

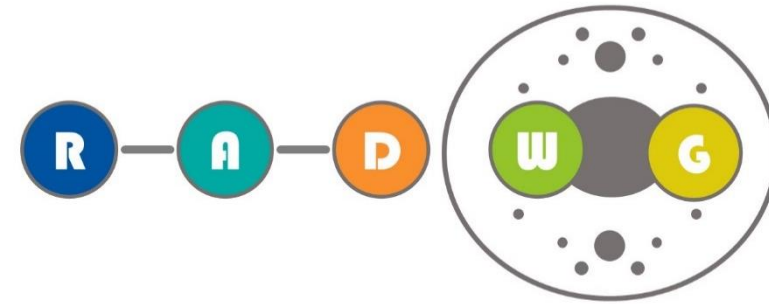
RADWG Meeting February 2017

Salvatore Danzeca EN/STI/ECE on behalf of the RADWG

AGENDA

- Activities overview by Salvatore Danzeca
- **Update of the radiation levels in the LHC and the outlooks for the 2017 by Corinna Martinella**
- **Latest results and status of the tests for next year for EPC by Lawakilea Lionel Foro**
- **TE/ABT test in CHARM : Test Setup and Results by Tobias Stadlbauer**
- **RF switches PSI test results - Gilles Foucard**

RADWG Mandate



- It provides **support** to the accelerator sector equipment groups for the assessment of radiation tolerance of electronic equipment to be installed in radiation exposed areas.
- It is as a **forum** for electronic engineers to discuss
 - design practices
 - radiation tests
 - radiation induced failures in the accelerators.
- It **coordinates radiation test campaigns** inside and outside CERN
- The RADWG **assists the R2E Project** leader for the evaluation of the technical aspects of the proposed mitigation actions with the representatives of the equipment groups

Radiation Hardness Assurance

- We are promoting a Radiation Hardness Assurance procedure for the new developments and for the systems already installed.
- A draft of the procedure document is at this link : <https://edms.cern.ch/document/1740220/1>
- Simple structure:
 - **RHAPV: Project Validation** (new project) -> report of the project information, radiation environment, radiation tests
 - **RHACD: Check document** (existing equipment) -> report the card changed and if they are conform with the RHAPS.
 - **RHAPS: Process structure** -> Pure RHA guideline which give information on the process and guide the user through the testing method and effectiveness.

New Developments

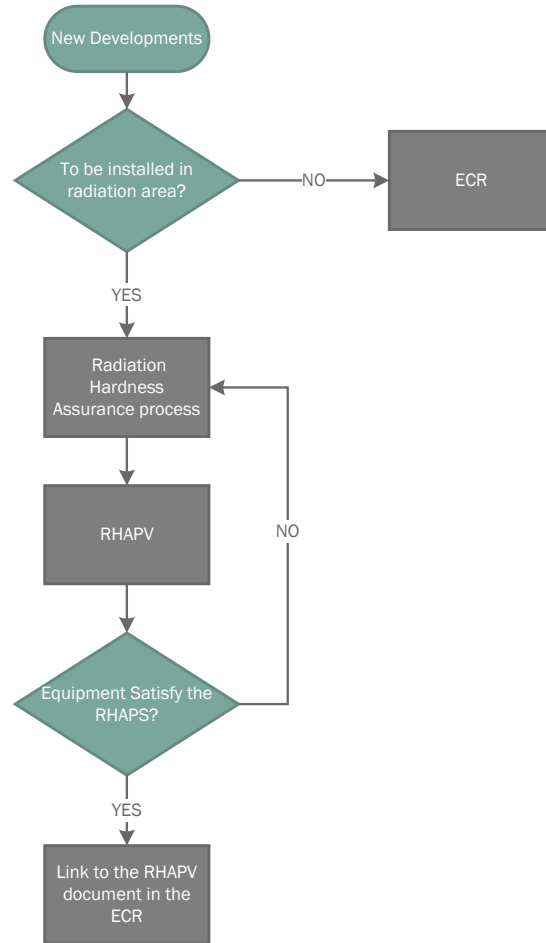
- Have to follow a radiation assurance procedure RHA
- The criticality should be assessed
- The system has to be tested in a representative radiation environment

System already installed

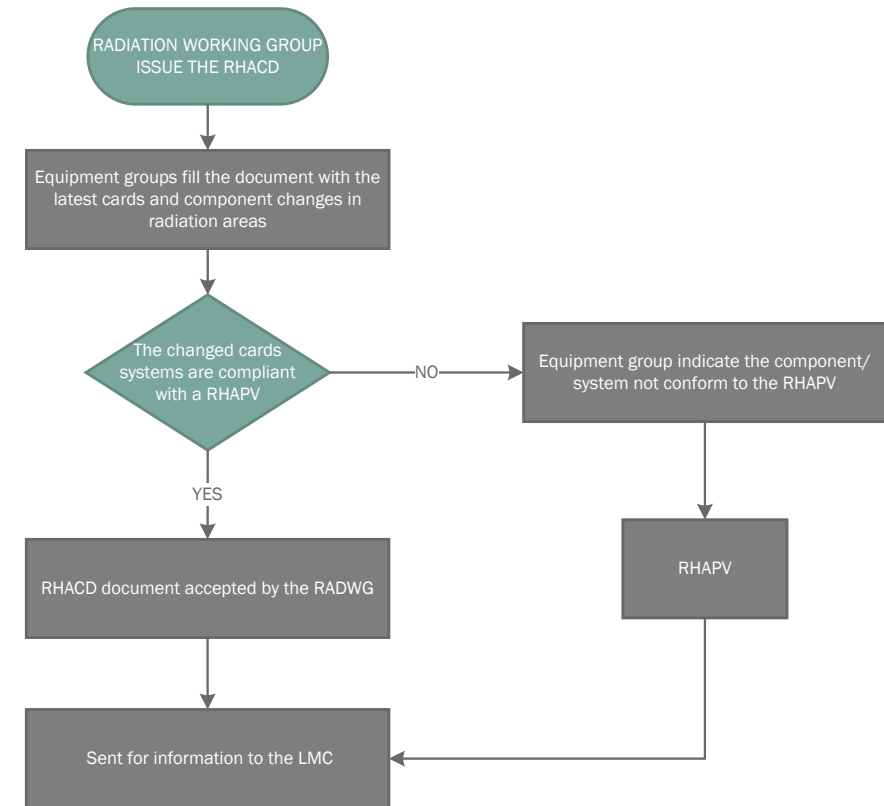
- Their fault rate should be assessed
- The relocation should be notified
- The integration document will have a field pointing at the RHA document
- Any system change should be notified

RHA Procedure

New Installation



Hardware modification/change



Component test requests

- PSI proton irradiation from 30 to 200 MeV
- Co60 gamma irradiation facility at CERN
- CHARM mixed field irradiation facility at CERN
- Several other facilities accessible: Neutrons (intermediate and thermal)/heavy ions/xrays..
- Requests:
 - 40 components BE-BI DOROS
 - 4 components BE-BI SEM grid amplifier
 - 2-3 components TE-MPE
 - 2-3 components IT-CS
 - 36 candidate TE-VSC
 - 15-20 candidates EN-STI

Group	Responsibles	Project	Date	Request
BE-BI	Marek Gasior, Jakub Olexa	DOROS	13 Jan 2017	170105_DOROS4ALPS_ComponentTesting_a2.xlsx
BE-BI	Gerrit Jan Focker	SEM grid amplifiers, wire scanner	26 Jan 2017	Fraunhofer_SpecDoc_6.pdf
TE-MPE	Jens Steckert	QDS	26 Feb 2017	https://wikis.cern.ch/display/MPEEP/Radiation+testing
IT-CS	Aruelie Pascal, Giosue Zambon	TETRA	25 Jan 2017	RF transceiver
TE-VSC	Pawel Wojciech Krakowski	Active Penning and Pirani front-end	23 Jan 2017	RHA_VSC_PEN_PIR.docx
EN-STI	Salvatore Danzeca	RadMon	01 Dec 2016	IO Muiltplexer - RF Transceiver

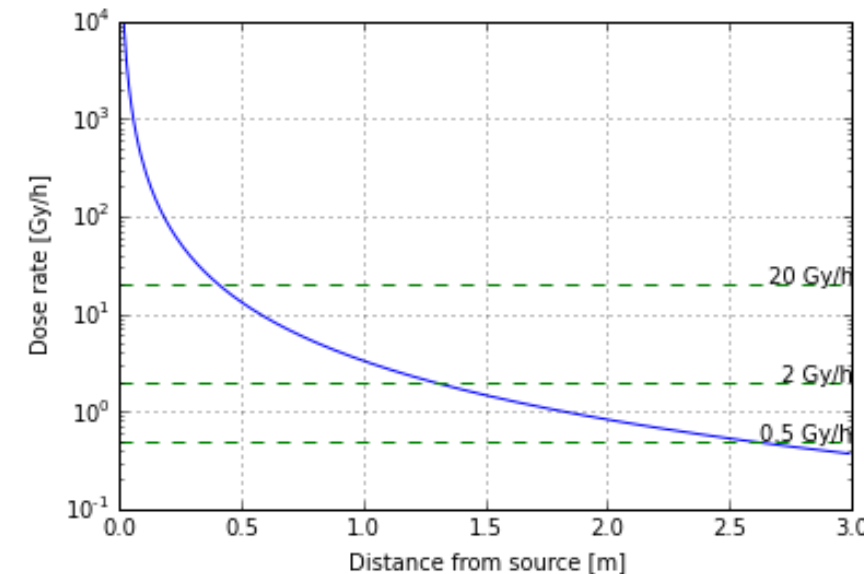
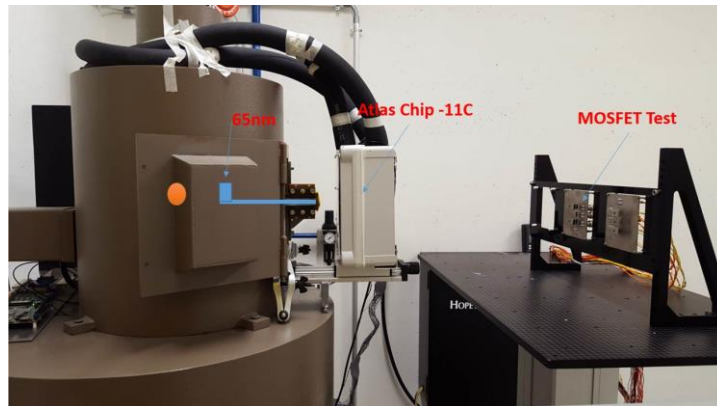
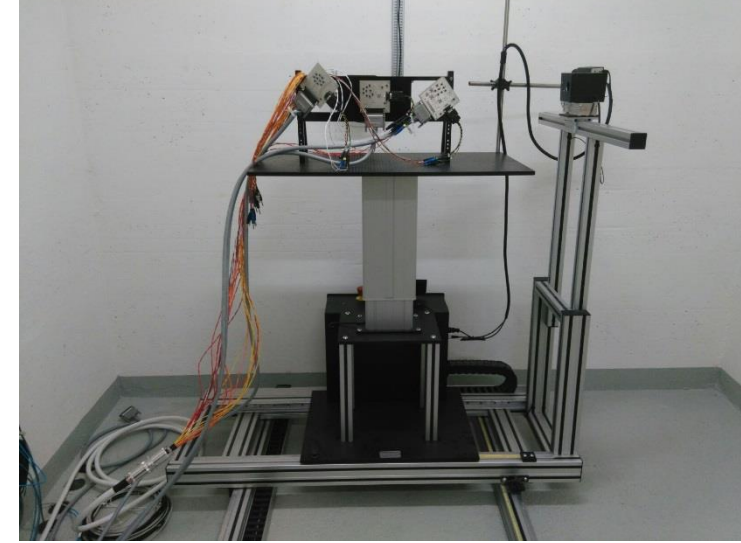
Radiation test campaigns

- PSI Facility Updates
 - Provisory planning
 - 2 slots available at the moment February and March

Test date	Components	Test group	Equipment owner
18-19 February	Current source- OpAmp – LDO	EN/STI	BE/BI – EN/STI
25-26 March	OpAmps, Voltage reference, digital logic	EN/STI	TE/EPC BE/BI
April	MISC	EN/STI	BE/BI – TE/VSC – TE/MPE
June	MISC	EN/STI	BE/BI – TE/VSC
July	MISC	EN/STI	BE/BI – TE/VSC
August	MISC	EN/STI	BE/BI – TE/VSC
September	MISC	EN/STI	BE/BI – TE/VSC
October	MISC	-	-
November	MISC	-	-

^{60}Co facility @ CERN

- Reminder: dose rates from 20Gy/h up to 0.36Gy/h
- Inside the irradiator setup: 300Gy/h to 100Gy/h on a small surface
- Short calibration test on the 9th of February by RP
- Currently waiting for the Cryo valve tests (~40 days)
- ATLAS will test for few months after the cryo test



CHARM Facility

- It will start on the **1st of May**
- **2 weeks for the commissioning**
- Priority : **TE-EPC Equipment 4-6-8kA and 600A ~9 weeks**
- Already 6 requests with an average of 2 weeks each irradiation
- Preliminary planning – further discussion needed with the users and IRRAD for activities coordination
- RP week still to be scheduled (possible date is in July) – on-going discussion on very low intensity extraction ($\sim 1e9$)

Month	April				May				June				July				August													
Week	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33										
Day	04/04	07/04	13/04	22/04	27/04	04/05	11/05	18/05	25/05	01/06	08/06	15/06	22/06	29/06	06/07	13/07	20/07	27/07	03/08	10/08	17/08									
CHARM					Commissioning																									
CAHRM User 1					GEFE		GEFE		GEFE		LHCb SciFI Pelle grino		LHCb SciFI Pelle grino		DOR OS Gasio r		DOR OS Gasio r		ALPO DE Hart mut		ALPO DE Hart mut		ATLA S Izzo		ATLA S Izzo		GEM		GEM	
CHARM User 2					GEFE		GEFE		GEFE		LHCb SciFI Pelle grino		LHCb SciFI Pelle grino		DOR OS Gasio r		DOR OS Gasio r		ALPO DE Hart mut		ALPO DE Hart mut		ATLA S Izzo		ATLA S Izzo		GEM		GEM	
days	23				A																									

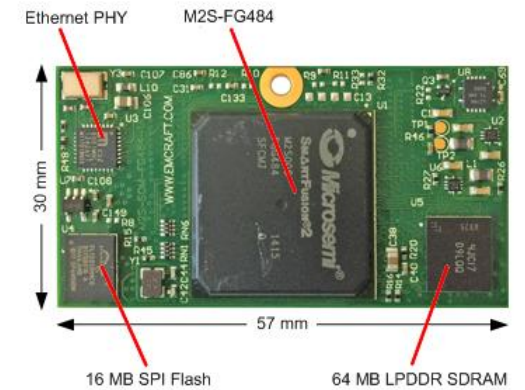
CHARM Facility

- Having EPC for 9 weeks: difficult to have another user
 - Technical question of having two racks : solved (Thanks Jerome)
 - We can host another user while testing the bulky EPC equipment (the total number of chain limit the installation of more than 1 user)
- 1 single user can run in parallel with EPC in position 10
 - Calibration in the 'new' test position to be done during the commissioning run
- We are looking into improving the overhead conveyer and have a second test location that can run in parallel
 - Cabling is required: the RADWG members can suggest some cables that would need for the conveyor location



SmartFusion2 Test

- SmartFusion2 FPGA+ARM cortex devices well tested during the 2015-2016
 - The official test report:
<https://edms.cern.ch/ui/#!master/navigator/document?P:1552346648:1370156112:subDocs>
 - The TWEPP presentation by N. Trikoupis :
<http://indico.cern.ch/event/489996/contributions/2291859/>
- Artix Xilinx FPGA tested in CHARM during the 2016
 - Data presented at TWEPP by R.Ferraro:
<http://indico.cern.ch/event/489996/contributions/2291857/>
 - Paper to be presented at RADECS 2017
- SOM module with SmartFusion2 to be tested in PSI and CHARM in 2017
 - Are you willing for a collaboration in developing/testing such a common block?

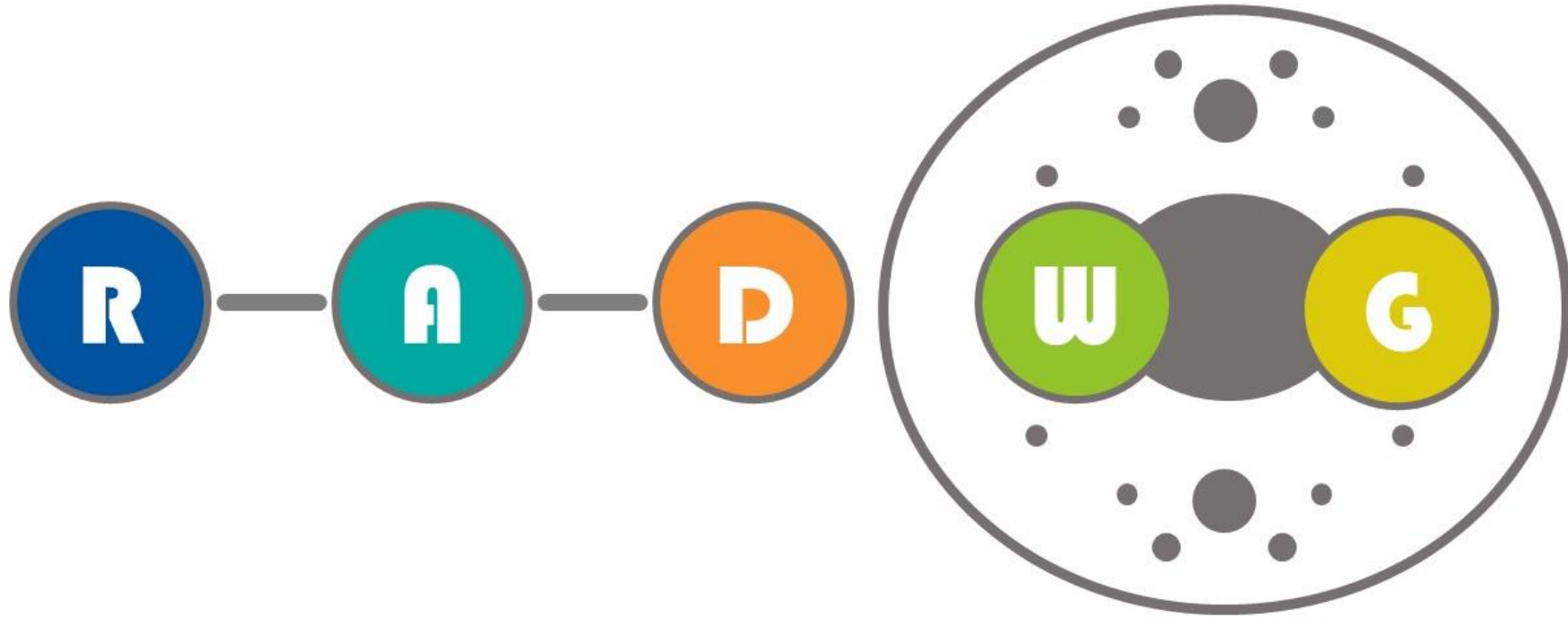


Radiation Monitoring

- Cryo Valves passive dosimeter installed in P1 and P5
 - read during the TS3 2016
 - Dose measurements reported and discussed in the next MCWG
- 200 RadFets ready to be installed in the SPS for the BE-BI racks
 - All the racks of BE-BI will be covered with a dosimeter
 - Installation foreseen for mid-February
- 100 RadMon to be installed in the P3 and P7 of the LHC
 - The RadMon will have a deported unit which will be placed on the equipment down the dipole
 - The QPS rack can be the preferred one because present in all the cell.
 - This will permit us to know the dose at the equipment level in the hot-cell (i.e 9-11)

Conferences 2017

- NSREC 2017 - IEEE Nuclear and Space Radiation Effects Conference July 17-21, 2017 - The New Orleans Marriott – Call for abstract deadline 3rd February
- RADECS 2017 – October 2-6, 2017, call for abstract deadline: April 24th, 2017
 - <http://radecs2017.com/Radecs2017/Conference.html>
- TWEPP 2017 : 11-14 September – Santa Cruz, CA, USA
- NSS 2017 IEEE Nuclear Science Symposium and Medical Imaging Conference - 21 Oct - 28 Oct 2017 Atlanta, GA, USA



Thank you