

- Integrating part of the *ATLAS Radiation Monitor* will measure

- Total Ionization Dose – TID:

- RADFET's (threshold voltage increase)
thick oxide from LAAS (for low doses),
thin oxide from REM (for high doses)

- Non-Ionizing Energy Loss – (bulk damage in silicon)

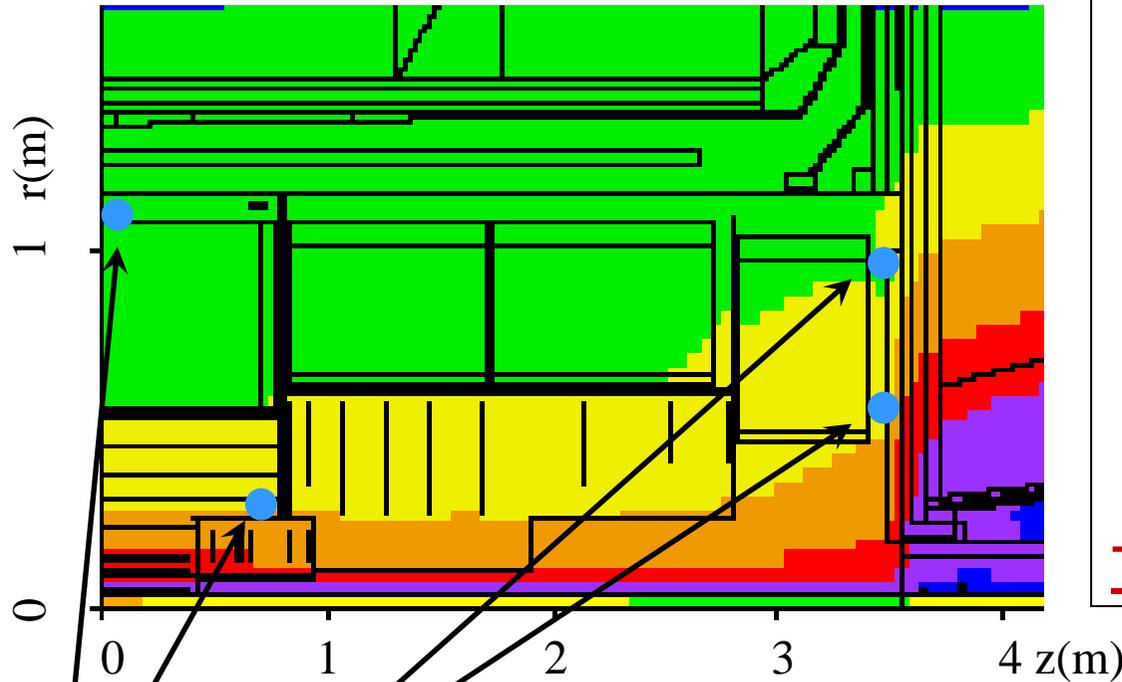
- PIN diodes under forward bias (resistivity increase with NIEL)
CMRP low fluences ($< 10^{12}$ n/cm²),
BPW34F for higher fluences ($> 10^{12}$ n/cm²),
EPI PIN-diodes (leakage current increase with NIEL, ID only)

- Thermal Neutron Fluence

- DMILL bipolar transistor from ATMEL (measure decrease of common-emitter current gain i.e. increase of base current at given collector current, ID only)



Positions of RMSBs in the ID



Side A ($z > 0$):
 at $\Phi = 0^\circ$ and 180°
 Side C ($z < 0$):
 at $\Phi = 90^\circ$ and 270°

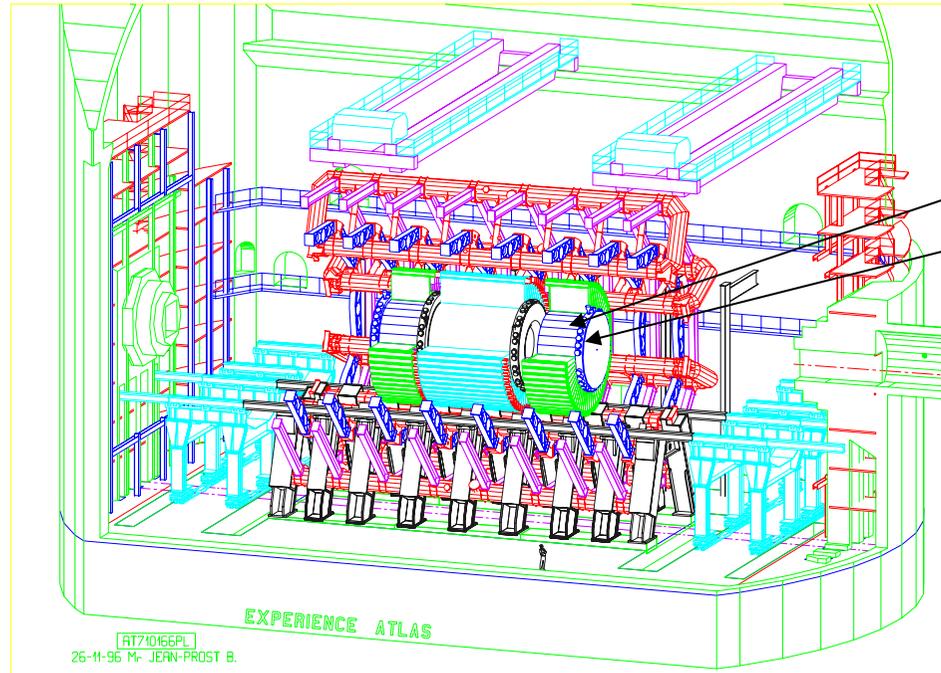
2 positions at
 $Z=0, R=110,$
 $\Phi = 0^\circ$ and 180°

Total of 14 in the ID

r[cm]	z [cm]	Φ_{eq} [$10^{14}/m^2$] 10 y (LL y)	$\Phi(E > 20 \text{ MeV})$ [$10^{14}/cm^2$]	TID[10^4 Gy] 10 y (LL y)
20-30	80-90	2.33 (0.03)	2.2	14 (0.2)
40-50	340-350	2.35 (0.03)	1.25	6.7 (0.09)
80-90	340-350	1.06 (0.01)	0.41	1.91 (0.03)
100-110	0-10	0.51 (<0.01)	0.15	0.76 (0.01)



RMSBs outside of ID



6 locations in Tiles

18 locations in LAr

16 locations in muon detectors

System	TID (Gy/10y)	TID (Gy/LL year)	ΔV in the first year (V)	ΔV (10y)	NIEL (n/cm ² /10y)	NIEL (n/cm ² /frist y)	ΔV first year (V)	ΔV (10y)
Lar:	5.7-50	0.08-0.7	0.04-0.3	2.-5.	1.5e11-1.5e12	2.1e9-2.1e10	0.01-0.1	0.7-7
TILE:	0.2-2.5	0.003-0.035	0.002-0.02	0.1-1	1.5e10-2.3e11	2.1e8-3.2e9	0.002-0.02	0.08-1



Read-out

ELMB + DAC boards:

- ELMB available, 64 ADC channels
- DAC board (16 channels) produced and tested

Fully compatible with ATLAS DCS
(CAN bus communication)

Readout principles

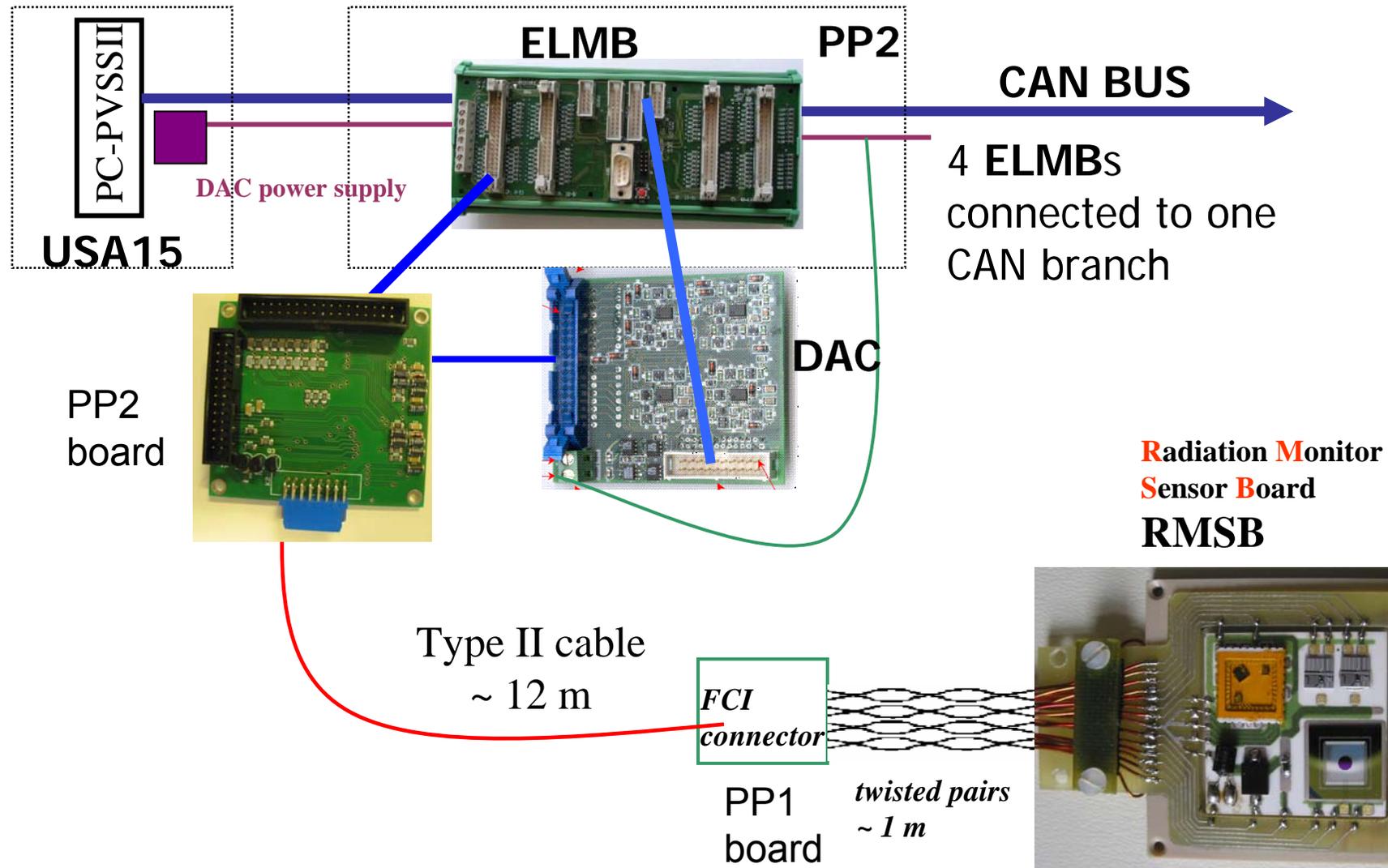
RADFET, PIN: current enforced (DAC)-voltage measured (ADC)

EPI: current (DAC) converted to voltage (resistor) –
voltage drop on resistor due to leakage current measured (ADC)

DMILL: collector current enforced (DAC) –
voltage drop on resistor due to base current measured (ADC)



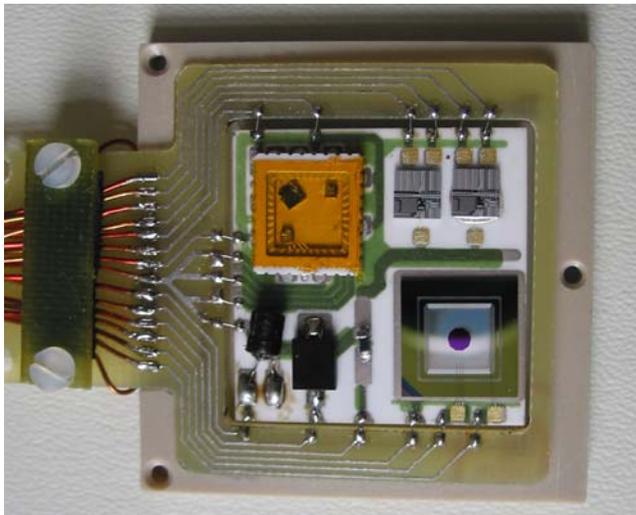
Schematic view of the Inner Detector monitor readout



Status of monitor for Inner Detector:

- all sensors delivered
- DACs, connection boards, patch panels, ceramic hybrids, housings produced
- cabling, space for patch panels and ELMBs defined
- software (programming of processor on ELMB board) written
- 2 RMSBs installed (on cryostat wall at $z=0$)
- remaining 12 monitors will be installed in fall 2006

Populated hybrid:



Hybrid with pigtail cable:



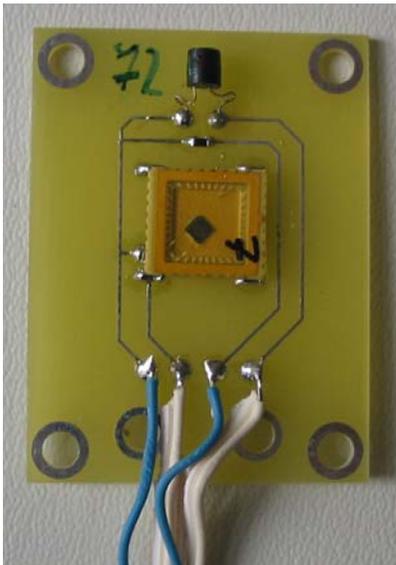
Status of monitors for calorimeters:

- all sensors delivered
- all RMSBs produced
- DACs, patch panels, housings produced
- cabling, space for patch panels and ELMBs defined

Status of monitors for muon chambers:

- all sensors delivered

Populated RMSB:



RMSB in Al box:

