

R2E Annual Meeting - 2021



R2E

Report of Contributions

Contribution ID: 2

Type: **not specified**

Meeting Opening - R2E in ATS Sector and Systems Department

Tuesday 2 February 2021 09:00 (15 minutes)

The Radiation to Electronics (R2E) project provides crucial support for radiation tolerant developments throughout the ATS sector, while ensuring the harmonization and quality control of the related procedure. Despite the significant progress in the overall R2E performance of the LHC from Run 1 to Run 2, critical challenges lay ahead with respect to guaranteeing a compliant radiation performance of “new” systems in the machine (including consolidation) in view of the tighter availability requirements and increased radiation levels.

Presenters: GODDARD, Brennan (CERN); BURNET, Jean-Paul (CERN)

Session Classification: Introduction

Contribution ID: 3

Type: **not specified**

Why do we (still) need R2E?

Tuesday 2 February 2021 09:15 (25 minutes)

We will briefly present the requirements and constraints that drive the need for an R2E approach for radiation tolerant development and qualification of accelerator systems. A special focus is set on the radiation sensitivity of COTS components (and variability thereof).

Presenter: GARCIA ALIA, Ruben (CERN)

Session Classification: Introduction

Contribution ID: 4

Type: **not specified**

Collaboration Overview

Tuesday 2 February 2021 09:40 (20 minutes)

The R2E project generates many results of interest to the enlarged radiation effects community and catalyses synergies with other domains (especially aerospace). An overview of the multiple running collaborations where the R2E project is playing a critical role will be presented, with focus on European projects and knowledge transfer activities.

Presenters: CHESTA, Enrico (CERN); GARCIA ALIA, Ruben (CERN)

Session Classification: Introduction

Contribution ID: 5

Type: **not specified**

Radiation Monitoring: Run 2 Overview and Run 3 Outlook

Tuesday 2 February 2021 10:00 (20 minutes)

The monitoring, simulation and prediction of radiation levels are a critical ingredient in reducing radiation-induced electronics' failures, and therefore contribute to an adequate accelerators availability.

In this talk, activities of the Monitoring and Calculation Working Group will be presented, with the focus on Run 2 highlights, current developments, and Run 3 outlook.

Presenter: BILKO, Kacper (CERN)

Session Classification: Services

Contribution ID: 6

Type: **not specified**

Radiation environment simulation and specifications

Tuesday 2 February 2021 10:20 (20 minutes)

In addition to data from radiation monitors, FLUKA simulations are a critical tool to predict the radiation levels on electronic equipment at the LHC and in other CERN accelerators, transfer lines, and facilities. This talk presents an overview of the most relevant results, focusing on the HL-LHC radiation level specifications recently included in a comprehensive document.

Presenter: Dr LERNER, Giuseppe (CERN)

Session Classification: Services

Contribution ID: 7

Type: **not specified**

Testing of electronic components

Tuesday 2 February 2021 11:00 (20 minutes)

An overview of the Radiation Working Group (RadWG) mandate, activities and projects fulfilled by the BE-CEM-EPR section will be presented. The qualification protocol, guidelines and documents from component to system-level will be discussed as well as the different radiation facilities that can be used for this purpose.

Presenters: FERRARO, Rudy (CERN); DANZECA, Salvatore (CERN)

Session Classification: Services

Contribution ID: 8

Type: **not specified**

CHARM facility operation and user support

Tuesday 2 February 2021 11:20 (20 minutes)

Presenter: DANZECA, Salvatore (CERN)

Session Classification: Services

Contribution ID: 9

Type: **not specified**

Upgrade of the CERN Cobalt-60 (CC60) facility

Tuesday 2 February 2021 11:40 (20 minutes)

The CERN Cobalt-60 facility serves different essential purposes in the context of the R2E project. Firstly, Total Ionizing Dose (TID) testing is a crucial step for the qualification of components candidate for the electronics installed in the CERN accelerators' radiation environment. At the CC60, the screening of components produced by different manufacturers can be easily performed. Moreover, thanks to the large irradiation area available, entire systems and multiple users testing in parallel are allowed. Secondly, testing materials to be employed in high radiation level areas, such as the particle detector of the experiments, can be done by installing small samples in the aperture of the irradiator, and hence exposed to high dose rates (up to 300 Gy/h). Finally, the accuracy on the facility calibration allows to carry on R&D on solid state dosimeters, like RadFETs, Floating Gate Dosimeters, NMOS dosimeters, Optical Fiber Dosimeters, and Gafchromic films.

To face the increasing number of requests, a new 110 TBq Co-60 source, 10 times more active than the current source, will be soon installed. The source installation requires the upgrade of the infrastructures to deal with the higher radiation levels, as well as the collaboration of different entities, including external companies, to safely transfer the new source in the irradiator. The upgrade of the facility will be beneficial for the whole R2E community.

Presenter: BRUCOLI, Matteo (CERN)

Session Classification: Services

Contribution ID: **10**

Type: **not specified**

Radiation to Materials

Tuesday 2 February 2021 12:00 (20 minutes)

The Radiation to Materials initiative at CERN has the following goals: coordinate irradiation tests of non-metallic materials in external facilities and provide internal support to select radiation resistant components for use in high radiation areas. Future plans include experimental studies to improve the understanding of radiation damage mechanisms.

Presenter: FERRARI, Matteo (CERN)

Session Classification: Services

Contribution ID: 11

Type: **not specified**

RadMON system

Tuesday 2 February 2021 12:20 (20 minutes)

Presenter: DANZECA, Salvatore (CERN)

Session Classification: Services

Contribution ID: 12

Type: **not specified**

Optical fiber dosimetry

Tuesday 2 February 2021 13:50 (20 minutes)

The Distributed Optical Fibre Radiation Sensors are systems recently deployed in the accelerator complex (PSB and PS during Run 2, and SPS and parts of LHC, during LS2).

With such systems, we monitor the distributed radiation levels in the accelerators with a ~1m spatial resolution, hence providing critical inputs to the Monitoring & Calculation Working Group. In this presentation, we will report on the status of the optical fibre dosimetry, as well as the relating R&D activities.

Presenter: Dr DI FRANCESCA, Diego (CERN)

Session Classification: Services

Contribution ID: 13

Type: **not specified**

High-Level Dosimetry

Tuesday 2 February 2021 14:10 (20 minutes)

The main goal of the High-Level Dosimetry (HLD) at CERN is to determine the radiation levels at equipment located in the accelerator complex, hence contributing to the evaluation of their radiation lifetime. The HLD activities, previously performed by the Radiation Protection group, are in process of transfer to the R2E project. The monitoring of the accumulated dose can be carried out with two passive dosimeters: the Polymer Alanine Dosimeter (PAD) and the Radio-Photo-Luminescence (RPL) dosimeter, both read out in-house at CERN.

Presenter: QUADROS DE AGUIAR, Ygor (CERN)

Session Classification: Services

Contribution ID: 14

Type: **not specified**

R2M studies of radiation effects on oils and greases

Tuesday 2 February 2021 16:15 (15 minutes)

Lubrication problems in radiation areas at CERN and insufficient data for a reliable lubricant selection during design have highlighted the need to improve knowledge of radiation effects in oils and greases. R2M are preparing experimental studies to verify the radiation resistance of promising products identified via theoretical considerations and literature.

Presenters: SENAJOVA, Dominika (Ministere des affaires etrangeres et europeennes (FR)); FER-RARI, Matteo (CERN)

Session Classification: Research

Contribution ID: 15

Type: **not specified**

Radiation Induced Luminescence optical fiber dosimeter

Tuesday 2 February 2021 16:00 (15 minutes)

Our R&D activity targets the development of versatile radiation sensors to address environments typical of accelerators and space. In this presentation, we report the main scientific results on radioluminescence-based radiation sensing in optical fibres, showing the performances offered by this technology as well as the temperature dependence of the sensors response.

Presenter: KERBOUB, Nourdine (Universite Jean Monnet (FR))

Session Classification: Research

Contribution ID: 16

Type: **not specified**

Benchmark between FLUKA and radiation detectors

Tuesday 2 February 2021 15:45 (15 minutes)

The latest comparisons between the measurements of the radiation detectors and the simulated values using the FLUKA code are presented. The focus is on the benchmarks for the LHC for the Total Ionising Dose (TID) recorded by the Beam Loss Monitors (BLMs) in discrete locations of IP1 and IP5, and by the Optical Fibre as a continuous passive measurement in the Dispersion Suppressor of IP1, as well as for Single Event Effect (SEE) counted by the Radiation Monitors (RadMons). In addition, the radiation monitor benchmarks in the CHARM facility are provided.

Presenter: PRELIPCEAN, Daniel (Technische Universitat Munchen (DE))

Session Classification: Research

Contribution ID: 17

Type: **not specified**

Neutron induced SEEs

Tuesday 2 February 2021 15:30 (15 minutes)

Neutrons with energies between 0.1-10 MeV can significantly impact the Soft Error Rate (SER) in SRAMs and other microelectronics manufactured in scaled technologies, with respect to high-energy neutrons. Experimental measurements benchmarked with Monte Carlo simulations showed that neutrons with these energies can induce more than 60% of the overall upset rate in accelerator applications.

Presenter: CECCHETTO, Matteo (Universite Montpellier II (FR))

Session Classification: Research

Contribution ID: 18

Type: **not specified**

Experimental evaluation of external facilities

Tuesday 2 February 2021 17:45 (15 minutes)

The R2E project has explored the use of several irradiation facilities in Europe that can provide complementary and supplementary radiation testing coverage to CHARM mixed-field testing and PSI high-energy proton testing. This includes thermal, intermediate and high-energy neutron facilities as well as proton, heavy ion and pion facilities.

Presenter: CORONETTI, Andrea (CERN)

Session Classification: Research

Contribution ID: 19

Type: **not specified**

System level radiation testing

Tuesday 2 February 2021 15:00 (15 minutes)

Guidelines for system-level testing of space equipment tested at CHARM were developed, highlighting potentials and limitations of such a solution for high-risk acceptance space missions. The achieved work can be of direct application to commercial systems used at CERN. The follow-up work will delve into the standardization of system-level testing for accelerator equipment covering the full spectra of qualification from commercial to custom-developed systems.

Presenters: CORONETTI, Andrea (CERN); SLIPUKHIN, Ivan (CERN)

Session Classification: Research

Contribution ID: 20

Type: **not specified**

Silicon diode as R2E detector

Tuesday 2 February 2021 14:45 (15 minutes)

Over the recent R2E irradiation campaigns, a new silicon diode setup proved to be a crucial tool in radiation environment characterization and validations of Monte-Carlo simulations. In this talk, a short description of the detector system will be given, along with highlights of the results and outlook for further development.

Presenter: BILKO, Kacper (CERN)

Session Classification: Research

Contribution ID: 21

Type: **not specified**

G4SEE Monte Carlo simulation tool

Tuesday 2 February 2021 14:30 (15 minutes)

A novel, easy-to-use, Geant4-based simulation tool is being developed for the R2E community. G4SEE enables a detailed, efficient, event-by-event direct and indirect energy deposition scoring in micro-metric volumes, in order to better understand SEE mechanisms (like neutron induced SEEs), perform SEE sensitivity analysis or even reverse engineering of components.

Presenter: LUCSANYI, David (CERN)

Session Classification: Research

Contribution ID: 22

Type: **not specified**

Radiation tolerant wireless IoT system for Radiation Monitoring

Tuesday 2 February 2021 16:30 (15 minutes)

The BatMON is a wireless, battery-powered radiation monitoring system for particle accelerators. The system is based on radiation qualified COTS that allow the device to survive in radiation areas. The system can measure TID and High-Energy Hadron and Thermal Neutron fluences, thanks to the Floating-Gate dosimeter and SRAMs embedded on the sensor mezzanine.

Data are saved in a non-volatile memory and are transmitted using LoRaWAN, which enables long communication range without excessive infrastructure costs. The entire system is modular, allowing the reuse of the microcontroller-based platform, also known as “minIOT platform”, for other radiation tolerant applications.

Presenter: ZIMMARO, Alessandro (Universita e sezione INFN di Napoli (IT))

Session Classification: Research

Contribution ID: 23

Type: **not specified**

Updates on FPGA testing

Tuesday 2 February 2021 16:45 (15 minutes)

With the upgrade of the HL-LHC, a certain number of systems require more radiation-tolerant FPGAs, especially against TID. In this presentation will be presented some promising results for CERN applications from radiation campaigns performed on two FPGAs: NGMedium from NanoXplore and PolarFire from Microsemi.

Presenter: FERRARO, Rudy (CERN)

Session Classification: Research

Contribution ID: 24

Type: **not specified**

Floating Gate Dosimeter: sensitivity characterization and heavy ion response

Tuesday 2 February 2021 17:00 (15 minutes)

The Floating Gate Dosimeters (FGDOS) is now approaching its first deployment in the new wireless IoT system for radiation monitoring, called BatMON. In order to further improve the accuracy of the measurement, its radiation response has been investigated in detail to determine the cause of the sensitivity drift. A compensation method has been developed and tested by performing experiments and evaluating its efficiency.

The peculiar working principle of the sensor makes it a good candidate for auxiliary applications. Dedicated radiation test campaigns have been performed to investigate the radiation response of the sensor to heavy ions. In particular, the capability of the FGDOS to work as single ion detector has been demonstrated at the UNILAC facility of GSI (Germany).

Presenter: BRUCOLI, Matteo (CERN)

Session Classification: Research

Contribution ID: 25

Type: **not specified**

Heavy ion dosimetry and experiments in CHARM: part I

Tuesday 2 February 2021 17:15 (15 minutes)

In addition to its regular operation with protons on a copper target, the CHARM facility was successfully exploited in Run 2 during heavy ion runs, requiring a dedicated effort to calibrate the instruments that measure the beam intensity in the facility. The results of these measurements are presented for the 2018 Pb ion campaign, highlighting the main conclusions and limitations.

Presenters: CORONETTI, Andrea (CERN); Dr LERNER, Giuseppe (CERN)

Session Classification: Research

Contribution ID: 26

Type: **not specified**

R2E in HL-LHC context

Wednesday 3 February 2021 09:00 (20 minutes)

The High Luminosity Upgrade of the LHC aims at enabling the goal of collecting 10 times the integrated luminosity compared to the first decade of the LHC lifetime. For this reason and based on prior experience in the LHC, the design of the HL-LHC machine, its equipment systems as well as its operational procedures have been done considering R2E as one of the fundamental constraints to be considered. This contribution outlines the main goals and challenges of the HL-LHC project and the employed strategies to minimize machine downtime due to R2E effects.

Presenter: ZERLAUTH, Markus (CERN)**Session Classification:** Introduction

Contribution ID: 27

Type: **not specified**

Heavy ion dosimetry and experiments in CHARM: part II

Tuesday 2 February 2021 17:30 (15 minutes)

In the framework of the heavy ion accelerator program, the CHARM facility has been exploited to investigate the effect of Ultra High Energy (UHE, >5 GeV/n) Heavy Ions on electronics. Testing at UHE provides important information on the Radiation Hardness Assurance of the component, however a few facilities allows such high energies (5.9 GeV/n for Pb-ions). In this context, a suitable calibration of the facility is essential to perform accurate radiation tests.

The combination of beam instruments, specifically a Secondary Emission Chamber (SEC) and a Multi Wire Proportional Chamber (MWPC), has been utilized to determine the ion flux as a function of its x-y position. In addition, the shape of the beam has been compared with the one measured by the radiation sensitive Gafchromic films. Electronic-related radiation quantities have been measured by the RadMON system. In particular, the Total Ionizing Dose per ion was measured by the RadFETs, whereas the 1-MeV equivalent Neutron Fluence per ion has been measured by pin-diodes. The results are compared with the theoretical values.

Presenters: BRUCOLI, Matteo (CERN); FERRARO, Rudy (CERN)

Session Classification: Research

Contribution ID: 28

Type: **not specified**

R2E in SY/STI group, and meeting wrap-up

Wednesday 3 February 2021 16:40 (30 minutes)

Presenter: Dr GILARDONI, Simone (CERN)

Session Classification: Meeting closure

Contribution ID: 29

Type: **not specified**

Design of a 500 Gy radiation tolerant converter

Wednesday 3 February 2021 14:00 (20 minutes)

In 2010, and with the objective of improving the LHC availability, CERN decided to replace converters operating under radiation by radiation tolerant ones. This major work focused first on the 600A and kA converters installed mainly in RRs point 1/5/7, all deployed during LS2, after a successful radiation tolerant development and qualification.

The emerging challenges now focus on the 60A and 120A converters, located in parts of the machine (both tunnel and alcoves) expected to receive up to 250 Gy during the HL-LHC era.

The experience of the former R2E design, and the related lesson learnt, allow to present a credible and efficient plan, optimizing the resources for adequate and reasonable design.

This talk will present the hypothesis and general background for the design of 60A and 120A converters, focusing on design choices (redundancy), as well as testing effort to come in the following years.

Presenter: THUREL, Yves (CERN)

Session Classification: Developments

Contribution ID: 30

Type: **not specified**

Overview of MPE-Machine Interlock systems affected by radiation

Wednesday 3 February 2021 14:20 (20 minutes)

We will provide an overview of the ongoing progress and plans to increase radiation tolerance of all MPE-MI equipment impacted by radiation, according to the recent R2E radiation level specification. In particular, we will cover the WIC and PIC systems and the User Interface unit (CIBU) connected to the BIS.

Presenter: SECONDO, Raffaello (CERN)

Session Classification: Developments

Contribution ID: 31

Type: **not specified**

DI/OT - modular platform for rad-tol electronics

Wednesday 3 February 2021 11:40 (15 minutes)

Distributed I/O Tier (DI/OT) is a modular, reusable and centrally-supported hardware kit based on a 3U crate to cover the needs of the equipment groups in the HL-LHC era. The kit aims to provide basic building blocks and a range of communication options for radiation-exposed areas. The talk will introduce different hardware components that are being designed as well as foreseen applications and radiation levels.

Presenter: DANILUK, Grzegorz (CERN)

Session Classification: Developments

Contribution ID: 32

Type: **not specified**

RaToPUS - rad-tol switched mode AC/DC power supply

Wednesday 3 February 2021 11:55 (15 minutes)

RaToPUS is a 100W radiation-tolerant switched-mode AC/DC power supply compatible with CompactPCI-Serial standard. It is designed as part of the Distributed I/O Tier project to be used in radiation-exposed installations of the HL-LHC. This talk will present the design highlights and status of its development and testing.

Presenter: PATNAIK, Lalit (Beams Department, CERN)

Session Classification: Developments

Contribution ID: 33

Type: **not specified**

DI/OT System Board and crate monitoring

Wednesday 3 February 2021 12:10 (15 minutes)

The DI/OT rad-tol System Board is an Igloo2-based CPCI-S FMC carrier that controls the DI/OT crate in radiation-exposed applications. Its specifications, component selection, and development status will be outlined, followed by a brief discussion of the PSI irradiation results of the MoniMod monitoring and fan control module.

Presenter: GENTSOS, Christos (CERN (BE-CO))

Session Classification: Developments

Contribution ID: 34

Type: **not specified**

Ensuring high-reliability for DI/OT hardware kit

Wednesday 3 February 2021 12:25 (15 minutes)

Ensuring high reliability for the DI/OT is to be addressed during all life cycle phases within a variety of disciplines. Despite of meeting radiation tolerance requirements, hardware and gateway reliability, operational support, maintenance, and others also contribute to achieving high performance and reliability for the DI/OT. This talk will present the applied methodology and the current progress.

Presenter: SCHRAMM, Volker (CERN)

Session Classification: Developments

Contribution ID: 35

Type: **not specified**

The quench detection system for the 11 T MBH protection –the radiation tolerant version of the UQDS platform

Wednesday 3 February 2021 10:40 (20 minutes)

In this talk we present the quench detection equipment developed to protect the MBH 11T magnet in the LHC. Since the foreseen UQDS (universal quench detection system) will be installed in RR73 and RR77 the system needs to be radiation tolerant up to 0.4 Gy/y for the main system and 4 Gy/y for the current sensor. The system design, as well as the radiation testing of single components and the whole system will be discussed.

Presenter: STECKERT, Jens (CERN)

Session Classification: Developments

Contribution ID: 36

Type: **not specified**

Radiation tolerant bus-bar splice protection system for the HL-LHC era

Wednesday 3 February 2021 11:00 (20 minutes)

In the context of consolidation of quench detection systems in LHC, new electronics developments are ongoing to enhance existing system functionalities and improve system operation under radiation. One of the developments, presented in this talk, concerns the quench detection of bus-bar splices in main LHC magnet circuits, with the focus on strengthening the radiation tolerance of the existing systems.

Presenter: SPASIC, Jelena (CERN)

Session Classification: Developments

Contribution ID: 37

Type: **not specified**

Next generation of radiation tolerant field-bus clients for QPS

Wednesday 3 February 2021 11:20 (20 minutes)

The existing LHC QPS field-bus clients showed vulnerability to the increasing radiation load during Run 2 affecting data integrity of protection data needed for a proper analysis of protection events. To overcome this issue, a new radiation tolerant FPGA-based field-bus client is currently under development. This talk gives an overview of the design solution and the development status.

Presenter: SPASIC, Jelena (CERN)

Session Classification: Developments

Contribution ID: 38

Type: **not specified**

Key R2E Challenges for New Space

Wednesday 3 February 2021 15:40 (1 hour)

The growth in the commercial space sector has been fueled by drastic launch cost reductions and functionality provided by aggressive and persistent technology scaling. We consider two major challenges to the “New Space” sector: Managing manufacturing variation in COTS devices AND radiation test strategies with limited schedule and budgets.

Presenter: Dr BAUMANN, Robert (Radiosity Solutions LLC)

Session Classification: Invited Talk

Contribution ID: 39

Type: **not specified**

BI developments using Timepix3

Wednesday 3 February 2021 09:20 (15 minutes)

Timepix3 hybrid pixel detectors are used in the beam gas ionization profile monitors (BGI) in the primary vacuum of the PS together with a radiation tolerant readout system. Such detectors and readout system could also be used for beam loss and radiation monitoring. The capabilities of the Timepix3 and the readout will be discussed in this talk in the context of beam instrumentation.

Presenter: SANDBERG, Hampus (CERN)

Session Classification: Developments

Contribution ID: 40

Type: **not specified**

Radiation tolerant camera developments

Wednesday 3 February 2021 09:35 (15 minutes)

A digital (CMOS) radiation tolerant camera is under development through a collaboration between CERN and the Micro-Cameras & Space Exploration commercial partner. The aim is the replacement of already (or very soon) obsolete tube based and CCD analogue cameras that compose the park of 200 profile monitor systems at CERN. Specifications and expected performances of this new camera will be described.

Presenter: BURGER, Stephane (CERN)

Session Classification: Developments

Contribution ID: 41

Type: **not specified**

R2E developments for Beam Position Monitoring

Wednesday 3 February 2021 09:50 (20 minutes)

Beam Position Monitoring (BPM) systems are deployed throughout the accelerator complex at CERN. In some cases, their front-end electronics are exposed to high levels of radiation. This presentation focuses on the status and outlook of R2E developments related to BPM front-end electronics, including DAQ and data communication.

Presenter: BARROS MARIN, Manoel (CERN)

Session Classification: Developments

Contribution ID: 42

Type: **not specified**

R2E developments for Beam Loss Monitoring

Wednesday 3 February 2021 10:10 (20 minutes)

Presenter: ZAMANTZAS, Christos (CERN)

Session Classification: Developments

Contribution ID: 43

Type: **not specified**

Terrestrial neutron effects on commercial SiC power MOSFETs

Tuesday 2 February 2021 18:00 (15 minutes)

Accelerated terrestrial neutron irradiations were performed on commercial SiC power MOSFETs with planar, trench and double-trench architectures. Enhanced gate and drain leakage were observed in some devices which did not exhibit a destructive failure during the exposure. Failure cross-sections and FIT rates are discussed for the three architectures.

Presenter: MARTINELLA, Corinna (University of Jyväskylä (FI))

Session Classification: Research

Contribution ID: 44

Type: **not specified**

R2E challenges of LHC beam dumping generators and high sensitivity HEH monitor development

Wednesday 3 February 2021 13:45 (15 minutes)

The LHC beam dumping system has critical importance for LHC safety. High Voltage (HV) semi-conductors used in extraction and dilution generators operates at up to 28 kV and are potentially exposed to high-energy hadrons leaking from the tunnel. Mitigation measures aiming reduction of the R2E failure rate to the required level are described.

Presenter: SENAJ, Viliam (CERN)

Session Classification: Developments

Contribution ID: 45

Type: **not specified**

Atmospheric neutron testing of GaN power devices

Tuesday 2 February 2021 18:15 (15 minutes)

Wide bandgap power components are known for their resistance to both cumulative radiation damage and SEE, especially when compared to their silicon counterparts, and hence making them promising candidates for radiation tolerant accelerator systems. In this presentation, we show preliminary results of GaN power components recently tested with atmospheric neutrons at ChipIr (UK).

Presenter: SACRISTAN BARBERO, Mario (CERN-CIEMAT)

Session Classification: Research