SERESSA 2022

Brief introduction to the Radiation to Electronics (R2E) project at CERN

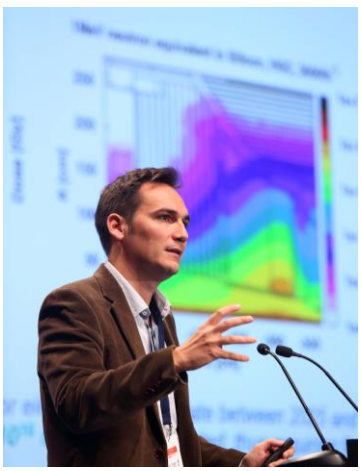
Rubén García Alía, CERN

Abstract:

High-energy particle accelerators are a prominent source of radiation, to which the various nearby electronics systems, critical to the accelerator operation, are exposed to. Hence, the radiation tolerance of such systems needs to be accounted for during their design phase, and validated experimentally. At CERN, the Radiation to Electronics (R2E) project is responsible for providing the necessary support to ensure an adequate performance of its accelerator infrastructure, with regards to radiation exposed electronics. Such support comes mainly in the form of (a) radiation monitoring and calculation, (b) radiation effects mitigation at circuit and system level, (c) operation of CERN irradiation facilities and (d) radiation testing of electronic components and systems.

Short Bio:

Rubén received a master's degree in physics by the University Complutense in Madrid and then spent one year at the European Space Agency, as a graduate trainee in the space environments and effects section. He then moved to CERN where, in collaboration with the University of Montpellier, he completed his doctoral thesis about radiation fields in high-energy accelerators and their impact on Single Event Effects. He is currently leading the "Radiation to Electronics" program at CERN, as well as the RADNEXT and HEARTS EU projects.



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Accelerator Radiation Environment and Neutron Effects in Electronics

Matteo Cecchetto, CERN

Abstract:

The talk introduces the radiation environment in the Large Hadron Collider (LHC) accelerator at CERN and the radiation-induced effects in electronics, presenting several comparisons with the atmospheric environment. The talk shows how the radiation levels are measured and simulated in critical areas, focusing on thermal and higher energy neutrons, which are the main contributors to SEEs. In addition, the SEEs induced by neutrons between 0.1 and 10 MeV are compared to the overall error rate due to the full neutron spectra, showing that in some cases they can induce more failures than more energetic neutrons. The related Radiation hardness Assurance (RHA) implications are presented.

Short Bio:

Matteo Cecchetto received the Master degree in Electronic Engineering from the University of Padova (Italy) in 2017, and performed the PhD at CERN (Switzerland) obtaining the degree from the University of Montpellier (France) in 2021. He is currently Senior Fellow at CERN, working in the Radiation to Electronics (R2E) project. His main activities focus on the experimental and simulation study of neutron-induced Single Event Effects in accelerator and atmospheric environments, with a deepening on the effect of thermal and intermediate-energy neutrons, and related implications on the qualification approach for electronics.

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