		
1000	1100	"	r19222	TGT issue		
1100	1200	"	DC HV scan 9 10 10	TGT issue	TGT issue	
1200	1300	ACC ready; TGT ready	r19223	TGT issue		
1300	1400	beam tuning	DC HV scan 10 10 10		DC HV scan 10 11 12	
1400	1500	beam tuning	r19224		r19238	
1500	1600	Moller runs	DC HV scan 10 10 11		DC HV scan 12 13 13	
1600	1700	beam tuning	r19225 - 19226		r19239	r19254 - trig valid prod
1700	1800	detector	DC HV scan 10 12 11		DC HV scan 11 11 11	DC & CVT thr study
1800	1900	r19204 - trig valid prod	r19228		r19243; DC HV scan 10 12 10	r19258 200 MeV, 60 nA
1900	2000	r19205 - trig valid rnd	DC HV scan 10 11 10		r19244	
2000	2100	r19206 - trig valid rnd	r19229		200 MeV no DC roads	solenoid trip
2100	2200	"			60 nA	
2200	2300	"	200 MeV no DC roads		r19245 - 19248	r19259 300 MeV, 75 nA
2300	2400	r19208 - trig valid mod	r19231 - 19232		200 MeV no DC roads	

DC HV Scan - Dec. 2023 RG-K Commissioning Run

Run Number	R1 DC HV Setting	R2 DC HV Setting	R3 DC HV Setting
19220	10	11	11
19222	11	12	12
19223	9	10	10
19224	10	10	10
19225	10	10	11
19226	10	10	11
19228	10	12	11
19229	10	11	10
19238	10	11	12
19239	12	13	13
19243	11	11	11
19244	10	12	10



History of HV settings for (R1, R2, R3):

- (8, 10, 9) : RG-A Spr18
- (8, 9, 9) : RG-A F18 (early)
- (9, 10, 10) : RG-A F18, RG-K, RG-A/B Spr19
- (10, 10, 10) : RG-M, RG-C
- (10, 11, 11) : RG-D
- (11, 12, 12) : RG-K Spr24 (1)
- (10, 12, 11) : RG-K Spr24 (2)

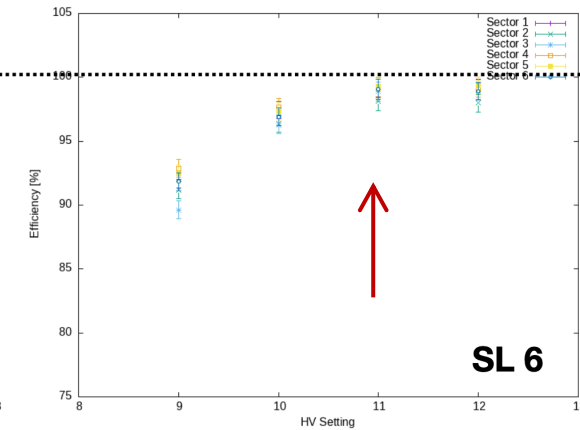
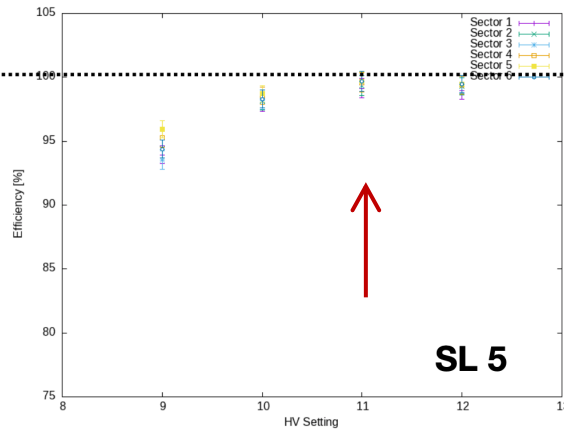
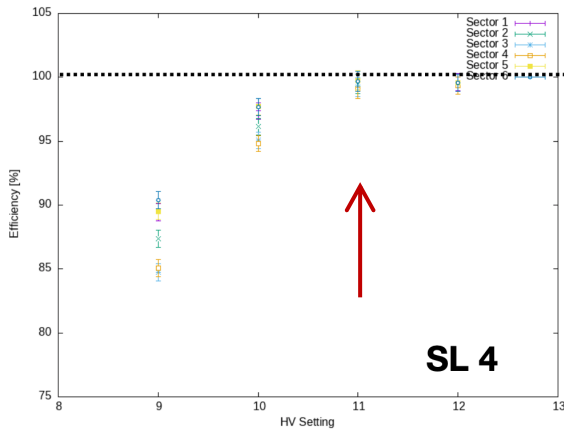
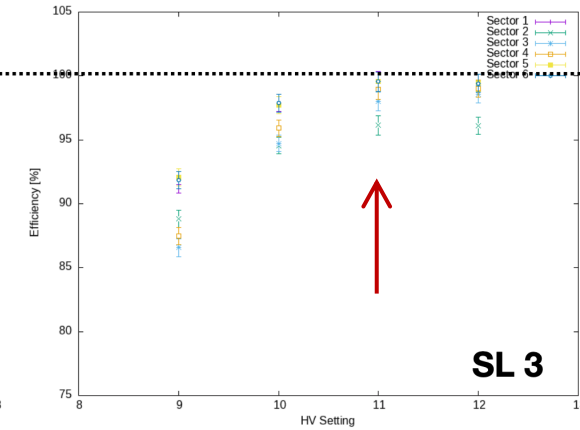
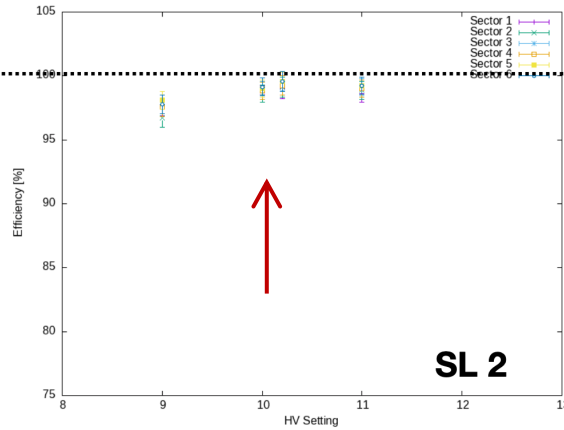
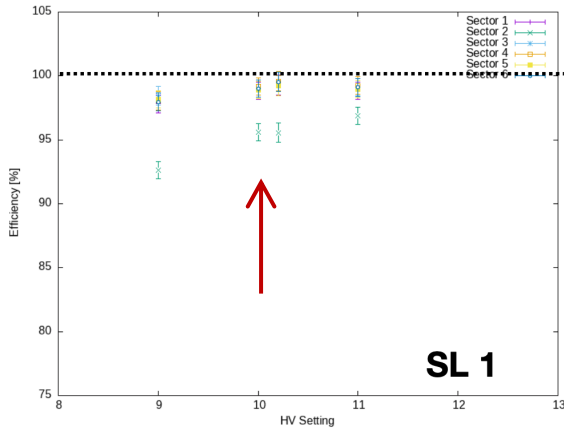
DC HV Scan - RG-D Commissioning

It's about the resolution!

Efficiency Scan

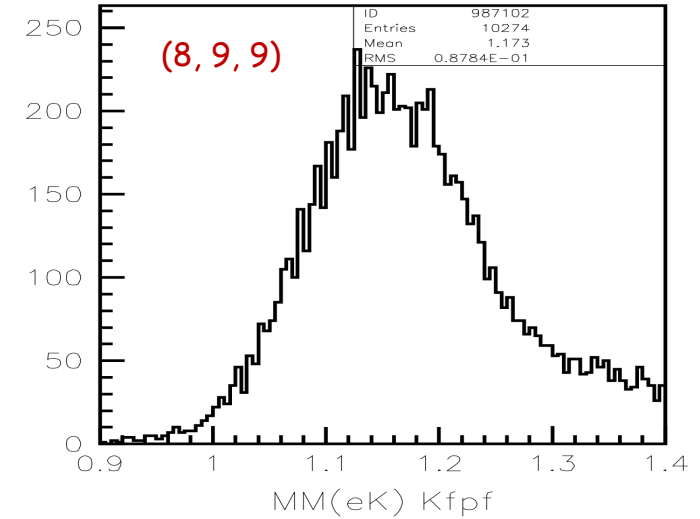
Dclayeffi program:
Veronique Ziegler

Analysis work:
Aron Kripko

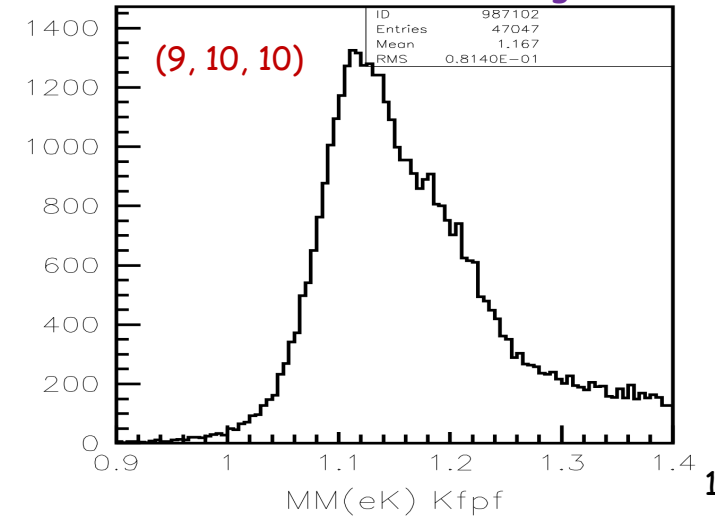


Finding: Efficiency plateau for (10, 11, 11) or higher

RG-A F18 "early" inbending

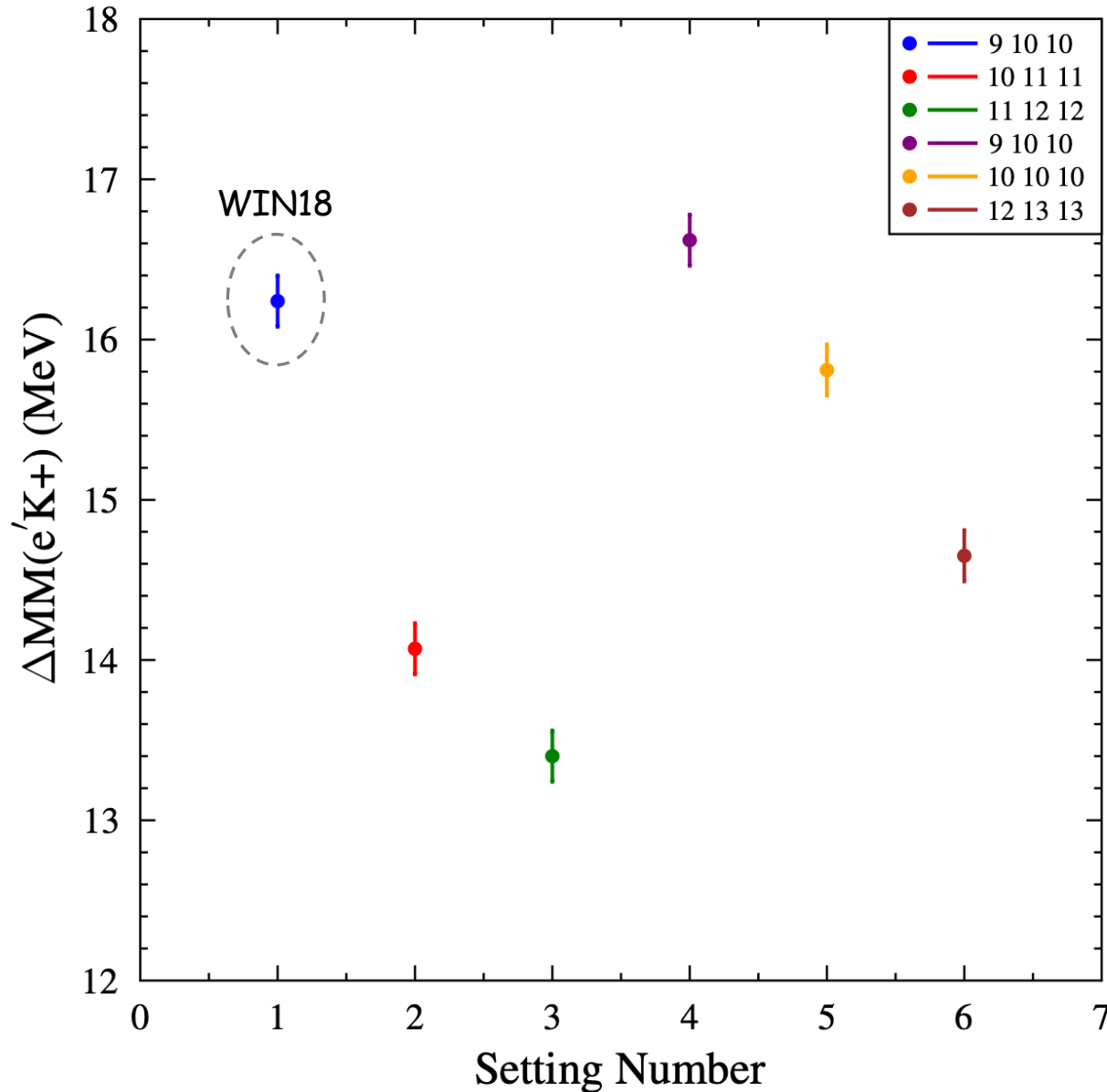


RG-A F18 inbending

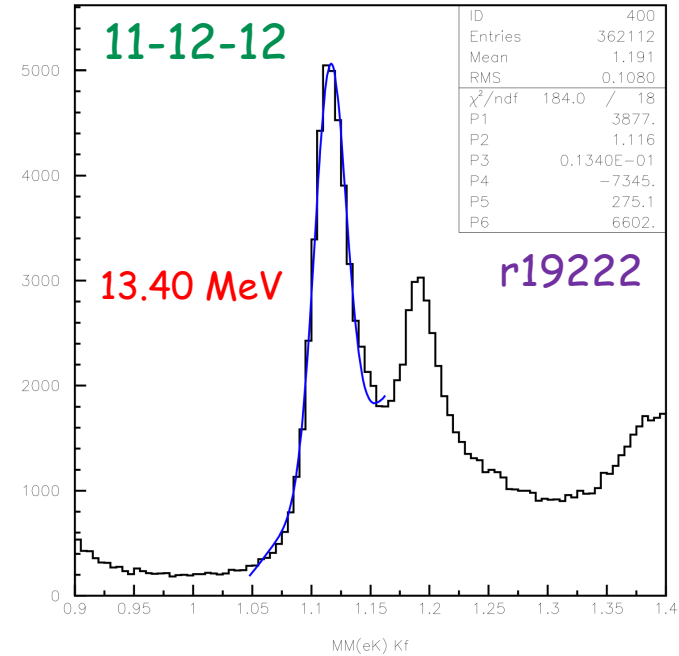


DC HV Scan - Resolution Studies

PRELIMINARY



Settings chosen for Jan. 6.4 GeV dataset



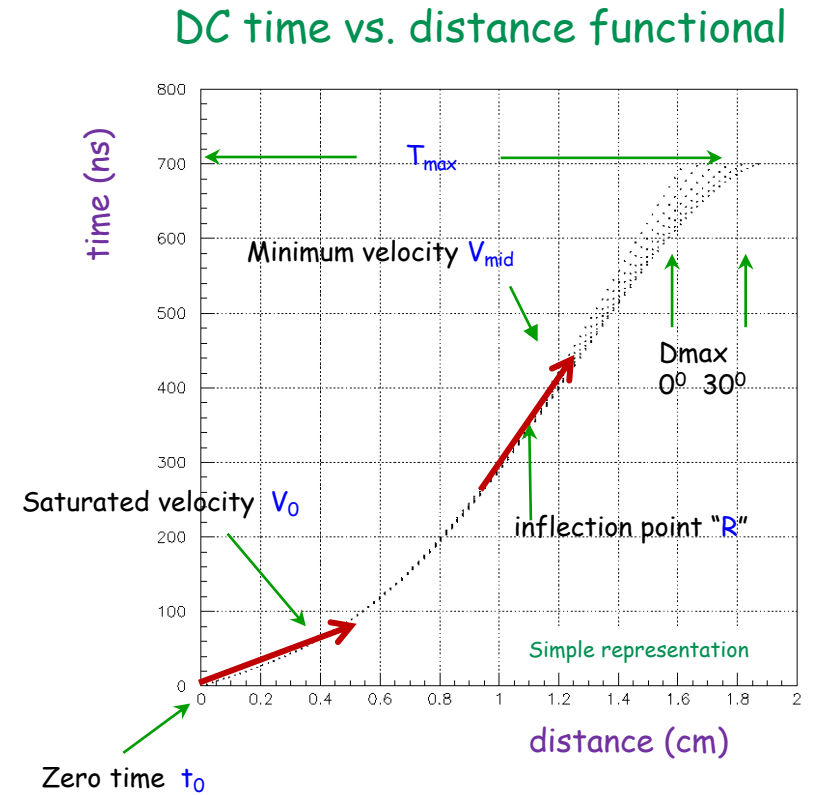
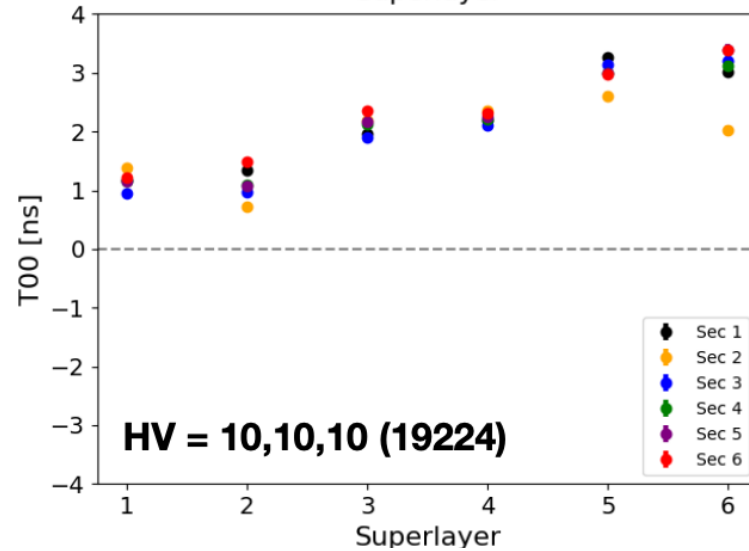
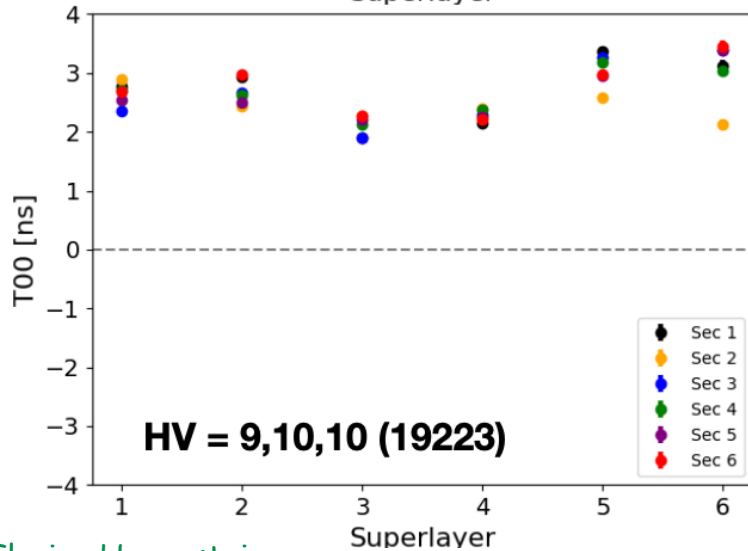
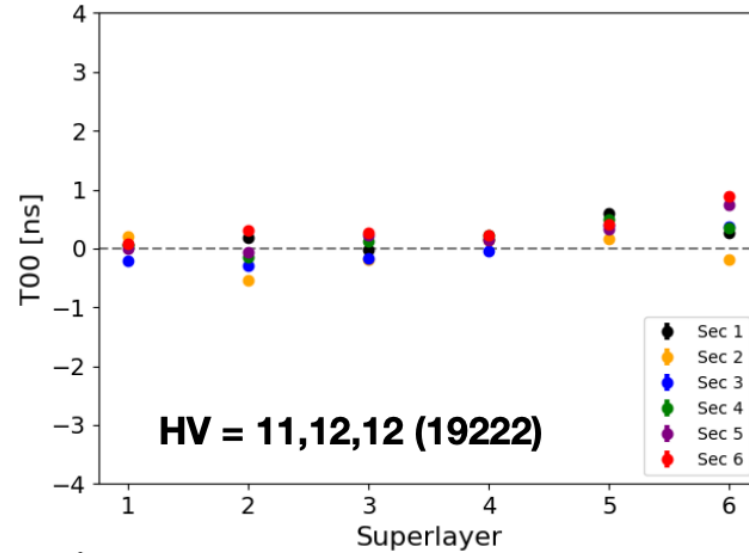
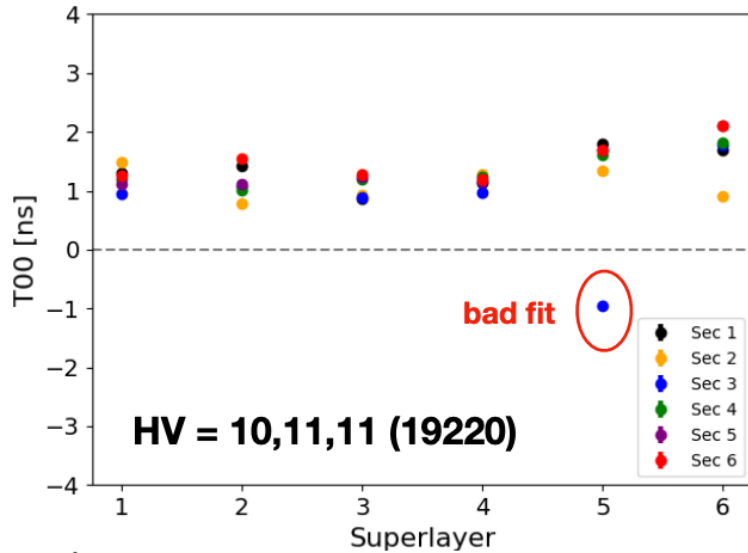
*from RG-K meeting presentation Jan. 10, 2024

stay tuned...
More to Come!

Caveats: Preliminary calibrations + alignment + software

DC HV Scan - Dec. 2023 RG-K Commissioning Run

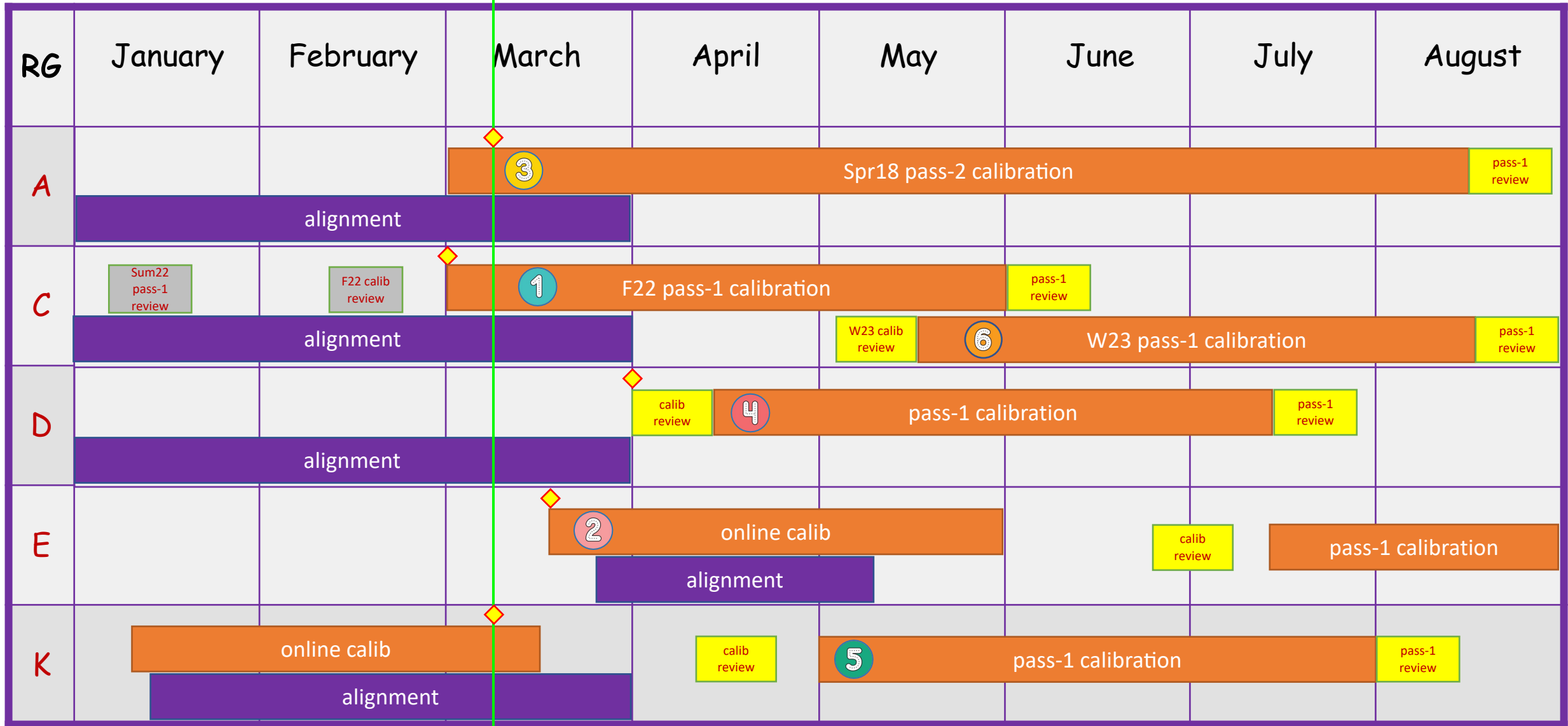
Zero Time Study



Study completed with single t2d calibration

Calibration Timeline: January - August 2024

March 12, 2024



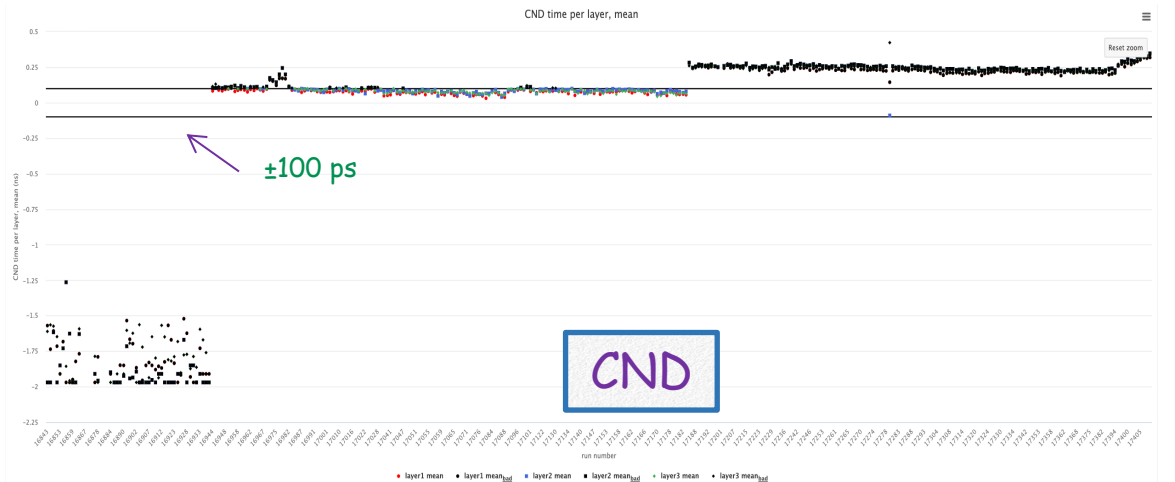
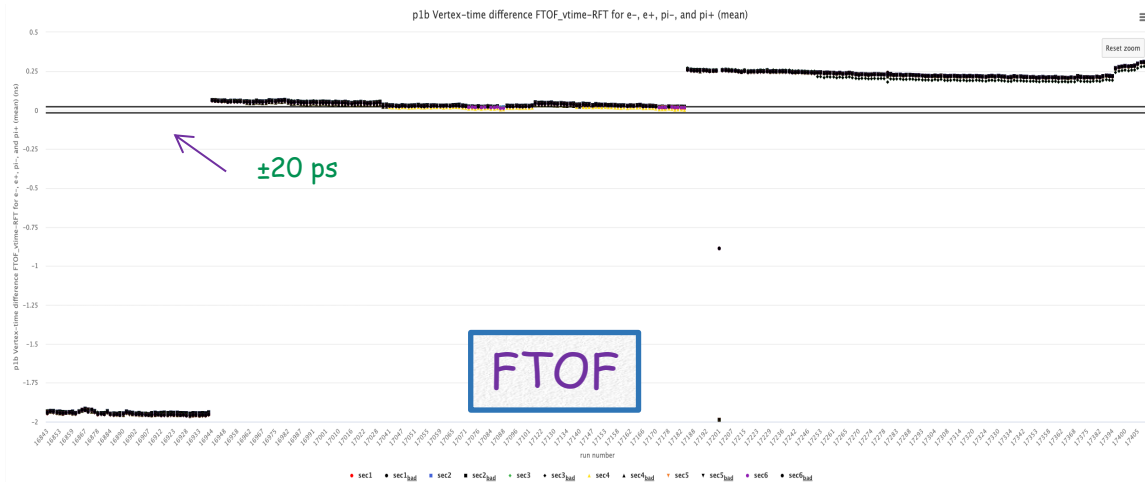
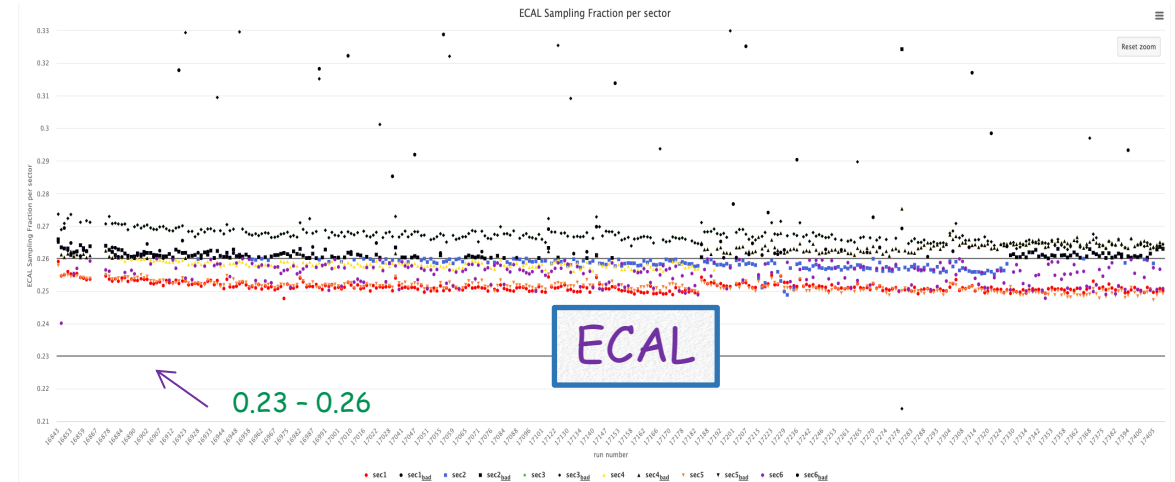
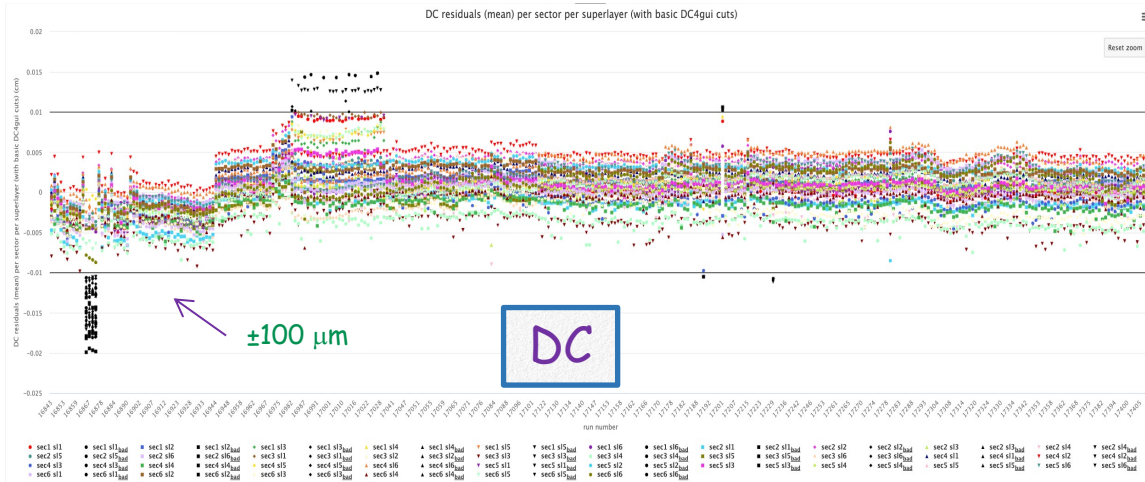
Summary

- CALCOM has been overseeing the detector calibrations of the different CLAS12 datasets:
 - Recent focus: *RG-A, B, C, D, E, F, K* 7 pass-1/2 reviews completed since Oct. 2022
 - Development of algorithms continues: *DC alignment, DC calibrations*
 - Close coordination of CALCOM with software group
- "Online" calibrations now established as our standard approach:
 - Supported online calibration approach for RGs D & K (ref. run calibration, alignment, pass-0/timelines)
 - RG-E integrated into CALCOM - following online calibration scheme
 - Integration of RG-L (ALERT) into CALCOM on the near-term horizon
- CALCOM is a critical service-work committee for the CLAS Collaboration:
 - Lots of folks are part of this work:
 - *CALCOM, Analysis Coordinators, chefs, timeline crew, subsystem group leaders, calibration team, alignment team, software group, data validators*
- Notes:
 - Delays due to work on DC alignment + DC calibration suite/protocols have caused a bit of a calibration backup - the spring/summer will be a very busy period of calibration!
 - Beginning work to streamline calibration tools for more automation and improved speed

clas12_calcom@jlab.org

Backup Slides

RG-C F22 - Starting Point



*Starting point after online calibration efforts - FTOF now getting underway

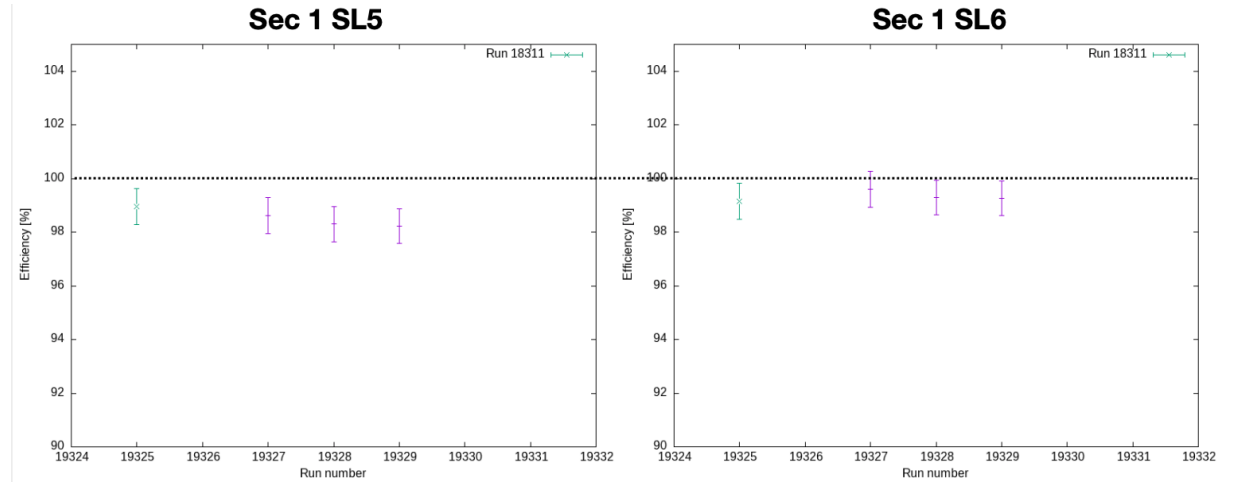
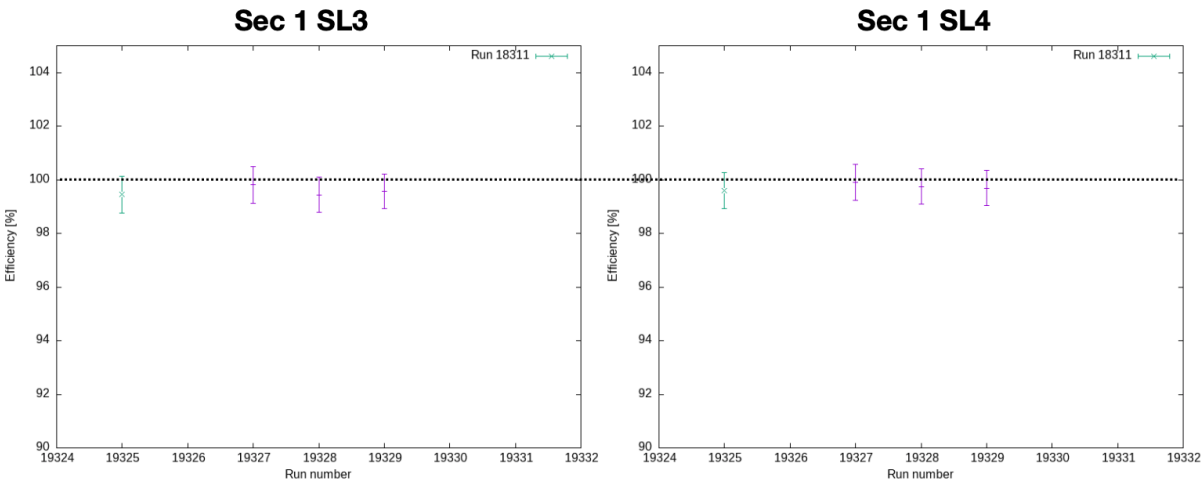
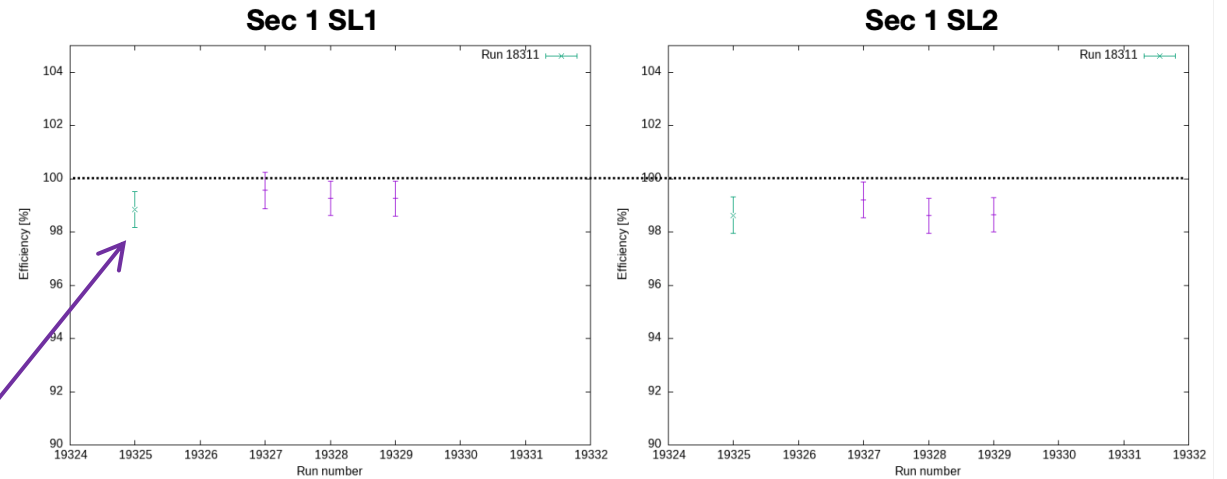
DC HV Scan - Dec. 2023 RG-K Commissioning Run

Threshold Study

Vary DCRB threshold at fixed HV (11, 12, 12):

- r19327 - (30, 45, 45) mV
- r19328 - (45, 60, 60) mV
- r19329 - (60, 60, 60) mV


r18311: (11, 12, 12) (30, 45, 45) mV


































Dclayeffi program: Veronique Ziegler

Analysis work: Aron Kripko

Longer-Term CALCOM Work Items

- Documentation of calibration procedures:
 - Tutorials for training
 - Instructions for completing validation
 - Github repository  GitHub
- Automation:
 - Interactive vs. batch running
 - Online reconstruction/calibration compatibility (L3 trigger)
- Streamlining code suites:
 - Increase speed of processing
 - Code stability
 - Updates to common tools across suites
- Personnel:
 - Additional calibration team members
 - Cross-training and checking documentation
 - Assign code developers for all suites
- Long lead time procedures:
 - Procedures to improve automation and validation necessary:
 - Final calibrations reliant on tracker system alignment (DC, FMT, CVT, ...)
 - Beam offset calibrations (with or without beam raster)

Calibration Suite Documentation:

- Alignment: [DC and FMT](#) 
- BAND:
- Beam Offset: [suite](#) 
- Cherenkov:
 - HTCC: [suite](#) , [tutorial](#) 
 - LTCC: [suite](#) 
 - RICH: [suite](#) , [Time calibration](#)  [Cherenkov angle calibration](#) 
[Monitoring histograms and timelines](#) 
- CND: [suite](#) , [tutorial](#) , [algorithms](#) 
- CTOF: [suite](#) , [tutorial](#) , [algorithms](#) , [ccdb](#) , [geometry](#) 
- CVT:
 - MM:
 - SVT: [suite](#) 
- DC: [suite](#) , [tutorial](#) , [calibration wikipedia](#) 
- ECAL: [suite](#) 
- FT:
 - FT-CAL: [suite](#), [tutorial](#) 
 - FT-HODO: [suite](#), [tutorial](#) 
- FTOF: [suite](#) , [tutorial](#) , [algorithms](#) , [ccdb](#) , [geometry](#) 
- RF: [suite](#), [tutorial](#) 
- RTPC: [geom](#) , [ccdb](#) 

CLAS12 Calibration and Commissioning

Contents [\[hide\]](#)

- 1 CALCOM Committee
- 2 CLAS12 Subsystem Contact Persons
- 3 Commissioning Plans
- 4 CLAS12 Calibration
- 5 Meetings and Minutes

CALCOM Committee

The role of the CALCOM (Calibration and Commissioning) Group is to be responsible for the development of the tools/algorithms to calibrate the CLAS12 detector and to help ensure that the design performance specifications are met. In addition the CALCOM group is responsible for developing the CLAS12 commissioning plan and overseeing its execution.

The committee is composed by:

- Daniel Carman [✉](#) (chair / hardware)
- Raffaella De Vita [✉](#) (software / hardware)
- Gagik Gavalian [✉](#) (common tools)
- Maurizio Ungaro [✉](#) (simulation)
- Veronique Ziegler [✉](#) (reconstruction)



CLAS12 Subsystem Contact Persons

System	Subsystem	Contact Person(s)	Software Contact Person
Calorimeters	ECAL	C. Smith	C. Smith
	SVT	Y. Gotra	V. Ziegler
Central Tracker	MM	Y. Gotra	F. Bossu, M. Defurne
	RTPC	M. Hattawy	M. Hattawy
Cherenkov Counters	HTCC	Y. Sharabian	I. Illari, W. Phelps
	LTCC	M. Ungaro	V. Mascagna, M. Ungaro
	RICH	M. Contalbrigo	M. Mirazita
Forward Tagger	FT-Cal	R. De Vita	R. De Vita
	FT-Hodo	N. Zachariou	R. De Vita
	FT-Trk	R. De Vita	V. Ziegler
Forward Tracker	DC	F. Hauenstein	V. Ziegler
	FMT	Y. Gotra	V. Ziegler
RF		R. De Vita	R. De Vita
Scintillation Counters	FTOF	D.S. Carman	D.S. Carman
	CTOF	D.S. Carman	D.S. Carman
	CND	S. Niccolai	S. Niccolai
	BAND	F. Hauenstein	F. Hauenstein

CLAS12 Calibration

Ready for Calibration Reviews

- RG-A: [F18](#) [D](#), [Spr19](#)
- RG-B: [Spr19](#), [F19/W20](#) [D](#)
- RG-C: [Sum22](#) [D](#)
- RG-K: [W18](#)
- RG-M: [F20/W21](#) [D](#)

Information for Analysis Coordinators:

- Calibration sequence [\[1\]](#) [D](#)
- What are the calibration standards for CLAS12? [\[2\]](#) [D](#)
- General information on CALCOM and "online" calibrations [\[3\]](#) [D](#)
- Calibration and Software Development Teams: [\[4\]](#) [D](#)
- [Run-Based Monitoring](#) [D](#)
- [CCDB Tables and Usage Policies](#) [D](#)
- [CLAS12 Hardware Status Word Definitions](#) [D](#)

Calibration Suite Documentation:

- Alignment: [DC and FMT](#) [✉](#)
- BAND:
- Beam Offset: [suite](#) [✉](#)
- Cherenkov:
 - HTCC: [suite](#) [✉](#), [tutorial](#) [D](#)
 - LTCC: [suite](#) [✉](#)
 - RICH: [suite](#) [✉](#), [Time calibration](#) [D](#) [Cherenkov angle calibration](#) [D](#) [Monitoring histograms and timelines](#) [D](#)
- CND: [suite](#) [✉](#), [tutorial](#) [D](#), [algorithms](#) [D](#)
- CTOF: [suite](#) [✉](#), [tutorial](#) [D](#), [algorithms](#) [D](#), [ccdb](#) [D](#), [geometry](#) [D](#)
- CVT:
 - MM:
 - SVT: [suite](#) [✉](#)
- DC: [suite](#) [✉](#), [tutorial](#) [D](#), [calibration wikipedia](#) [✉](#)
- ECAL: [suite](#) [✉](#)
- FT:
 - FT-CAL: [suite](#), [tutorial](#) [✉](#)
 - FT-HODO: [suite](#), [tutorial](#) [✉](#)
- FTOF: [suite](#) [✉](#), [tutorial](#) [D](#), [algorithms](#) [D](#), [ccdb](#) [D](#), [geometry](#) [D](#)
- RF: [suite](#), [tutorial](#) [✉](#)
- RTPC: [geom](#) [✉](#), [ccdb](#) [✉](#)



Meetings and Minutes

- Zoom meeting connection: [\[5\]](#) [✉](#)
- [2011 Meetings](#)
- [2012 Meetings](#)
- [2013 Meetings](#)
- [2014 Meetings](#)
- [2015 Meetings](#)
- [2016 Meetings](#)
- [2017 Meetings](#)
- [2018 Meetings](#)
- [2019 Meetings](#)
- [2020 Meetings](#)
- [2021 Meetings](#)
- [2022 Meetings](#)
- [2023 Meetings](#)
- [2024 Meetings](#)



clas12_calcom@jlab.org



https://clasweb.jlab.org/wiki/index.php/CLAS12_Calibration_and_Commissioning

Pass-X Readiness Reviews



Readiness Review for “PASS-X” cooking of CLAS12 data

Cooking any CLAS12 data set is a computing-intensive process requiring detailed planning and preparatory work to guarantee the output data quality. For this reason, a “readiness review” is requested to authorize the start of the reconstruction data processing of any data set that makes a formal request for cooking to the CCC. The charge for this review is outlined below.

The review committee is requested to answer the charge questions based on the material presented by the Run Group and report its findings, comments, and recommendations to the CLAS Coordinating Committee.

Review Charge:

Charge #1: Is the quality of detector calibration and alignment adequate to achieve the performance specifications foreseen for CLAS12 or achievable at the current time, given the “state-of-the-art” calibration, alignment, and reconstruction algorithms?

Charge #2: Is data quality as a function of run number or time for the data set proposed for cooking stable and understood? Have runs been classified in terms of type (empty target, calibration, special, production, ...) and quality (golden run, known issues, ...), and is a detailed list available? Based on validation studies, have all CLAS12 subsystem performances been understood and issues identified?

Charge #3: Has a ‘Hardware (HW) status table (i.e., bad channel table) been compiled for use in the data and MC reconstructions? Has the efficiency versus beam current been studied? How does it compare to MC simulations with the merged background? Are the DAQ translation tables correcting for all known cable swaps? At what stage(s) in the software?

Charge #4: Are analysis plans for the data set developed at adequate levels? Is the list of planned skims defined and tested running the analysis trains on preliminary data? Is all ancillary information (helicity, Faraday Cup, ...) available and understood?

Charge #5: Are the data processing tools that will be used adequate for the proposed processing task? Is the data management plan (staging area, tape destination, directory structure, logs, ...) defined and appropriate given the available resources? Is the estimate of processing time per event available and resources needed to complete the task sound?

Charge #6: Have the tools for monitoring the quality of the cooking output and identify/correct failures been defined and ready to be used?

Charge #7: Is the person-power identified and in-place for the proposed data processing?

Committee: Marco Battaglieri (chair), Nathan Baltzell, Marco Mirazita, Cole Smith, Larry Weinstein

Role: Final review of calibration quality, status tables, software and scripting before recommendation to CCC to approve production cooking (see the generic review charge).

Reviews:

- RG-B Spr19: Oct. 28, 2022
- RG-M 21/22: May 23, 2023
- RG-A Spr19: May 31, 2023
- RG-K W18: Aug. 16, 2023
- RG-A F18: Sep. 22, 2023
- RG-B F19/W20: Nov. 1, 2023
- RG-C Sum22: Jan. 26, 2024

7 reviews completed since Oct. 2022

Notes:

- The calibration quality for all subsystems should meet the defined QA specifications for all datasets to allow for minimal systematics when combining data taking years apart.
- The calibration QA specifications are well defined and the Run Groups are held to the same standards.
- The committee prepares their report for delivery to the CCC to give approval to start data processing.