

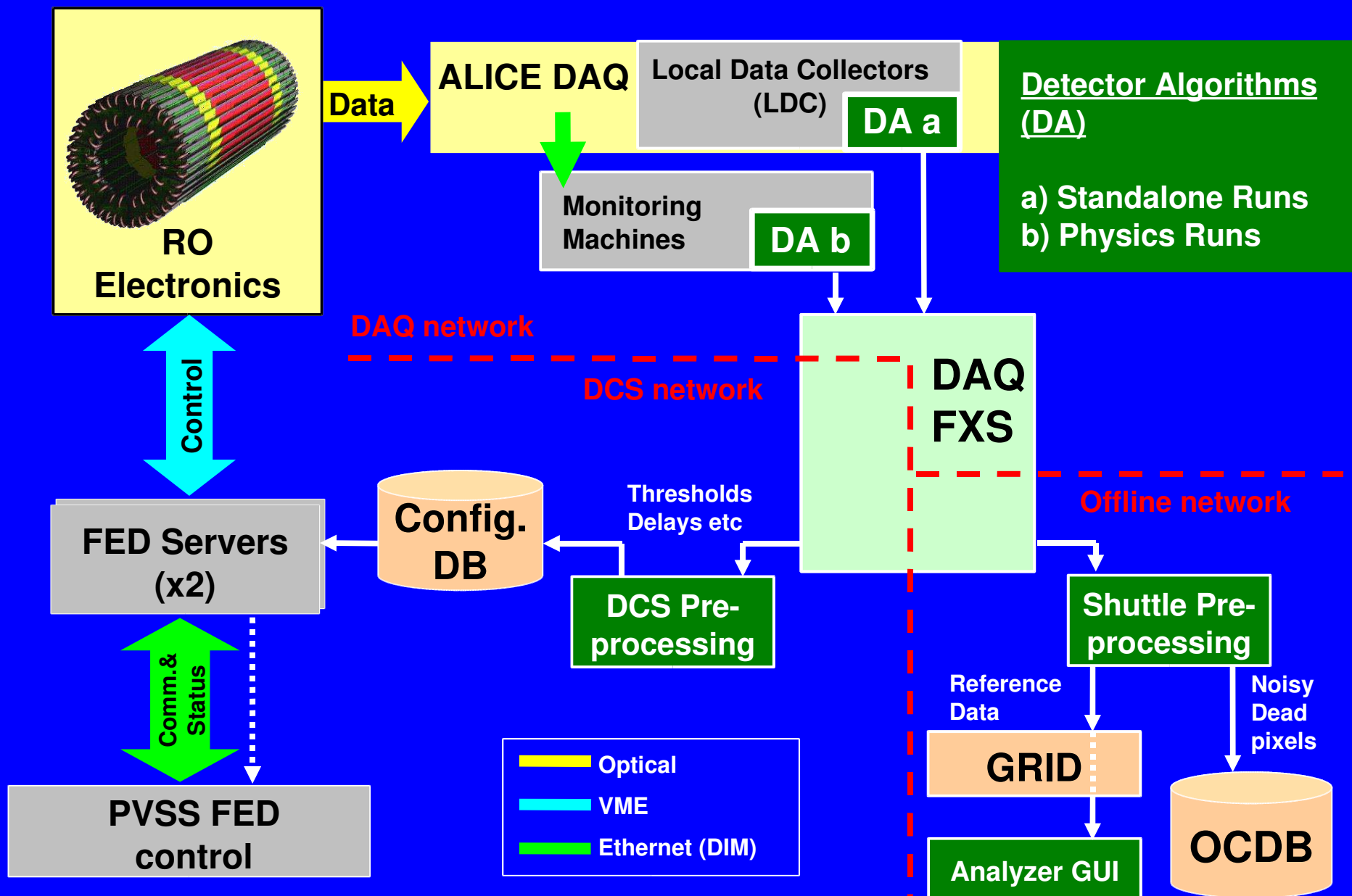
Progress on SPD Detector Algorithms

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Dead and Noisy pixels: Change of strategy

- Tests performed by DAQ at point 2:
30MB/s for each LDC (using 3 LDCs) can be picked up online by the monitoring library in DATE
- This will be enough to catch almost all events
- The dead and noisy pixel search will be performed online

SPD Online Calibration Scheme



Physics Run DA

- DA (ITSSPDPHYSda) running on a monitoring machine
- During run: Filling hit-maps
- At end-of-run: Search for noisy and dead pixels
- Lists of noisy and dead pixels and reference data (hit-maps) will be sent to the FXS

Classes used by this DA follow a similar scheme as in the standalone case:

	Standalone Runs (“SCAN”)	Physics Runs (“PHYS”)
Reference data content (TObjects in .root file)	AliITSONlineSPDscanInfo	AliITSONlineSPDphysInfo
	AliITSONlineSPDHitArray	AliITSONlineSPDHitArray
	AliITSONlineSPDHitEvent	
Reference data (interface)	AliITSONlineSPDscan	AliITSONlineSPDphys
Algorithms	AliITSONlineSPDscanAnalyzer	AliITSONlineSPDphysAnalyzer
DA main program	ITSSPDSCANda.cxx *	ITSSPDPHYSda.cxx

*) ITSSPDda.cxx in cvs now will change name to ITSSPDSCANda.cxx

Noisy pixel search

- ◆ Always for one run only
- ◆ Search performed on the level of read-out chip (8192 pixels)
- ◆ Hits in each pixel compared to:
 - Binomial with (hit-)probability $p = N_{\text{ChipHits}}/8192/N_{\text{events}}$
Limit set so that probability of falsely declaring a noisy pixel $< X$ ($\sim 10^{-12}$)
 - Fixed limit ratio
(If a pixel fires more than X % ($\sim 10\%$) of the events, it must be noisy)

Dead pixel search

- ◆ May span several runs – If previous runs did not have enough statistics, the hit-maps from this run will be added to the previous ones, stored locally.
- ◆ Noisy pixels found in noisy search removed from hit-maps
- ◆ Search performed on the level of read-out chip (8192 pixels)
- ◆ 4 different categories of chips:
ENOUGHSTAT, DEAD, INEFFICIENT, NEEDSMORESTAT

Dead pixel search (continued)

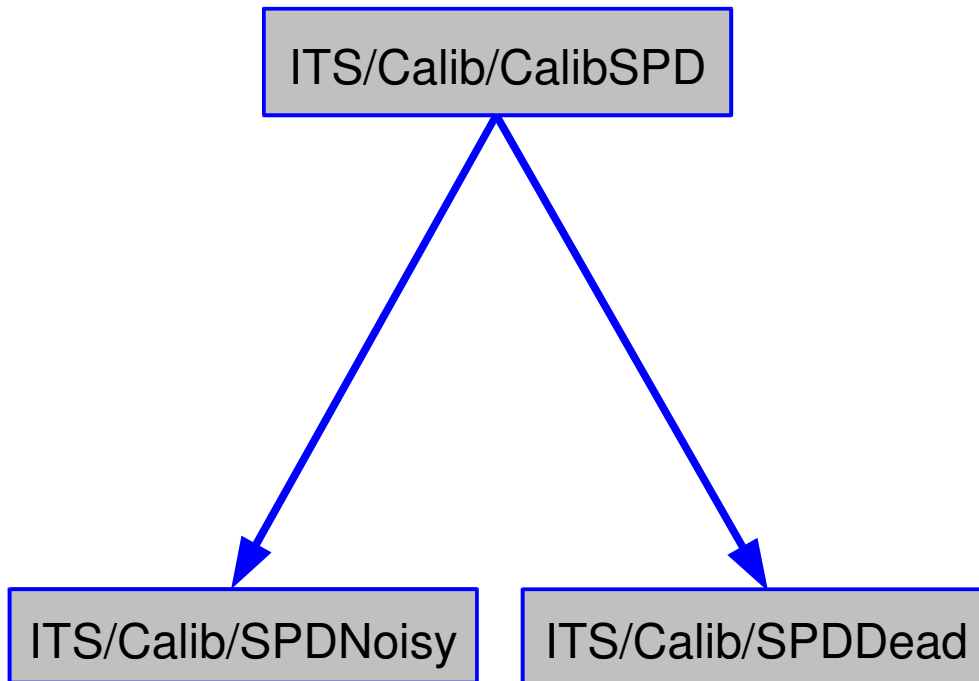
- **ENOUGHSTAT:**
 - All 8192 pixels have at least one hit **OR**
 - Probability of falsely declaring a dead pixel, $(1-p)^{N_{\text{events}}} < X$ ($\sim 10^{-12}$)
($p = N_{\text{ChipHits}}/N_{\text{pixels}}/N_{\text{events}}$)
- **DEAD:**
 - No hits at all **AND** $N_{\text{EqHits}} > \text{limit}$, limit = $\sim 60,000$
 N_{EqHits} is the nr of hits for the full DDL (60 chips)
- **INEFFICIENT:**
 - $N_{\text{ChipHits}} < N_{\text{EqHits}}/60 \cdot \text{ratio}$, ratio = ~ 0.1
- **NEEDSMORESTAT:**
 - All other cases than the 3 above

- ◆ If there are no category **NEEDSMORESTAT** chips, the calibration is complete, and all hit-maps - stored locally - are reset afterwards
- ◆ Dead pixels will be declared for the **ENOUGHSTAT** and **DEAD** chips.
- ◆ The list of dead pixels found in the set of runs used, will be sent to OCDB via FXS. If the calibration was not complete, the OCDB entries for this set of runs will later be over-written.
- ◆ A local copy of the dead pixel list will be kept as a starting point for next calibration. The first step in the algorithm is to loop through all previously found dead pixels, and see if they still have no hits.
- ◆ Estimated nr of events needed (assuming a 10^{-12} limit as stated above):
 - p-p: $\sim 3,000,000$ ($p=10^{-5}$)
 - Pb-Pb: $\sim 10,000$ ($p=3 \cdot 10^{-3}$)

Change to OCDB entries

Noisy and dead pixel calibrations may have different run validities
This requires separate entries in OCDB:

OCDB entry



AliITSCalibrationSPD

```
UInt_t  fNrNoisy;  
TArrayI fNoisyChannels;  
UInt_t  fNrDead;  
TArrayI fDeadChannels;
```

```
UInt_t  fNrBad;  
TArrayI fBadChannels;
```

This requires some changes elsewhere as well and is **not yet implemented**

Preprocessing

Noisy pixels (Standalone “Noise scan”)

- List put in OCDB valid for current run nr until infinity

Noisy pixels (Physics runs)

- Reads noisy pixels from standalone calibration (OCDB)
- Noisy pixels found in the physics run will be added to previous list of noisy pixels
- List put in OCDB valid only for current run nr

Dead pixels (Physics runs)

- List put in OCDB valid only for current run nr(s)

Use of calibration parameters in reconstruction

- Noisy pixels will be removed from digits (not yet implemented)
- Currently no plan to use the dead pixel info

SPD DA Progress

Type of calibration	Reference Data	Algorithm Implemented	Output to OCDB	Output to DCS
Standalone Runs (LDC end-of-run processing):			ITSSPDSCANda	
Minimum Threshold	Implemented	Implemented	Nothing to be done	Implemented
Mean Threshold	Implemented	Defined but not yet implemented	Nothing to be done	Nothing to be done
Generic DAC	Implemented	Nothing to be done	Nothing to be done	Nothing to be done
Uniformity Matrix	Implemented	Defined but not yet implemented	Nothing to be done	Nothing to be done
Noise	Implemented	Implemented	Implemented	Implemented
Delay	Implemented	Implemented	Nothing to be done	Implemented
Fast-OR Uniformity	Not yet defined	Not yet defined	Nothing to be done	Not yet defined
Physics Runs (online monitoring):			ITSSPDPHYSda	
Noisy Pixels	Defined but not yet implemented	Defined but not yet implemented	Defined but not yet implemented	Nothing to be done
Dead Pixels	Defined but not yet implemented	Defined but not yet implemented	Defined but not yet implemented	Nothing to be done

Implemented	Implemented
Defined but not yet implemented	Defined but not yet implemented
Not yet defined	Not yet defined
Nothing to be done	Nothing to be done

- OCDB Output: Lists of noisy and dead pixels in Root files
- DCS Output: Settings for Configuration DB in text files
- Reference Data: Raw data summary in Root files (one for each eq.)
Contains all data needed to make the calibrations