

Passive dosimeters: summary of users requirements

- Conclusions of the 22 July 2004 RADMON meeting
 - **ALICE:** - a few 10th passive dosimeters (probably TLD and RPL);
 - **ATLAS:** - passive dosimeters only outside the inner detector
 - a few hundred measurement points;
 - TLD = a very interesting option;
 - dosimeters readout frequency = 1 per year;
 - **CMS:** - passive dosimeters only outside the tracker;
 - a few hundred measurement points with TLDs;
 - could need some RPLs;
 - **LHCb:** - in the calorimeters : ~50 measurement points with alanine;
 - in the outer parts : TLD a good option for area monitoring (<100).
 - Difficult to give an exact number for passive dosimeters
 - **TLD:** if few hundreds= 200; with 3 dosimeters for each measurement point => TLD~ 1800;
 - **Alanine** ~ 100;
 - **RPL** ~ 100.

Passive dosimeters: summary of users requirements

- Questions arising from the 22 July 2004 RADMON meeting
 - Cost per dosimeter?
 - Readout with the actual SC-RP infrastructure :
feasibility , investment, man-power?
 - Would these requirements change significantly if less dosimeters are needed?
 - After this meeting, did the number/type of needed dosimeters change?

Passive dosimeters: summary of users requirements

- Cost per dosimeter.
 - TLD: Harshaw (Bicron)→ TLD 600 - 3.2x3.2x0.38 mm³: 17 US\$;
TLD 700 - 3.2x3.2x0.38 mm³ : 24 US\$;
 - RPL: firm in China ~ 1 US\$; elsewhere ~20 US\$;
 - Alanine: contact with university ~ 0.7 US\$; official ~ 13 US\$.

- TLD Readout with the actual SC-RP infrastructure : feasibility , investment, man-power.
 - Equipment available at CERN-SC/RP group
 - HARSHAW TLD reader model 5500:
 - automatic reader;
 - old PC and software package;
 - readout capacity= 50 TLDs; cycle time= 30 s per chip with normal temperature profile;
 - linearity[10μGy; 1Gy], supralinearity [1Gy; 20 Gy]

Passive dosimeters: summary of users requirements

- ALNOR TLD reader
 - automatic reader;
 - old PC and software package;
 - readout capacity= 20 slides of 4 TLDs= 80 TLDs; cycle time= 10s per chip (and 20 minutes for 80 TLDs);
 - linearity[10 μ Gy; 2Gy].
- Ovens
 - 1 large oven: cannot perform annealing at 400C (max. 300 C);
 - 1 small programmable oven: space constraint, HARSHAW readout plaques do not fit in \rightarrow manual intervention!
- Remarks
 - in 2005, SC/RP team had 228 points of measurement with TLD on the CERN site (Meyrin + Preveessin) \rightarrow 456 TLD 600 + 456 TLD 700 read 1 time/year.

Passive dosimeters: summary of users requirements

- Proposal for TLD readout
 - Should upgrade the reader: new PC and software?;
 - new readers: model 6600 plus (110 000 US\$); model 8800 (176 000 US\$); (actual model 5500 price=62 000 US\$);
 - Should design dedicated TLDs containers for exposure; if the small oven is used for the annealing → find a solution to avoid too much manual intervention (actually TLDs are moved with tweezers!)
- Would these requirements change significantly if less dosimeters are needed?
 - Not really...

Passive dosimeters: summary of users requirements

- After the meeting, did the number/type of needed dosimeters change?
 - ALICE:
 - passive dosimetry in the (multi-) Gy/year for components survey;
 - 32 measurement points with TLDs (4 in TPC, 4 in TDR+TOF, 4 in HMPID+PHOS, 10 in μ electr. and 10 in racks);
 - ATLAS:
 - still elaborating on the model of radiation monitors;
 - current strategy= the usage of the passive sensors as a one time exercise to calibrate the radiation map in the cavern that can be scaled with the on-line monitors;
 - no number yet.

Passive dosimeters: summary of users requirements

- CMS:
 - still under study (type of TLD);
 - A very preliminary estimate:
 - 80 measurement points with TLD; 2 or 4 TLDs per points
=> total= 160 or 320;
 - 64 measurement points with alanine;
- LHCb:
 - under study (no number yet).

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- SUMARISE

Estimation 2004

	TLD	alanine	RPL	total
ALICE	few 10th		few 10th	~ 50 x 3 + 50
ATLAS	few hundred			~200 x 3
CMS	few hundred			~200 x 3
LHCb	<100	~50		Max. 100 x3 + 50

TLD ~ 1650
alanine ~50
RPL ~50

Estimation 2005

	TLD	alanine	RPL	total
ALICE	32 x ?	?	?	32 x ?
ATLAS	?	?	?	?
CMS	160 to 320	64	no	Min. 224 Max. 384
LHCb	?	?	?	?

TLD ~ ?
alanine ~?
RPL ~?

Passive dosimeters: summary of users requirements

Why the number of the passive dosimeters and their readout frequency are required?

- LHC start = 2007 (in $2\frac{1}{2}$ year!)
- Depending of your requirements,
 - Upgrade of the actual readout devices (in particular for the TLDs);
 - Outsourcing or have a person fulltime dedicated to the passive dosimeters in the experiments (installation, removal, readout, calibration)
- **Optimization of the readout chain** and number of dosimeters = of first importance for the machine and for the experiments !!

- November 2006: LHC injection test; could put passive dosimeters in LHCb for test.

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