

# R2E Weekly Report status

AT/MB/MC – 4<sup>th</sup> R2E Project Meeting – 7<sup>th</sup> April 2011

# Rationales for the weekly report

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- The objective of the weekly report exercise is to provide **radiation levels** (high energy hadron fluences and dose) **in critical areas** – both tunnel and shielded – of the LHC, where COTS electronics is installed
- LHC-**RadMons**, **BLM** (and **PMI/PATs** are considered but not reported)
- Aim is to provide a **concise but complete report of radiation levels at the RadWG meeting**, so that equipment owners are continuously updated
- **Know radiation-risk areas** + specific attention is placed to “**unexpected**” loss locations
  - Close link to LHC beam operation to understand these events
- On the medium term an **online web-based system** will be able to provide an interface also to an LHC map with the weekly readings
- ... in addition **updated layout maps with monitor locations** will also be included

# Procedure for the weekly report

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- Extraction of the **complete list of detectors** (RadMon/BLM/PMI/PAT) **over the full past week**
- Sets of python routines are used to **process the data and create an Excel sheet** with a “News” (counts/readings above a certain threshold) + all detectors by points
- A **master weekly report template** then takes the readings from this sheet and apply the **respective calibration factor for the RadMon** and extracts:
  - **HEH/week** (tunnel and shielded areas)
  - **HEH/2011** (tunnel and shielded areas)
  - **BLM/week** (tunnel areas)
  - ... lumi and beam intensity will be soon included
- The risk factor can be changed region per region in order to improve the prediction capability (at present a rough estimation is present)

# Example of the full list of detectors

Radmon Data:

Detector:	2011-03-22	2011-03-23	2011-03-24	2011-03-25	2011-03-26	2011-03-27	Delta
SIMA.UJ17.1RM03S	378	486	615	616	616	618	460
SIMA.UJ13.1LM03S	257	340	417	417	417	417	298
SIMA.8L1.1LM14S	242	333	397	397	397	399	295
SIMA.4L1.1LM07S	221	290	356	357	357	357	265
SIMA.4R1.1RM19S	196	261	319	319	320	322	225
SIMA.4R1.1RM07S	150	209	264	265	265	267	206
SIMA.4L1.1LM18S	119	157	192	192	192	192	138
SIMA.8R1.1RM15S	25	34	40	40	40	40	30
SIMA.UJ14.1LM02S	27	33	40	40	40	40	29
SIMA.UJ16.1RM02S	23	29	36	36	36	36	23
SIMA.4R1.1RM08S	5	9	12	12	12	12	10
SIMA.5L1.1LM08S	12	13	18	18	18	18	10
SIMA.11L1.1LM17S	6	8	10	10	10	10	9
SIMA.11R1.1RM18S	4	5	7	7	7	7	4
SIMA.6L1.1LM09S	5	5	5	5	5	5	3
SIMA.6R1.1RM10S	1	2	4	4	4	4	3
SIMA.9L1.1LM15S	3	3	3	3	3	3	3

RadMons/BLM for PI ordered as decreasing counts/dose

BLM Data:

Detector:	Dose: (mGy)
BLMEI.04L1.B2E10_TANAL.4L1	4289.437228
BLMQI.03R1.B1E30_MQXA	3160.329201
BLMEI.04R1.B1E10_TANAR.4R1	2878.137306
BLMQI.03L1.B2E30_MQXA	1846.848563
BLMQI.04L1.B2E30_MQY	1568.421384
BLMQI.01L1.B1I30_MQXA	1158.839554
BLMQI.01R1.B1E30_MQXA	1148.605577
BLMQI.01R1.B2I30_MQXA	1085.092536
BLMQI.02L1.B1I23_MQXB	813.708195
BLMQI.01L1.B2E30_MQXA	790.252508
BLMQI.02R1.B1E30_MQXB	771.781248
BLMQI.02L1.B2E30_MQXB	622.762318
BLMEI.05L1.B2E10_TCL.5L1.B2	596.44985
BLMEI.04L1.B2E10_TCLP.4L1.B2	590.872975
BLMEI.04R1.B2I10_TCTVA.4R1.B2	589.770909
BLMEI.04R1.B2I10_TCTH.4R1.B2	565.988172
BLMQI.02R1.B2I23_MQXB	535.154085
BLMQI.02L1.B1I30_MQXB	534.947835
BLMQI.02R1.B2I30_MQXB	518.833665
BLMQI.01R1.B1E10_MQXA	512.381082

# Extracts from the weekly report (W12) (1 / 3)

Radiation levels in the LHC (R2E-related)						
Week 12 (21.3.2011 00:00h- 27.3.2011 23:59h)						
Comments:	- Locations with cumulated fluences <HEH/cm2 are those where the RadMons counts (@5V) are statistically not relevant - RadMon readings in shielded areas are strongly affected by the thermal neutron component					
Uncertainties:	Tunnel locations - factor of <b>2x</b> Shielded areas - factor of <b>3x</b>					
RRs	<i>tunnel</i>			<i>shielded areas</i>		
	HEH (cm-2/week)	HEH (cm-2/2011)	BLM dose (mGy/week)	HEH (cm-2/week)	HEH (cm-2/2011)	
73	<1,00E+6	<1,00E+6	3.61E+02	<1,00E+6	<1,00E+6	
77	1.73E+06	5.18E+06	3.06E+02	<1,00E+6	<1,00E+6	
53	<1,00E+6	1.73E+06	2.34E+02	<1,00E+6	<1,00E+6	
57	<1,00E+6	<1,00E+6	2.33E+02	<1,00E+6	<1,00E+6	
13	<1,00E+6	<1,00E+6	2.55E+02	<1,00E+6	<1,00E+6	
17	<1,00E+6	<1,00E+6	2.53E+02	<1,00E+6	<1,00E+6	
UJs	<i>tunnel</i>			<i>shielded areas</i>		
	HEH (cm-2/week)	HEH (cm-2/2011)	BLM dose (mGy/week)	HEH (cm-2/week)	HEH (cm-2/2011)	
14 (13, tun)	5.15E+08	7.20E+08	1.85E+03	<1,00E+6	1.38E+06	
16 (17, tun)	7.95E+08	1.07E+09	3.16E+03	<1,00E+6	1.24E+06	
22	6.91E+07	1.40E+08	3.24E+02	N/A	N/A	
23	3.45E+06	8.64E+06	2.13E+02	<1,00E+6	<1,00E+6	
87	5.53E+07	7.77E+07	1.52E+02	<1,00E+6	<1,00E+6	
88	6.39E+07	1.85E+08	1.56E+02	N/A	N/A	
32	<1,00E+6	<1,00E+6	2.42E+02	N/A	N/A	
33	<1,00E+6	<1,00E+6	N/A	<1,00E+6	<1,00E+6	
56	2.50E+08	3.51E+08	1.25E+03	<1,00E+6	<1,00E+6	

Color based identification of radiation levels similar to the Area Overview page of the R2E Website ([link](#))

# Extracts from the weekly report (W12) (2/3)

REs	<i>tunnel/side</i>			<i>shielded areas</i>	
	HEH (cm-2/week)	HEH (cm-2/2011)	BLM dose (mGy/week)	HEH (cm-2/week)	HEH (cm-2/2011)
28	<1,00E+6	<1,00E+6	1.87E+02	<1,00E+6	<1,00E+6
38	<1,00E+6	<1,00E+6	2.21E+02	<1,00E+6	<1,00E+6
62	<1,00E+6	<1,00E+6	1.96E+02	<1,00E+6	<1,00E+6
68	<1,00E+6	<1,00E+6	1.92E+02	<1,00E+6	<1,00E+6
78	1.31E+06	1.31E+06	1.93E+02	<1,00E+6	<1,00E+6
<b>US85/UX85</b>	<i>cavern UX85</i>			<i>cavern US85</i>	
	HEH (cm-2/week)	HEH (cm-2/2011)		HEH (cm-2/week)	HEH (cm-2/2011)
	1.09E+06	2.17E+06		<1,00E+6	<1,00E+6
<b>R34</b>	<i>tunnel</i>				
	HEH (cm-2/week)	HEH (cm-2/2011)	BLM dose (mGy/week)		
	3.21E+08	5.35E+08	2.50E+03	N/A	
<b>R74/76</b>	1.68E+09	2.09E+09	2.83E+04	N/A	
<b>R771</b>	3.12E+09	3.86E+09	2.91E+03	N/A	
<b>P2 right (27)</b>	<i>tunnel (RA)</i>			<i>shielded areas (UA)</i>	
	HEH (cm-2/week)	HEH (cm-2/2011)	BLM dose (mGy/week)	HEH (cm-2/week)	HEH (cm-2/2011)
	1.19E+08	6.96E+08	2.63E+02	<1,00E+6	<1,00E+6
<b>P2 left (23)</b>	3.14E+07	6.94E+07	2.59E+02	<1,00E+6	<1,00E+6
<b>P8 right (87)</b>	1.45E+08	3.34E+08	7.35E+02	<1,00E+6	<1,00E+6
<b>P8 left (83)</b>	N/A	N/A	5.69E+02	<1,00E+6	<1,00E+6

UX balcony  
US 2<sup>nd</sup> floor cryo

RadMons at  
secondary  
collimators

RadMons at  
ZDC/TCTH  
→ TDI

# Extracts from the weekly report (W12) (3/3)

“Special” locations, which strongly depends on LHC operation (DS/ARC)

Additional points of interest (losses observed in 'unusual' locations)						
		<i>tunnel</i>			<i>shielded areas</i>	
		HEH (cm-2/week)	HEH (cm-2/2011)	BLM dose (mGy/week)	HEH (cm-2/week)	HEH (cm-2/2011)
	<b>UXC55</b>	4.93E+07	7.74E+07	N/A	N/A	N/A
DS →	<b>8R5</b>	7.26E+07	8.98E+07	4.30E+02	N/A	N/A
QPS issues	<b>9R5</b>	1.38E+07	2.76E+07	2.48E+02	N/A	N/A
	<b>11R5</b>	1.55E+07	2.25E+07	2.94E+02	N/A	N/A
	<b>UPS54</b>	N/A	N/A	N/A	<1,00E+6	<1,00E+6
DS →	<b>11L1</b>	1.55E+07	1.73E+07	3.10E+02	N/A	N/A
QPS issues	<b>8L1</b>	5.10E+08	6.89E+08	3.30E+02	N/A	N/A
	<b>ARC</b>					
High doses in middle	32R4	N/A	N/A	4.99E+02		
ARC → observation	33R4	N/A	N/A	2.76E+02		
also by OP → QPS	32L8	N/A	N/A	4.24E+02		
issue (no firmware	11R3	N/A	N/A	6.06E+02		
update up to there?)	11L4	<1,00E+6	<1,00E+6	3.27E+02		