

WP1 - Environment, Facilities & Monitoring

17-19 May, 2021

RADSAGA Final Conference and Industrial event

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RADiation and Reliability Challenges for Electronics used in Space, Aviation, Ground and Accelerators (RADSAGA) is a project funded by the European Commission under the Horizon2020 Framework Program under the Grant Agreement 721624.

RADSAGA began in Mars 2017 and will run for 5 years.



- ❑ Objectives
 - ❑ cross-calibration of the broad range of radiation environments and test facilities
 - ❑ study the use of alternative test approaches to characterize the response of components and systems to complex radiation environments

5 ESRs involved in this WP



- ❑ Some changes along the way
 - ❑ WP Leader
 - ❑ Prof. Ari Virtanen (JYU) retired and Dr. Arto Javanainen (JYU) took over
 - ❑ ESR3
 - ❑ Original ESR resigned and after a new hiring round Christoph Meyer “continued” the project

- ❑ ESR1 : Sascha Lüdeke (University of Jyväskylä)
 - ❑ Supervisor : Arto Javanainen (University of Jyväskylä)
 - ❑ Co-supervisor : Heikki Kettunen (University of Jyväskylä)

« Correlations of direct ionization effects from low -E protons to energetic heavy ions »

- Creating a semi-empirical model for electronic stopping (or LET)
- Combining LET-model with a straggling (i.e. energy deposition variance) model in order to estimate energy deposition probability distribution in various target volumes
- Building analytical model to estimate SV geometries (for SER estimations) from SEU data without help from MC simulations (to save time)

- ❑ ESR2 : Daniel Söderström (University of Jyväskylä)
 - ❑ Supervisor : Heikki Kettunen (University of Jyväskylä)
 - ❑ Co-supervisors : Arto Javanainen (University of Jyväskylä)
Luigi DiLillo (LIRMM / University of Montpellier)
Sylvain Girard (Université Jean Monnet)

- « Electron-induced SEEs in SDRAMs and dosimetry of a pulsed electron beam »

- Studying the effects of high-energy electrons on SDRAMs and optical fibers

- SDRAMs exhibit three types of effects : (1) ***stuck bits***, (2) ***SEUs*** and (3) ***cumulative effects***

- Response of different types of optical fibers studied for dosimetry applications

- ❑ ESR3 : Christoph Meyer (University of Groningen)
 - ❑ Supervisor : Sytze Brandenburg (University of Groningen)
 - ❑ Co-supervisors : Björn Poppe (University of Oldenburg)
Emiel van der Graaf (University of Groningen)
Arto Javanainen (University of Jyväskylä)

« Design of an experimental set-up to investigate the capability of different detectors to measure LET spectra »

- Comparing energy deposition in detectors with differently sized charge collection volumes
- LET distributions for different ions and energies to be measured

- ❑ ESR4 : Vanessa Wyrwoll (CERN, UiO)
 - ❑ Supervisor : Ketil Roed (University of Oslo)
 - ❑ Co-supervisors : Ruben Garcia Alia (CERN)
 - Björn Poppe (University of Oldenburg)
 - Arto Javanainen (University of Jyväskylä)
 - Frederic Wrobel (University of Montpellier)
- «Unique particle beams and energies at CERN applied to radiation testing of electronics »
- The utilization of ultra high energy (UHE) ion beams in radiation effects testing studied via experiments and MC-simulations

- ❑ ESR5 : Jialei Wang (KU Leuven)
 - ❑ Supervisor : Paul Leroux (KU Leuven)
 - ❑ Co-supervisors : Ketil Roed (University of Oslo)
Jeffrey Prinzie (KU Leuven)

« SRAM based Radiation Monitor system »

- Designing and testing of a controllable radiation monitor based on SRAM technology
- Exhaustive radiation characterization with various particle beams performed



- ❑ **Milestones:**
 - ❑ MS4 *“Draft analysis of test facilities and respective dosimetry systems to be presented to network; additional measurements/facilities to be decided upon”* by ESR1+2
- ❑ **Deliverables :**
 - ❑ D1.1 *“Summary of Radiation Hardening Assurance Approaches in European Test Facilities”* by ESR1
 - ❑ D1.2 *“Design status report and prototype of SRAM radiation monitor”* by ESR5
 - ❑ D1.3 *“Facility dosimetry procedure and dedicated monitors”* ESR1+2
 - ❑ D1.4 *“Documentation of test setups practical for mixed-field facilities”* by ESR12+15



- ❑ Articles in journals:
 - ❑ IEEE Tran. Nucl. Sci. x 12
 - ❑ Nucl. Instr. Meth. A x 2
 - ❑ Optical Soc. America x 1

- ❑ Conference Presentations
 - ❑ NSREC, RADECS, DTIS, DFT

- ❑ PhD manuscripts
 - ❑ all 5 ESRs to defend their PhD in near future