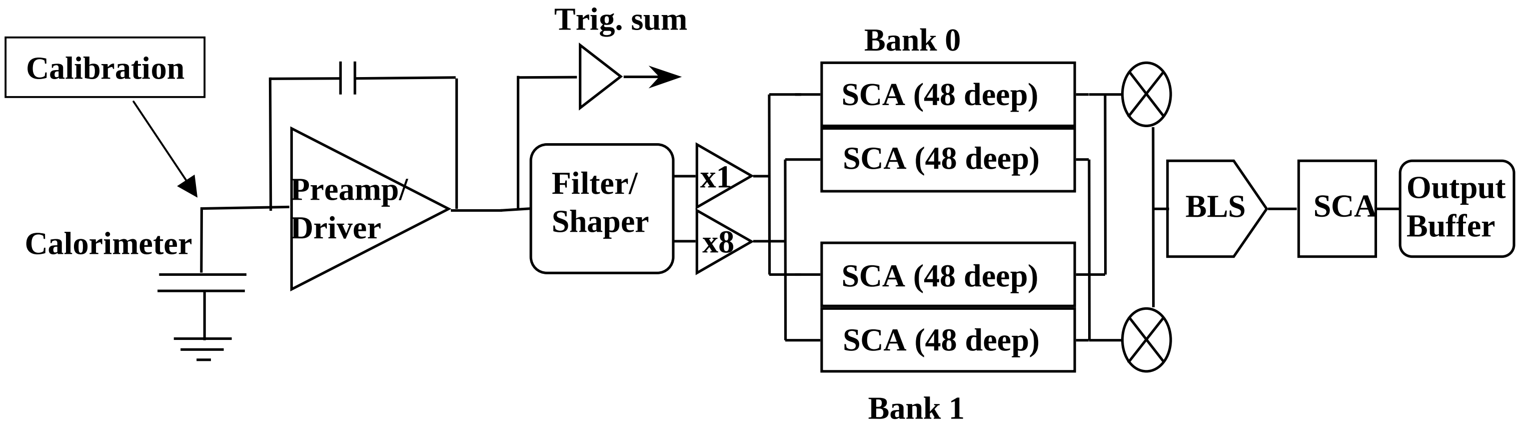
Calorimeter Calibration: Calibration procedure and Database Definition

Ursula Bassler, Mrinmoy Bhattacharjee,
Leslie Groer, Evelyne Lebreton, Frederic
Machefert, Bob Olivier, Dean Schamberger,
Vicky White

Calibration Constants

Calorimeter Electronics



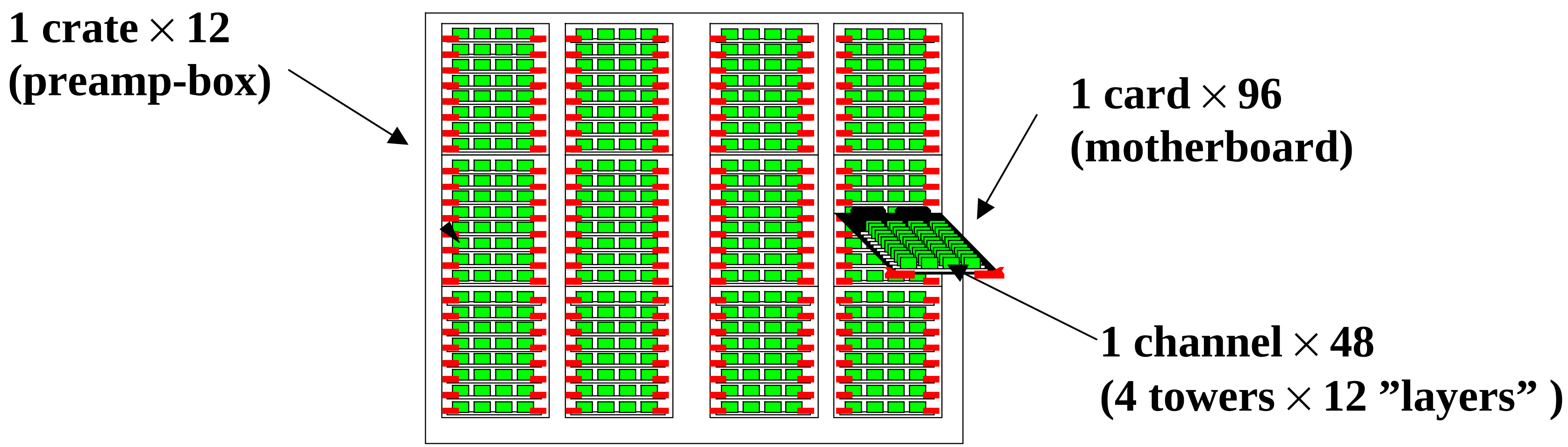
Trigger: no calibration

BaseLineSubtractor: integer values - **⟨ped⟩, σ, 0-suppr.**

L3: "golden sample" - **⟨ped⟩, σ, 0-suppr., gain1, gain8**

Reco: ⟨ped⟩, σ, 0-suppr., gain1, gain8

Calorimeter Read-Out Structure



12 preamp -boxes → 96 preamp-motherboards → 4 towers → 12 “layers”

12 BLS-crates → 96 BLS-motherboards → 48 channels

12 ADC-crates → 96 ADC-cards → 48 channels

⇒ **smallest unit to be calibrated: 1 crate**

Calibration Data Flow

CALIBRATION PROCEDURES: 2/3 times a week

• pedestal runs: ⟨ped⟩, σ

• pulser runs: gain1, gain8

after validation

ONLINE DATABASE:

• constants ordered by crate#, card#, channel #

copy

OFFLINE DATABASE:

• optimized format for reco possible

?

BLS:

• integers for 0-suppression

•constants updated

L3:

• "golden sample"

TRIGGER:

• no calibration

RECONSTRUCTION:

• 0-suppression parameters

• channel and gain inter-calibration

• constants updated

10/05/00

Calibration in the Reconstruction

raw data chunk: packed format
ADC hits, crate #, card #, tower #, layers#

cal_unpack_package

FE data chunk: unpacked format
ADC hits, crate #, card #, tower #, layers#

cal_calib_package

Calibrated data chunk: keeps ordering
energies, crate #, card #, tower #, layers#

cal_geom_package

Reconstructed data chunk: physics units
energies, η, φ

OFFLINE DATABASE:
- **crate #, card #, tower #, layers#**
- **⟨ped⟩, σ, 0-suppr., gain1, gain8**

calibration manager:
access to database for all subdetectors

cal_calibrator:
fills calorimeter calibration classes

cal_runs:

- gives a unique run number to all calorimeter runs
- run_type: either ***pedestal*** or ***pulser***
- run_status: ***valid*** if used for calibration constants
  non valid if debugging information

run-id	run_description	run_start	run_type	run_status
1	1st pedestal run	21.01.2001 10:14	ped	valid
2	1st pulser run	21.01.2001 10:34	pul	valid
3	debug preamp_box 1	22.01.2001 9:23	pul	not valid
4	CC only	24.01.2001 17:48	pul	valid

cal_calibration:

• links different pedestal and calibration coefficient determination into a valid set of calibration constants
• status allows to invalid a given calibration
• validity given by the latest valid calibration

calibration_id	ped_cal_id	pul_cal_id	start	status	description
1	1	1	21.01.2001 10:34	valid	1st calibration
2	1	3	24.01.2001 17:48	valid	new CC pulser values

cal_ped_collection:

- join table: gives link between run-id, calibration-id and collection-id for each different crate (example with 2 crates)
- to be optimized with designer tools
- similar table for pulser: cal_pul_collection
- time stamp should be added (ppt-problem)

ped_cal_id	run_id	ped_col_id	crate #
1	1	1	1
1	1	1	2
2	5	2	1
2	1	1	2

cal_ped_values:

- collection_key gives the link to calibration set
- status can be used to flag bad channels + pointer to error cause
- unique pointer can be defined and values stored in separate table

crate_id	card_id	channel_id	collection_key	mean	sigma	status
1	1	1	1	1.13	0.24	valid
	1	2	1	0.95	0.25	valid
2	1	1	1	0.28	0.13	valid
		2	1	0.41	0.16	valid
1	1	1	2	1.51	0.78	non valid
	1	2	2	0.97	0.26	valid
1	1	1	3	0.25	0.15	valid
	1	2	3	0.36	0.17	valid

Software for calibration procedure:

- **handling of calibration data taking - Bob**
  - GUI + interfaces to determine: pedestal or pulser run
    automated or manual configuration
- **computing of pedestals and calibration constants - Bob, Mrinmoy**
- **validation of calibration run - Mrinmoy**
  comparison with previously stored values
  flagging of bad channels
- **filling of cal_xxx_values table**
- **assembling of valid calibration set**
  check of valid-flags and time stamps
  filling of pointer tables
- **copy to offline database**
  eventual optimization of table format

Software for database handling:

- **final database definition & design**

  professional design → Vicky

  definitions → Dean, Mrinmoy, Ursula
- **creation of database server**

  procedure to read/write data into online database

  online software group?
- **definition of offline database table and calibration classes**

  Evelyne, Ursula
- **creation of offline database tables and database server**

  Evelyne with help from Fermilab
- **sql to transfer data between online/offline database**

  help from support database group
- **creation of offline calibrator classes and code**

  Evelyne, Ursula