SRO WG meeting
Feb 24, 2026
Calibration Workflow

M.Battaglieri (INFN), M.Diefenthaler (JLab), T.Gunji (TokyoU), J.Landgraf (BNL), T.Wenaus (BNL)

SRO sub-detector calibration tables and DCS feedback (in preparation for the next TIC meeting)

Subsystem	Region	Contact person	Pre-physics-operation calibrations (Cosmic, no-beam calibration, commissioning)	Steady State calibrations: aim to produce final reconstruction-ready calibration within few days of physics data taking in a continous process				T0 + 12hr	T0 + 24hr	T0 + 36hr	T0 + 48hr	T0 + 60hr	T0 + 72hr	T0 + 84hr	T0 + 96hr	Monitoring	Computing resource	Post-reconstruction calibrations (applied at analysis stages)	Comment	Subsystem
				Task	Human intervention ?	Data Needed	Dependecy													
MAPS	Barrel+Disk	"Schambach, Jo" <schambachjj@ornl.gov>,	Threshold Scan / ALICE=20min Fake rate scan/noisy pixel masking	(See Alignment)															TIC meeting: https://indico.bnl.gov/event/21648/	MAPS
MPGD	Barrel+Disk	Kondo Gnanvo <kagnanvo@jlab.org>, BOSSU Francesco <francesco.bossu@cea.fr>, Annalisa D'Angelo <annalisa.dangelo@roma2.infn.it>	nosiy and dead strips masking, pedestal and timing offset adjustment	(See Alignment)																MPGD
bTOF, eTOF (ac-lgad)	Barrel/Forward	tonko.ljubicic@gmail.com	Bias voltage determination ASIC baseline, noise, threshold Clock sync Time walk calibration	Gain calibration TDC bin width determination Clock offset calibration Hit position dependency (intrinsic and c-by-c)	QA	High p tracks ~1hr of production data?	Tracking, pfRICH	Data Acc. Dependen	Dependen	Processin	Processing								SRO meeting https://indico.bnl.gov/event/21619/	bTOF, eTOF (ac-lgad)
Central Detector Tracker Alignment		Ernst Sichtermann <epsichtermann@lbl.gov>	Initial alignment	Alignment Check/Update (if needed)	QA	Prodcution data		Processing											SRO meeting https://indico.bnl.gov/event/21619/	Central Detector Trac
pfRICH	Backward	ayk@bnl.gov	Thresholds (noise dependent), dynamic range adjustments, timing offsets, synchronization Initial alignment	Alignment Check/Update (if needed) Time dependencies (Aerogel transparency, mirror reflectivity, Gas pressure)	?	Prodcution data		Data Acc.	Processing										TIC meeting: https://indico.bnl.gov/event/21648/	pfRICH
DIRC	Barrel		Laser data?	?	?														TIC meeting: https://indico.bnl.gov/event/21648/	DIRC
dRICH	Forward	pietro.antonioli@bo.infn.it, francesco.noferini@bo.infn.it	Bunch timing offset scan Threshold scan Noise masking	Track based alignment	?	High p tracks ~1hr of production data?	Tracking	Data Acc. Dependen	Processin	Processing									SRO meeting: https://indico.bnl.gov/event/22114/	dRICH
bEMC	Backward	munoz@jlab.org, hornt@cua.edu	Cosmic and LED for the initial gain balancing	DIS Electron Pi0->gg events energy scale	QA	DIS electron Pi0 di-photon resonance ~1 day of production data	Tracking	Data Acc. Dependen	Data Acc.	Processin	Processing					LED			SRO meeting: https://indico.bnl.gov/event/22412/ Carlos: aiming 1% precision Planning for LED flash during production run, processi	bEMC
AstroPix	Barrel	sjoosten@anl.gov																	TIC meeting: https://indico.bnl.gov/event/21648/	AstroPix
ScifiPb	Barrel			SiPM gain		?													TIC meeting: https://indico.bnl.gov/event/21648/	ScifiPb
fEMC	Forward	munoz@jlab.org, hornt@cua.edu		Pi0, eta->gg events energy scale		Pi0 di-photon resonance ~1 day of production data		Data Acc.	Data Acc.	Processin	Processing								SRO meeting: https://indico.bnl.gov/event/22412/ Need pi0 filtered data for automated calibration	
		gvisser@indiana.edu	IV Scan	Second iteration pi0 (if needed)	QA							Processing				LED		High energy cluster non-linearity	AI driven calibration?	fEMC
bHCAL	Backward	NOVITZKYN@ORNL.GOV	LED	?															TIC meeting: https://indico.bnl.gov/event/21648/	bHCAL
cHCAL	Barrel	NOVITZKYN@ORNL.GOV	MIP calibration Gain calibration	(See hadronic e-scale calib)															SRO meeting: https://indico.bnl.gov/event/21785/	cHCAL
fHCAL	Forward	NOVITZKYN@ORNL.GOV																		fHCAL
fHCAL insert	Forward	NOVITZKYN@ORNL.GOV																		fHCAL insert
Hadronic energy scale calibration		NOVITZKYN@ORNL.GOV	?	Set full calo stack energy scale for hadroinc shower and jets	?	High energy hadronic showers and jets	Tracking h-PID	Data Acc. Dependen	Data Acc. Dependen	Data Acc. Dependen	?	?	?	?	?			Final energy scale calibration (if needed)	Comments from Oleg during SRO meeting: https://indi	Hadronic energy scal
low Q2 Tagger	Far Backward	k.livingston@physics.gla.ac.uk	Alignment?																TIC meeting: https://indico.bnl.gov/event/22079/	low Q2 Tagger
low Q2 Tagger (CAL)	Far Backward	k.livingston@physics.gla.ac.uk																	TIC meeting: https://indico.bnl.gov/event/22079/	low Q2 Tagger (CAL)
Pair Spec Tracker	Far Backward	yulia@jlab.org																	TIC meeting: https://indico.bnl.gov/event/22079/	Pair Spec Tracker
Par Spec Cal	Far Backward	yulia@jlab.org																	TIC meeting: https://indico.bnl.gov/event/22079/	Par Spec Cal
Direct Photon Cal	Far Backward	yulia@jlab.org																	TIC meeting: https://indico.bnl.gov/event/22079/	Direct Photon Cal
B0 Tracking	Far Forward	"Jentsch, Alexander" <ajentsch@bnl.gov>,	Survey alignment/Cosmic	Alignment check		MIP		Processing											SRO/FF meeting https://indico.bnl.gov/event/22676/	B0 Tracking
B0 PbWO4	Far Forward	"Jentsch, Alexander" <ajentsch@bnl.gov>,	Survey alignment/Cosmic	SiPM gain		MIP/Gamma/Electrons		Processing								LED			SRO/FF meeting https://indico.bnl.gov/event/22676/	B0 PbWO4
Roman (Pots)	Far Forward	"Jentsch, Alexander" <ajentsch@bnl.gov>,					Acc. BPM Potential use of vertex of central detector	Data Acc. Dependen	Processing										SRO/FF meeting https://indico.bnl.gov/event/22676/	Roman (Pots)
Off Momentum	Far Forward	"Jentsch, Alexander" <ajentsch@bnl.gov>,	laser/survey alignment Low lumi running	beam position monitors/fill by fill correction		MIP rate distribution in RP		Data Acc. Dependen	Processing										SRO/FF meeting https://indico.bnl.gov/event/22676/	Off Momentum
ZDC PbWO4	Far Forward	"Jentsch, Alexander" <ajentsch@bnl.gov>,	Survey alignment, timing delay	SiPM/APD gain, timing	QA	Photon		Processing								LED			SRO/FF meeting https://indico.bnl.gov/event/22676/	ZDC PbWO4
ZDC Sampling	Far Forward	"Jentsch, Alexander" <ajentsch@bnl.gov>,	Survey alignment, timing delay	SiPM gain	QA	Single neutron		Processing								LED			SRO/FF meeting https://indico.bnl.gov/event/22676/	ZDC Sampling
Polarimetry		frathmann@bnl.gov																		Polarimetry

Feedback requested to the DCS (by Feb 27 2026)

What we are asking you to do

After briefly reviewing the overview slides, we kindly ask you (or the appropriate person in your detector group) to update the table entries relevant to your detector.

At this stage, rough estimates and qualitative answers are perfectly fine — this exercise is meant to capture workflow logic and dependencies, not to finalize algorithms.
In addition to detector-internal calibration needs, explicitly identifying dependencies on other detectors or reconstruction objects is extremely important for streaming DAQ design.

In particular, input on the following points would be very helpful:

- Organization
  - verify that the contact person in the table is the correct one
- Calibration/alignment items
  - What quantities need to be calibrated or aligned?
  - Which of them must be calibrated before prompt reconstruction or before full reconstruction?
- Timescale
  - Typical update frequency (per run, per fill, hourly, daily, etc.)
- Data requirement
  - Event selections, triggers, or statistics needed?
  - Order-of-magnitude estimate of the required fraction of the data stream
- Inter-detector dependencies (very important)
  - Does this calibration require:
    - reconstructed tracks?
    - vertex information?
    - PID information from other detectors?
  - Does it assume that other detectors must already be calibrated?
    - If yes, which ones and at what level of precision?
- Computation & workflow
  - Expected computational complexity (lightweight/moderate / heavy)
  - Can this calibration run asynchronously, or does it need to be tightly coupled to streaming reconstruction?
  - Could you specify where (E0, E1 or E2) the calibration code(s) is (are) expected to run

Your input will directly feed into:

- the definition of streaming calibration workflows across detectors,
- the design of E0–E1 and E1–E2 interfaces,
- identification of critical dependencies and iteration loops,
- and the prioritization of demonstrators and milestones for 2026.

SRO calibration workflow

- **Phase I - Conceptual design**
- **Phase II - Requirements implementation**
- **Use cases (EEECal calorimeter)**

Workflow Conceptual Design

1. Classification of calibration tasks
- Standalone (between fills, laser, pulser)
- Physics-driven (tracks, vertex, PID dependent)
- Iterative (requires previous constants or reco-calib loops)

2. Data and detector dependencies
- Identify required inputs (tracks, PID, other calibrated detectors)
- Build a dependency matrix / graph
- Explicitly identify circular dependencies and iteration needs

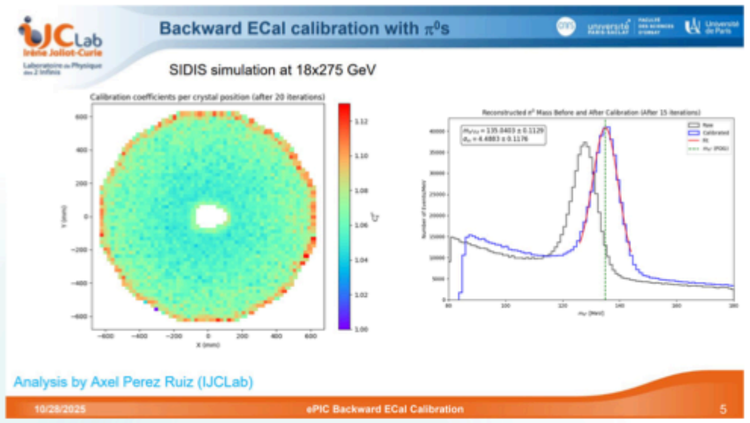
3. Latency classes
- Seconds (prompt feedback)
- Minutes (run-by-run updates)
- Hours (delayed / quasi-online)

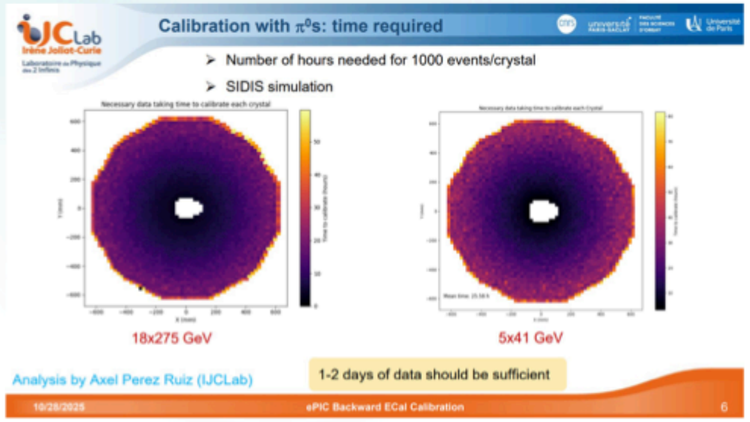
Requirements implementations

1. Interface specifications (E0–E1 / E1–E2)
 - What data is produced and consumed?
 - Calibration object format, metadata, versioning, validity intervals
2. Infrastructure requirements
 - Conditions database
 - Orchestration layer
 - Dedicated compute queues?
 - Monitoring and control interfaces
3. Workflow placement
 - At which stage of the data acquisition does each calibration run?
 - Synchronous vs asynchronous execution?
4. Resource profiles
 - CPU intensity
 - Acceleration using GPU and AI
 - Data fraction needed

Prototyping

Carlos (Muñoz Camacho) presented on Oct. 28 on the **Backward ECal (EEEMCal) Calibration**.
The EEEMCal is a good example to start with. https://indico.bnl.gov/event/30349/





This prototype addresses reconstruction-level calibrations and physics-based calibration using high-statistics events.

1. **Script Integration:** Carlos provides calibration scripts and integrates them into JANA2/EICrecon, defining data flow and required inputs.
2. **Workflow Implementation:** Implement file-based workflow first; then prepare for stream-based workflow
3. **AI-Driven Components:** Stepwise integration of calibration detection logic, automated validation, and selective human-in-the-loop checkpoints.
4. **Workflow Orchestration:** Proven workflows are then incorporated into the overall orchestration framework for automated operations.
5. **Milestones & Deliverables:** Prototype workflow (manual → semi-automated → AI-assisted), validated Conditions DB, documentation of APIs, state machine, ownership, and operational cycle; plan for scaling to full EIC detectors.

Other systems are welcome to join the prototype

EEECal as use case for SRO calibration

- ALLEN framework
- Simulations
- Test beam