



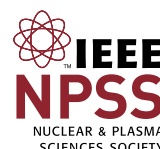
RADECS 2025

RADIation Effects on Components and Systems Conference

29 September - 3 October

ANTWERP
Belgium

PROGRAM



KU LEUVEN

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RADECS (RADiation and its Effects on Components and Systems Conference) is the annual international scientific and industrial forum on radiation and its effects on electronics and photonic materials, devices, circuits, sensors and systems. It is organized every year in a European venue and attracts hundreds of scientists and engineers from all over the world who exchange on the latest advances and results about:

- Basic Mechanisms of Radiation Effects
- Radiation Effects in Devices and Integrated Circuits:
 - Total Ionizing Dose (TID)
 - Total Non-Ionizing Dose (TNID)
 - Synergistic Effects
 - Single Event Effects (SEEs)
- Radiation Environments
- Radiation Test Facilities & Dosimetry
- Radiation Hardening Techniques (Device, board and system level)
- Radiation Hardness Assurance
- Radiation Effects in Photonics, Optoelectronics and Sensors
- Radiation Effects in complex devices and systems

The 2025 edition of the RADECS Conference is held on September 29 – October 3 at A Room with a ZOO in Antwerp (Belgium). It is organized by KU Leuven on behalf of the RADECS Association and is technically co-sponsored by the IEEE-NPSS.

In addition to the usual RADECS topics, the 2025 Short Course is entitled 'The Tools of Our Trade: From Space Environment to Systems and Validation'. It focuses on the tools used in the radiation hardness assurance (RHA) process including modeling, simulation, prediction, and validation. This one-day event follows the typical flow of RHA-related processes with the morning session emphasizing the basics while the afternoon delves deeper into applying the basics knowledge to device development, performance analysis, and system level consideration/validation.

Without forgetting a wonderful social program including technical visits, tours and social events which allows the attendees and companions to enjoy Antwerp and surroundings.

On behalf of the organizing committee and with warm gratitude to the entire team involved in the preparation, the sponsors and the exhibitors, we are glad to welcome you in Antwerp for an outstanding RADECS 2025 conference.

The General Chairs



Prof. Paul Leroux



Prof. Sylvain Girard

PAUL LEROUX (*KU Leuven, Belgium*) | **General Chair**
SYLVAIN GIRARD (*UJM, France*) | **General Co-Chair**

JEFFREY PRINZIE (*KU Leuven, Belgium*) | **Technical Program Co-Chair**
FREDERIC WROBEL (*University of Montpellier, France*) | **Technical Program Co-Chair**
STEFAN DE RAEDEMAKER (*KU Leuven, Belgium*) | **Technical Program Co-Chair Help**

TERESA FARRIS (*Archon-LLC, United States*) | **Industrial Exhibit Co-Chair**
MICHEL MELOTTE (*FairRad, Belgium*) | **Industrial Exhibit Co-Chair**

KEN LABEL (*NASA retired, United States*) | **Short Course Co-Chair**
GUY MEYNANTS (*KU Leuven, Belgium*) | **Short Course Co-Chair**

STEFANO BONALDO (*University of Padova, Italy*) | **Poster Session Co-Chair**
SERENA RIZZOLO (*Airbus Defense and Space, France*) | **Poster Session Co-Chair**

ALEXANDRE ROUSSET (*TRAD, France*) | **Data Workshop Session Co-Chair**
AMOR ROMERO-MAESTRE (*CNA, Spain*) | **Data Workshop Session Co-Chair**

CAMILLE BÉLANGER-CHAMPAGNE (*TRIUMF, Canada*) | **Awards Co-Chair**
JOCHEN KUHNHENN (*Fraunhofer INT, Germany*) | **Awards Co-Chair**

VALENTIJN DE SMEDT (*KU Leuven, Belgium*) | **Events and Local Arrangements Co-Chair**
JELLE VAN RETHY (*MAGICS, Belgium*) | **Events and Local Arrangements Co-Chair**

ESMEE TACKX (*KU Leuven, Belgium*) | **Student Special Events**

HANNE STAS (*KU Leuven, Belgium*) | **Social Media Chair**

PHILIPPE PAILLET (*CEA, France*) | **Proceedings Editor / RADECS liaison**
DAN FLEETWOOD (*Vanderbilt University, United States*) | **IEEE TNS Guest Editor**

YGOR AGUIAR (*CERN, Switzerland*) | **Diversity Co-Chair**
DENIZ CIVAY (*Trusted Semiconductor Solutions, United States*) | **Diversity Co-Chair**

MARISA SARTORI (*Sistema Congressi, Italy*) | **Financial Chair**

CONTACTS

ORGANIZING SECRETARIAT

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SUNDAY 28 September	MONDAY 29 September	TUESDAY 30 September	WEDNESDAY 1 October	THURSDAY 2 October	FRIDAY 3 October
	7:30 - 8:30 REGISTRATION	7:30 - 8:30 REGISTRATION	7:30 - 8:30 REGISTRATION	7:30 - 8:30 REGISTRATION	
TOURS	8:30 - 8:45 INTRODUCTION	8:30 - 9:00 Conference Opening	8:30 - 9:30 INVITED TALK 2 <i>Thomas Hertog</i>	8:30 - 9:30 INVITED TALK 3 <i>Sarah Baatout</i>	8:30 - 9:30 INVITED TALK 4 <i>Maarten Weyn</i>
	8:45 - 10:15 SHORT COURSE Morning Session	9:00 - 10:30 SESSION B	9:30 - 10:30 SESSION H	9:30 - 10:30 SESSION E	9:30 - 10:30 SESSION A
	10:15 - 10:45 COFFEE BREAK*	10:30 - 11:00 COFFEE BREAK*	10:30 - 11:00 COFFEE BREAK*	10:30 - 11:00 COFFEE BREAK*	10:30 - 11:00 COFFEE BREAK*
	10:45 - 12:15 SHORT COURSE Morning Session	11:30 - 12:45 SESSION G	11:00 - 12:45 SESSION I	11:45 - 12:45 SESSION J	11:00 - 12:30 SESSION D
	12:15 - 13:45 LUNCH	12:45 - 14:15 LUNCH	12:45 - 14:15 LUNCH	12:45 - 14:15 LUNCH RAFLÉ!	12:30 - 13:00 CLOSING SESSION
	13:45 - 15:15 SHORT COURSE Afternoon Session	14:15 - 15:15 INVITED TALK 1 <i>Jonathan Pellish</i>	14:15 - 15:15 Women in Engineering	14:15 - 16:15 DATA WORKSHOP	14:00 - 19:00 TECHNICAL VISITS
	15:15 - 15:45 COFFEE BREAK	15:15 - 16:30 SESSION F	15:15 - 18:00 POSTER SESSION	15:45 - 16:15 COFFEE BREAK*	
	INDUSTRIAL EXHIBITION SET-UP 15:45 - 18:00	16:30 - 17:00 COFFEE BREAK*	16:15 - 16:45 COFFEE BREAK*	16:45 - 18:00 RADECS General Assembly	
	15:45 - 18:00 SHORT COURSE Afternoon Session	17:00 - 18:05 SESSION C	POSTER SESSION		
	18:30 - 20:00 WELCOME RECEPTION	18:15 - 20:30 INDUSTRIAL EXHIBIT RECEPTION	17:45 - 20:45 SOCCER TOURNAMENT	19:30 - 22:30 GALA DINNER	

* COFFEE BREAK in the exhibition area

Single Event Effects: Devices & ICs
Chairs: Magali Haussy & Enxia Zhang
B1 09:05 - 09:20
Comparing SEU Vulnerability of SRAM and D-FF Cells in a 3-nm FinFET Technology
Authors: N. Pieper(1), Y. Xiong(1), J. Kronenberg(1), D. Ball(1), B. Bhuva(1)

1. Vanderbilt University, USA
Presenting author: Nicholas Pieper

Numerous factors are shown to strongly affect single-event upset (SEU) vulnerability for storage cells, resulting in Flip-Flop cells having greater vulnerability than SRAM cells at a 3-nm FinFET technology.

B2 09:20 - 09:35
Effects of Temperature and Supply Voltage of the SE Cross-Sections for Flip-flop Designs at 7-, 5-, and 3-nm bulk FinFET Nodes
Authors: X. Zhao(1), J. Kronenberg(1), Y. Xiong(1), N. Pieper(1), S. Ball(1), B. Bhuva(1)

1. Vanderbilt University, USA
Presenting Author: Xiaotong Zhao

SE cross-sections of D flip-flops at 7-nm, 5-nm, and 3-nm FinFET nodes are investigated at elevated temperatures across a range of supply voltages.

B3 09:35 - 09:50
Improvement of Heavy Ion-Induced Single-Event Burnout Tolerance Based on Automotive SiC Trench MOSFETs
Authors: E. Kagoshima(1), M. Takahashi(2), M. Iwata(2), T. Suzuki(2), R. Kihara(1), T. Nishiwaki(1), H. Fujiwara(1), H. Shindou(2)

1. MIRISE Technologies, Japan, 2. Japan Aerospace Exploration Agency, Japan
Presenting Author: Eiji Kagoshima

Single-event burnout (SEB) tolerance was improved in SiC trench MOSFETs by applying double or triple drift layers. It was confirmed experimentally that this multi-drift layer technique resolved the trade-off between SEB tolerance and on-resistance.

B4 09:50 - 10:05
Comparison of Heavy-Ion and Laser-Induced Single-Event Frequency Transients in CMOS LC-Tank Oscillators.
Authors: G. Adom-bamfi(1), Q. Ma(1), S. Biereigel(2), P. Leroux(1), J. Prinzie(1)

1. KU Leuven, Belgium, 2. CERN, Switzerland
Presenting author: Gideon Adom-Bamfi

This paper analyzes Single-Event Frequency Transients in CMOS LC-tank oscillators using heavy ions and 1064 nm pulsed laser testing, validating laser testing as an effective method for emulating radiation effects in inductors.

B5 10:05 - 10:20
Back-Gate Bias Suppression of High-Temperature Enhanced SEU Sensitivity in the DSOI Technology
Authors: Y. Sun(1), Y. Wang(1), S. Chen(2), F. Liu(1), L. Wang(1), B. Li(1), J. Gao(1), C. Wang(1), G. Zhang(1), K. Wang(1), L. Shu(1), L. Wang(1), T. Ye(1)

1. Institute of Microelectronics, Chinese Academy of Sciences, China, 2. institute of microelectronics of the chinese academy of sciences, China
Presenting Author: Yuxin Sun

The single-event upset (SEU) cross-section is experimentally shown to increase with temperature due to significant single-event transient pulse broadening and SRAM cell stability degradation. A negative back-gate bias applied to NMOS suppresses temperature-enhanced SEU sensitivity.

B6 11:00 - 11:15**Quasi Event-Wise Measurement of Neutron-Induced Multiple-Cell Upsets in 22-nm and 55-nm SRAMs**

Authors: Y. Gomi(1), K. Takami(1), R. Yasuda(1), H. Kanda(2), M. Fukuda(2), M. Hashimoto(1)

1. Kyoto univ., Japan, 2. Osaka univ., Japan

Presenting Author: Yuibi Gomi

We measured neutron-induced SEUs, including Distant MCUs, in dedicated self-scan 22/55-nm SRAMs, finding that Distant MCUs account for 13% of MCUs. We also evaluated conventional bitmap-based methods, showing narrow grouping distances prevent Distant MCU characterization.

B7 11:15 - 11:30**Observation of Higher Upset Rates in Multi-Bit Flip-Flops Utilized in Low Power Designs**

Authors: J. Kim(1), R. Bloom(1), Y. Yi(1), C. Lim(2), I. Jang(2), J. Jin(2), Y. Hwang(2), K. Chun(2), C. Kim(1)

1. University of Minnesota, USA, 2. Samsung Electronics Co., Ltd, Korea, Republic of

Presenting Author: Junkyu Kim

Neutron-induced upset results for multi-bit flip-flops with standard and DICE latch structures are presented. We uncover new vulnerabilities of multi-bit flip-flops, a popular technique for reducing chip power consumption, stemming from the shared clock buffer.

G1 11:35 - 11:50
Dosimetric characterization of the mixed radiation environment created by 1 GeV_n Fe-56 impact on regolith using Timepix3

Authors: H. Cintas(1), Y. Akisheva(2), B. Bergmann(1), S. Blunier(3), D. Boscolo(4), V. Pan(5), A. Rosenfeld(5), P. Smolyanskiy(1), R. Torres(3), L. Tran(5)

1. Institute of Experimental and Applied Physics, Czech Technical University in Prague, Czech Republic, 2. Yulia Talk Smart & Consulting, France, 3. European Space Agency, Germany, 4. GSI Helmholtzzentrum für Schwerionenforschung GmbH, Germany, 5. University of Wollongong, Australia

Presenting author: Hugo Cintas

We first used Geant4 to simulate the interaction of 1 GeV_n 56Fe with different thicknesses of regolith. Then, we used a Two-layer Timepix3 detector to measure and characterize the mixed radiation field generated to identify the optimal shielding configuration.

G2 11:50 - 12:05
Toward Accurate Monitoring of 14 MeV Neutron Flux: Dual Calibration of a Lithium-Glass Scintillator

Authors: F. Fricano(1), L. Weninger(1), A. Morana(2), A. Colangeli(3), S. Loreti(3), Y. Ouerdane(2), E. Marin(2), B. Aziz(2), D. Lambert(4), P. Paillet(4), B. Capoen(5), H. El hamzaoui(5), D. Labat(5), M. Bouazaoui(5), A. Pietropaolo(3), S. Girard(6)

1. Laboratoire Hubert Curien, France, 2. Laboratory Hubert Curien, France, 3. ENEA, Italy, 4. CEA, France, 5. Université de Lille, France, 6. Université de Saint Etienne, France

Presenting author: Fiammetta Fricano

We tested the capability of a cerium activated lithium silicate glass scintillator to act as neutron flux and fluence monitor. A characterization under X-rays allows for large dose effects investigation and dose rate range evaluation.

G3 12:05 - 12:20
Optimizing the Performances of Optical Fiber Dosimeters Operating in the Visible Domain

Authors: M. Roche(1), A. Morana(2), F. Fricano(3), N. Kerboub(4), J. Mekki(4), G. Mélin(5), T. Robin(5), E. Marin(3), A. Boukenter(3), Y. Ouerdane(3), D. Lambert(1), P. Paillet(1), S. Girard(6)

1. CEA, France, 2. Laboratory Hubert Curien, France, 3. Laboratoire Hubert Curien, France, 4. CNES, France, 5. EXAIL, France, 6. Université de Saint Etienne, France

Presenting author: Martin Roche

We investigate how the photobleaching effect influences the performances of a dosimeter based on phosphosilicate multimode optical fiber under various irradiation conditions (dose, dose rate, temperature).

G4 12:20 - 12:45
Fragmentation Analysis of High-Energy Heavy Ion Beams for Single Event Effects Testing at NSRL

Authors: T. Olsen(1), J. Gasparik(1), D. Inzalaco(1), X. Jiang(1), M. McCarthy(1), M. Sivertz(1)

1. NASA Space Radiation Lab (BNL), USA

Presenting author: Trevor Olsen

Fragmentation of high kinetic energy heavy ions results in a lower per-particle LET incident on a target. This paper presents a comparison between experimental data and FLUKA simulations of commonly used NSRL beams.

F1 15:20 - 15:35**All-Digital Phase-Locked Loop with Single-Event Phase and Frequency Transient Suppression****Authors:** S. Biereigel(1), S. Kulis(1), P. Moreira(1)

1. CERN, Switzerland

Presenting author: Stefan Biereigel

Improvement of radiation tolerance of an all-digital bang-bang PLL circuit using an auxiliary TDC circuit. The TDC allows detecting and reacting to larger phase deviations by the loop with low power overhead.

F2 15:35 - 15:50**Self-Correcting Flip-flop Circuit Avoiding Soft Error Accumulation in Low Power Designs****Authors:** A. Jain(1), A. Veggetti(2), D. Crippa(3), A. Benfante(4), A. Sharma(1)

1. STMicroelectronics, India, 2. STMicroelectronics, Italy, 3. STMicroelectronics, Italy, 4. STMicroelectronics, Italy

Presenting author: Abhishek Jain

A novel flip-flop architecture is presented which can load data asynchronously on assertion of enable signal, it can be implemented in DMR or TMR configuration with error detection to provide immunity to soft error.

F3 15:50 - 16:05**ML/AI-Based SEL/ μ -SEL Detection in a COTS System without Modifying the COTS System****Authors:** J. Zhao(1), Y. Sun(1), T. Zhang(2), K. Chong(2), W. Shu(2), J. Chang(1)

1. NTU, Singapore, 2. Zero-Error Systems (ZES) Pte Ltd, Singapore

Presenting author: Junkai Zhao

We propose an adaptive pre-processing module for ML/AI-based approaches to enhance the detection of SELs/ μ -SELs in a COTS system (embodying multiple COTS ICs) by monitoring only its input power rail, without modifying the COTS system.

F4 16:05 - 16:20**Self-Healing Gate-Controlled LPNP Device Using Electrical Annealing to Mitigate TID Radiation-Induced Degradation****Authors:** W. Ma(1), Z. Wang(2), X. Ouyang(1)

1. Northwest Institution of Nuclear Technology, China, 2. Chongqing Yuxin Electronics Co., Ltd., China

Presenting author: Wuying Ma

Radiation-hardened bipolar transistor with oxide-embedded polysilicon microheater achieves 96% recovery in 60s via Joule heating, mitigating 40 krad(Si) TID damage while preserving electrical characteristics and enabling in situ real-time defect annealing for space radiation environments.

C1 17:05 - 17:20
Radiation Effects Specific to State-of-the-Art Global Shutter CMOS Image Sensors
Authors: A. Jouni(1), A. Vriet(1), L. How(2), A. Merlenghi(1), M. Beaumel(3)

1. Sodern, France, 2. AdvEOTec, France, 3. SODERN, France

Presenting author: Ali Jouni

Radiation-Induced degradation arising from the operation principle of global shutter CMOS Image Sensors are studied. Increased charge generation rate in voltage and charge domain pixels memory nodes are highlighted.

C2 17:20 - 17:35
Impact of Hole Traps on the Dark Current of Proton Irradiated Ga-Free T2SL Infrared Detector
Authors: H. Mezouar(1), A. Michez(1), M. Tornay(1), P. Christol(1)

1. University of Montpellier, France

Presenting Author: Hassen Mezouar

We study the dark current in Ga-free InAs/InAsSb type-II superlattice midwave infrared barrier photodetectors irradiated with 60 MeV protons. The observed degradation, caused by displacement damage, is attributed to hole traps, impacting device performance.

C3 17:35 - 17:50
Electro-Optic Response of Silicon Photonics Ring Modulators under Ionizing Radiation
Authors: D. Alfiero(1), L. Olantera(1), C. Scarcella(1), A. Cristiano(1), S. Detraz(1), H. Fabik(1), H. Muthuganesan(1), I. Quintana ponce(1), C. Sigaud(1), C. Soos(1), J. Troska(1)

1. CERN, Switzerland

Presenting Author: Daniele Alfiero

The electro-optic frequency response of silicon photonic ring modulators was measured up to 12MGy total ionizing dose. Significant temperature-dependent degradation in both modulation efficiency and bandwidth was observed. Short high-temperature annealing achieved almost complete recovery.

C4 17:50 - 18:05
LED Lightning Influence on the Radiation Response of Erbium Doped Fiber Amplifiers
Authors: A. Facchini(1), L. Weninger(1), A. Morana(2), L. Mescia(3), T. Robin(4), A. Boukenter(1), E. Marin(1), Y. Ouerdane(1), S. Girard(5)

1. Laboratoire Hubert Curien, France, 2. Laboratoire Hubert Curien, France, 3. Politecnico di Bari, Italy, 4. Exail, France, 5. Université de Saint Etienne, France

Presenting Author: Alberto Facchini

We studied the radiation response of two different amplifiers based on radiation hardened optical fibers when an external LED lightning is used to photobleach these fibers radiation-induced attenuation and limit the gain degradation.

H1 09:35 - 09:50
TID-induced leakage current in a commercial 28-nm CMOS technology

Authors: K. Sarbandi(1), G. Borghello(1), F. Faccio(1), S. Michelis(1), G. Ripamonti(1), G. Bantemits(1), G. Ciachera(2)

1. CERN, Switzerland, 2. CERN, France

Presenting author: Kourosh Sarbandi

This study examines radiation-induced leakage in 28nm CMOS FOXFETs, linking it to STI-junction interactions. Results suggest BTBT as a key mechanism, with strong bias-temperature dependencies, impacting radiation-hardened circuit reliability.

H2 09:50 - 10:05
Heavy-Ion Induced Microstructural Damage Leading to Leakage Current in SiC PiN Diode

Authors: L. Qiu(1), Y. Bai(1), S. Zhao(2), J. Ding(3), P. Zhai(2), X. Liu(1)

1. Institute of Microelectronics, Chinese Academy of Sciences, China, 2. Institute of Modern Physics, Chinese Academy of Sciences, China, 3. Zhuzhou CRRC Times Semiconductor Company Ltd., China

Presenting author: Leshan Qiu

The microstructural damage at PN junction that leading to the SELC degradation of SiC PiN diode was observed for the first time, and the room and high temperature electrical characteristics of irradiated devices were investigated.

H3 10:05 - 10:20
Synergistic effect of 300 MeV proton and heavy ion irradiation on the electrical properties of β -Ga₂O₃ SBD

Authors: Z. Zhang(1), T. Wang(1), C. Liu(1), L. Shu(2), Y. Zhang(1), C. Qi(1), G. Ma(1), M. Huo(1), L. Xiao(1)

1. Harbin Institute of Technology, China, 2. Institute of Microelectronics of the Chinese Academy of Sciences, China

Presenting author: Zhengliang Zhang

This work investigates the synergistic radiation effects of β -Ga₂O₃ SBDs under 300 MeV proton and 143 MeV Ar heavy-ion irradiation.

I1 11:05 - 11:20
NORM on ASBM: Probing the High-Energy Radiation Environment from a Unique Orbit
Authors: I. Sandberg(1)

1. *Space Applications & Research Consultancy (SPARC), Greece*
Presenting author: Ingmar Sandberg

ASBM/NORM provides high resolution measurements of electrons within 0.4–6 MeV and protons within 10–90 MeV along TAP HEO. We review data and show that NORM is an invaluable asset for updating/validating space radiation environment models.

I2 11:20 - 11:35
Probing In-Orbit Radiation Environment with Sentinel-1 A & B Single Event Effects on Payload Mass Memories
Authors: V. Pietrosanti(1), S. Francola(2), R. Mancini(2), G. Ferrari(2), A. Leo(2), R. Marec(3)

1. *University of Rome Tor Vergata, Italy*, 2. *Thales Alenia Space Italy, Italy*, 3. *Thales Alenia Space, France*
Presenting author: Virginia Pietrosanti

Sentinel-1A and 1B in-orbit SEE data from mass memory units are analyzed. Simulated SEE rates, derived from ground data and detailed CAD models, are used to assess space radiation models, space weather and shielding effects.

I3 11:35 - 11:50
Measurement of Protons and Heavier Ions With a Single Layer Timepix Detector in Space
Authors: S. Gohl(1), B. Bergmann(2), H. Cintas(3), D. Garvey(1)

1. *IEAP, CTU in Prague, Czech Republic*, 2. *Institute of Experimental and Applied Physics, Czech Technical University in Prague, Czech Republic*, 3. *IEAP CTU, Czech Republic*
Presenting author: Stefan Gohl

The Space Application of Timepix Radiation Monitor (SATRAM) measures radiation dose, stopping power spectrum, and has particle species separation capabilities. Bayesian unfolding is used to determine the proton spectrum from SATRAM's single-layer sensor.

I4 11:50 - 12:05
Spatial Distribution of Terrestrial Neutron Flux in a Five-story Concrete Building
Authors: Y. Watanabe(1), H. Tanaka(1), Y. Horai(1), T. Kato(2)

1. *Kyushu University, Japan*, 2. *Socionext Inc, Japan*
Presenting author: Yukinobu Watanabe

The spatial and energy distributions of terrestrial neutron flux were measured inside a five-story concrete building. The results were well reproduced by PHITS simulations using the cosmic-ray model PARMA.

I5 12:05 - 12:20
Pulse Shape Identification of Neutron Reaction Products for in-situ Radiation Monitoring
Authors: Q. Gibaru(1), P. Caron(1)

1. *ONERA, France*
Presenting author: Quentin Gibaru

Simulations and experimental measurements of transients generated in neutron irradiated SSDs are performed. Simulated results are used to identify neutron reaction products by pulse shape analysis and machine learning.

I6 12:20 - 12:35
Characterisation of the Radiation Field in LHC IR4 using a Timepix Radiation Monitor and FLUKA simulations
Authors: D. Prelicpcean(1), G. Lerner(1), R. Garcia(1)

1. *CERN, Switzerland*
Presenting author: Daniel Prelicpcean

The Timepix3 Radiation Monitor measured ionising dose and charged particle fluence at LHC IR4; directionality and stopping power were also assessed and results compared with dedicated FLUKA simulations for validation.

E1 09:35 - 09:50
Analysis of In-System Performance of Point-of-Load Power Converters During System-Level Irradiation

Authors: I. Slipukhin(1), R. Garcia(1), F. Saigné(2), J. Boch(3), L. Dilillo(4), D. Prelipcean(1), M. Cecchetto(1), C. Cazzaniga(5), M. Kastriotou(5), S. Fiore(1), J. Lendaro(1)

1. CERN, Switzerland, 2. Université de Montpellier, France, 3. Univ Montpellier, France, 4. IES/University of Montpellier/CNRS, France, 5. STFC, United Kingdom

Presenting author: Ivan Slipukhin

With the implementation of in-system component-level observations based on the sampling of critical voltages of the Point-of-Load power converters, the radiation-induced effects causing system-level failures were revealed and investigated during three irradiation campaigns.

E2 09:50 - 10:05
Microbeam Testing of an ASIC Radiation-Hardened 32-bit RISC-V Microcontroller

Authors: C. Elash(1), S. Peracchi(2), Z. Li(1), J. Xing(1), H. Lu(1), R. Fung(3), Z. Pastuovic(2), R. Drury(2), G. Martin(4), L. Chen(1)

1. University of Saskatchewan, Canada, 2. ANSTO, Australia, 3. Cisco, USA, 4. Quicklogic Corp, USA

Presenting author: Christopher Elash

Microbeam testing was performed on a radiation-hardened ASIC 32-bit RISC-V microcontroller. Results show applied hardening techniques make the core and peripheral circuitry extremely robust. Individual scanning of memory blocks shows SEFI rates are unevenly distributed.

E3 10:05 - 10:20
HARV-SoC Evaluation on SmartFusion2 and PolarFire FPGAs Under Neutron Radiation

Authors: W. Grignani(1), D. Santos(2), M. Kastriotou(3), C. Cazzaniga(3), D. Melo(4), F. Wrobel(5), L. Dilillo(6)

1. IES - University of Montpellier, France, 2. IES, University of Montpellier, CNRS, France, 3. STFC, United Kingdom, 4. Univali, Brazil, 5. Université Montpellier, France, 6. IES/University of Montpellier/CNRS, France

Presenting author: Wesley Grignani

This work evaluates HARV-SoC under neutron irradiation, implementing and analyzing different designs on SmartFusion2 and PolarFire FPGAs. Different architectures are explored to assess fault tolerance and performance trade-offs for dependable applications.

E4 11:00 - 11:15
Uncovering Fault Behavior in Arm Cortex-M Microprocessors with cFS Under Neutron Radiation

Authors: L. Gobatto(1), F. Benevenuti(2), L. Laurini(3), B. Cheymol(4), R. Bastos(5), F. Lima kastensmidt(6), J. Azambuja(6)

1. Federal University of Rio Grande do Sul, Brazil, 2. Universidade Federal do Rio Grande do Sul, Brazil, 3. Univ. Grenoble Alpes, CNRS, Grenoble INP, TIMA, France, 4. Univ. Grenoble Alpes, CNRS, IN2P3, Grenoble INP, LPSC, France, 5. Univ. Grenoble Alpes / TIMA laboratory, France, 6. UFRGS, Brazil

Presenting author: Fernanda Lima Kastensmidt

This work analyzes how cFS and cache impact the reliability of Arm Cortex-M under neutron irradiation, revealing increased software failures and I/O timeouts, often caused by hardware and software exceptions.

E5 11:15 - 11:30
Self-healing architecture for RISC-V soft core processor in SRAM-based FPGAs using Dynamic Partial Reconfiguration

Authors: J. Cano(1), L. Entrena(2), M. Garcia(3), A. Lindoso(4)

1. Universidad Carlos III de Madrid, Spain, 2. Universidad Carlos III, Spain, 3. Universidad Carlos 3, Spain, 4. University Carlos III Madrid, Spain

Presenting author: Jorge Cano

This work proposes a RISC-V fault-tolerant processor architecture for SRAM-based FPGAs. The architecture aims to provide high reliability and availability using Dynamic Partial Reconfiguration, and has been validated for a commercial FPGA under proton irradiation.

E6 11:30 - 11:45**Reliability Analysis of Neural Network Inference on a Fault-Tolerant RISC-V SoC with Vector Extension****Authors:** C. Imianosky(1), D. Santos(2), W. Grignani(3), L. Dilillo(4)*1. IES - Université de Montpellier, France, 2. IES, University of Montpellier, CNRS, France, 3. IES - University of Montpellier, France, 4. IES/University of Montpellier/CNRS, France***Presenting author:** Carolina Imianosky

This work explores the deployment of quantized neural network inference on a fault-tolerant RISC-V SoC, enhancing performance with vectorized convolution and widening instructions. Through fault injection simulations, a reliability evaluation of the SoC is performed.

J2 11:50 - 12:05**Commercial GaN FETs. Radiation destructive events: Lot-to-lot and intra-lot variability.****Authors:** M. Perez-cerdan(1), M. Gomez-alonso(2), A. Fernandez-fernandez(2), P. Lopez-cenamor(2), A. Carbone(3), C. Palomar-trives(2), F. Franco(4)*1. Airbus Crisa / Universidad Complutense de Madrid (UCM), Spain, 2. Airbus Crisa, Spain, 3. Airbus France, Italy, 4. Universidad Complutense de Madrid (UCM), Spain***Presenting author:** Miguel Perez-Cerdan

This research is the beginning of a study on the reliability of gallium nitride (GaN) devices under radiation. Unlike silicon devices, GaN devices exhibit high variability in their radiation performance, both between and within lots.

J3 12:05 - 12:20**Study of TID Response of a Low Cost Motor Board with a System-Level Testing Approach****Authors:** G. Carpentier(1), J. Boch(2), F. Saigne(2), J. Favrichon(1), E. Cantrel(1), J. Vaille(2), T. Maraine(2), F. Wrobel(2), L. Dilillo(3)*1. CEA, France, 2. Université de Montpellier, IES, France, 3. Université de Montpellier, IES - CNRS, France***Presenting author:** Guillaume Carpentier

The Total Ionizing Dose response of a motor board is studied with radiation tests performed at system-level. The choice of monitoring parameters is crucial, as they can be used to determine the board's sensitive components.

A1 09:35 - 09:50**Experimental Calibration and Validation of a Voltage-Dependent SET Model in 65 nm CMOS****Authors:** V. Kampati(1), M. Gorbunov(2), Z. Li(2), B. Vignon(2), L. Berti(2), P. Leroux(1), J. Prinzie(1)

1. KU Leuven, Belgium, 2. imec, Belgium

Presenting author: Venkata Sathyajith Kampati

This paper presents the experimental calibration of a dynamic voltage-dependent Verilog-A model for single-event transients (SETs) in 65 nm CMOS, validated using SET pulse width data at $48 \text{ MeV}\cdot\text{cm}^2/\text{mg}$, with errors reduced to below 10%.

A2 09:50 - 10:05**Sensitive Volume Allocation Aligned with a Physics-Based Analytical Cross Section Model for Monte Carlo-Based Proton-Induced SEU Simulation****Authors:** K. Takeuchi(1), M. Hashimoto(2)

1. Japan Aerospace Exploration Agency, Japan, 2. Kyoto University, Japan

Presenting Author: Kozo Takeuchi

A method of constructing physically reasonable multiple sensitive volumes in particle transport Monte Carlo simulation is proposed in this paper. The validity of method is discussed with the proton-induced single event upsets on several SRAMs.

A3 10:05 - 10:20**Single-Event Transient Pulse Widths at the 3-nm bulk FinFET node****Authors:** J. Kronenberg(1), Y. Xiong(1), N. Pieper(1), D. Ball(1), B. Bhuvu(1)

1. Vanderbilt University, USA

Presenting Author: Jenna Kronenberg

Single-event transient pulses in 3-, 5-, and 7-nm combinational logic circuits and corresponding single-event cross-sections were obtained using SET filter circuits.

D1 11:05 - 11:20
Radiation Induced Leakage Current in 3-D NAND Technology
Authors: M. Kumar(1), M. Buddhano(1), J. Bell(1), A. Brandl(1), I. Chatterjee(2), B. Ray(3)

1. Colorado State University, USA, 2. Airbus, Germany, 3. Colorado State University-Fort Collins, USA

Presenting author: Mondol Anik Kumar

This paper demonstrates that floating-gate 3-D NAND is significantly more susceptible to radiation-induced-leakage-current (RILC) than charge-trap counterparts. RILC is higher in the lower layers and lower deck, and highest in the top threshold voltage state.

D2 11:20 - 11:35
TID Effects in Si and SiC Power MOSFETs and their implications on the performances of a Buck DC-DC Converter
Authors: H. Couillaud(1), M. Gaillardin(1), L. Artola(2)

1. CEA, France, 2. ONERA, France

Presenting Author: Hadrien Couillaud

TID effects in Si and SiC V-DMOSFETs are studied under various bias conditions. Experimental results reveal an unexpected TID sensitivity of the SiC MOSFET studied using TCAD simulations. DC/DC Buck tests confirm switching time degradation.

D3 11:35 - 11:50
Remaining Useful Life Prediction of Power Electronic Devices with Physics-Informed Deep Learning in Radiation Environments
Authors: L. Gao(1), C. Liu(1), Y. Xiao(1), C. Qi(1), M. Huo(1)

1. Harbin Institute of Technology, China

Presenting Author: Le Gao

This study presents a physics-informed deep learning approach for remaining useful life prediction of SiC MOSFETs under data-sparse conditions. Integrating irradiation-induced charge effects into a Transformer-based model, optimized via PSO, ensures robust, accurate predictions.

D4 11:50 - 12:05
TID Effects in Vertical SiC Power MOSFETs Irradiated at Different Temperatures
Authors: G. Andreetta(1), C. Martinella(2), P. Natzke(2), M. Bagatin(1), S. Gerardin(3), S. Mattiazzo(4), A. Paccagnella(1), U. Grossner(5), S. Bonaldo(1)

1. University of Padova, Italy, 2. APS Laboratory - ETH Zurich, Switzerland, 3. DEI - Padova University, Italy, 4. Università di Bergamo & INFN Padova, Italy, 5. APS - ETH Zurich, Switzerland

Presenting Author: Gabriele Andreetta

This study examines the TID effects induced by X-rays at different temperatures in SiC power MOSFETs. Irradiations at high temperatures evidence lower degradation of DC performance.

D5 12:05 - 12:20
Evaluation of Total Ionizing Dose Radiation Effects on Device and Circuit Variability in 22 nm FD-SOI
Authors: J. Zhao(1), Q. Yihong(2), L. Zheyi(3), M. Gorbunov(4), Q. Ma(2), X. Pengfei(2), L. Marien(2), T. Maraine(5), F. Saigné(6), P. Leroux(2), J. Prinzie(2)

1. KU Leuven, China, 2. KU Leuven, Belgium, 3. IMEC, Belgium, 4. Imec, Belgium, 5. Université de Montpellier, France, 6. Université de Montpellier, France

Presenting Author: Jinghao Zhao

This paper investigates TID effects on mismatch in 22 nm FD-SOI NMOSFETs and dynamic comparators, revealing increased threshold voltage variability and offset voltage, while current factor remains stable due to the ultra-thin gate oxide.

PA-1
Charge collection prediction and analysis in 3nm FinFET using the ambipolar diffusion with a-cutoff model

Authors: S. El hajji(1), G. Gasiot(1), T. Thery(1), V. Correas(1), N. Pieper(2), Y. Xiong(2), J. Kronenberg(2), J. Autran(3), B. Bhuva(2), D. Pandini(4), V. Malherbe(1), P. Roche(1)

1. STMicroelectronics, France, 2. Vanderbilt University, USA, 3. Rennes University, France, 4. STMicroelectronics, Italy

Presenting author: Sayah El Hajji

The ambipolar diffusion with a-cutoff (ADC) model is reviewed and applied to 3nm FinFET flip-flops. Charge collection mechanisms in FinFET are discussed, along with the influence of process and design features.

PA-2
Direct Measurements of Single-Event Burnout Current Induced by Neutron Irradiation in a 1200 V Fast Recovery Diode

Authors: TH. Nakamoto(1), J. Furuta(2), M. Yabuuchi(3), H. Sakamoto(3), R. Nakajima(1), K. Kobayashi(4), M. Sakai(5), S. Kumashiro(3) 1. Kyoto Institute of Technology, Japan, 2. Okayama Prefectural University, Japan, 3. Renesas Electronics Corporation, Japan, 4. Kyoto Institute of Technology, Japan, 5. Gunma University Heavy Ion Medical Center, Japan

Presenting Author: Hikaru Nakamoto

This study presents direct measurements of SEB current in a 1200 V FRD under neutron irradiation. Simulations indicate that incorporating increased charge generation and higher impact ionization improves agreement with experimentally observed current.

PA-3
A Mathematical Model to Identify the Occurrence of Stuck Bits in Radiation-Ground Tests

Authors: F. Franco(1), M. Rezaei(1), J. Fabero(1), H. Mecha(1), A. Colangeli(2), J. Clemente(1)

1. Universidad Complutense de Madrid, Spain, 2. ENEA, Italy

Presenting Author: Francisco J Franco

This abstract presents a mathematical model to estimate the expected number of repeated cells in memories due to single event upsets. Deviations from this model provide an objective criterion for identifying stuck bits.

PA-4
SEU-Resilient Design of 8T SRAM Utilizing Complementary FET (CFET) Technology

Authors: Z. Zhang(1), W. Chen(1), J. Lin(2), L. Cai(1)

1. Sun Yat-Sen University School of Microelectronics Science and Technology, China, 2. Sun Yat-Sen University School of mi, China

Presenting author: Zhengxin Zhang

This paper proposes an 8T CFET SRAM design that reduces area by 75% compared to FinFET SRAM while achieving an 85.3% reduction in upset cross-section, enhancing radiation tolerance significantly.

PA-5
A Charge-Width Calibration Approach for the Compact Modeling of Single Event Transients

Authors: Z. Li(1), M. Gorbunov(1), H. Caldas kessler(1), G. Franciscatto(1), V. Kampati(2), J. Zhao(2), J. Prinzie(2), L. Berti(1)

1. IMEC, Belgium, 2. KU Leuven, Belgium

Presenting Author: Zheyi Li

This paper introduces a novel calibration methodology for the Single-Event Transient (SET) compact model and offering insights into the underlying charge recombination effects in the charge collection process.

PA-6
Analysis of Shift Phenomena in SEE-Sensitive Nodes within Digital LDO under Clock Frequency Variations

Authors: R. Deng, H. Yuan, T. Li, Y. Chi, X. Chen, S. Liu, Z. Deng

National University of Defense Technology, China

Presenting Author: Ruiqi Deng

The shift phenomenon of SEE sensitive nodes from the shift register to power transistors is first observed in the digital LDO, demonstrating that the sensitive nodes in discrete sampling circuits are dependent on operating conditions.

PA-7
EV SEB failure Rate Modeling based on Neutron SEE Test for SiC MOSFET in SW Mode

Authors: RD. Bae(1), J. Park(2), M. Jo(3), L. Keunwoo(1), K. Kiseog(1), K. Youngboo(1)
1. QRT, Korea, Republic of, 2. Hyundai Motor Company, Korea, Republic of, 3. QRT Inc., Korea, Republic of

Presenting Author: Dongwoo Bae

We modeled EV's SEB failure rate based on neutron SEE test for SiC MOSFET in switching mode. We found the probability of SEB increase with longer driving distances and higher speeds of EVs.

PA-8L
Burnout susceptibility of silicon power diodes when exposed to 14 MeV neutrons

Authors: G. Canale parola(1), F. Velardi(1), S. Palazzo(2), G. Busatto(1), A. Sanseverino(1), E. Martano(1), S. Alberton(3), J. Wyss(1)
1. University of Cassino and Southern Lazio, Italy, 2. University of Cassino and Southern Lazio, Italy, 3. University of Sao Paulo, Institute of Physics, Brazil

Presenting Author: Giovanni Canale Parola

Low-energy neutrons can lead to significant failures in high-voltage power devices; a novel approach examines the effects of nuclear reaction products from low-energy neutrons inside the device, combining experimental characterization and numerical simulation.

PA-9L
The influence of angular incidence on pulse quenching in sub-20 nm FinFET technology

Authors: J. Yang(1), J. Yang(2), Y. Chi(3), P. Huang(4), R. Sun(4), Y. Jiao(2), Y. Pei(2), T. Ying(5), Y. Wei(2), X. Cui(2), X. Li(2)
1. School of Astronautics and the Technology Innovation Center of Materials and Devices for Extreme Environment, Harbin Institute of Technology, China, 2. School of Materials Science and Engineering and the Technology Innovation Center of Materials and Devices for Extreme Environment, Harbin Institute of Technology, China, 3. Micro-electronics and microprocessor institute, School of Computer, National University of Defense Technology, China, 4. Micro-electronics and microprocessor institute, School of Computer, National University of Defense Technology, China, 5. School of Physics and the Technology Innovation Center of Materials and Devices for Extreme Environment, Harbin Institute of Technology, China

Presenting Author: Jinhua Yang

The single-event transient pulse quenching effect of sub-20 nm bulk FinFET under different azimuth incident angles was studied by heavy ion experiment.

PB-1
Effect of Temperature on the SEU Cross-Section in a 40-nm SRAM when Exposed to Low-Energy Protons

Authors: P. Martin Holgado, A. Romero Maestre, J. De Martin Hernandez, Y. Morilla
Centro Nacional de Aceleradores (CNA), Spain

Presenting author: Pedro Martin Holgado

This work explores the impact of temperature on the SEU cross-sections of a 40-nm SRAM under low-energy proton irradiation. Tests in the PHOENIX chamber show slight temperature-dependent variations with a minimum sensitivity at 0 °C.

PB-2
Investigation of Neutron-Induced Failures in Commercial SiC Power Devices

Authors: N. Arnold(1), V. Kotagama(1), G. Parkinson(2), K. Niskanen(3), A. Renz(1), P. Gammon(1)
1. University of Warwick, United Kingdom, 2. University of Nottingham, United Kingdom, 3. University of Jyväskylä, Finland

Presenting Author: Niamh Arnold

Accelerated neutron testing was completed on a range of current-market SiC commercial devices in the 650 V and 1.2 kV range, resulting in an appraisal of cosmic ray resilience performance in current market devices.

PB-3
Single Event Transient Evaluation of 7nm FinFET LUT4 Representative of Versal

Authors: A. Urena-acuna(1), L. Artola(1), G. Hubert(1), S. Achag(2), V. Pouget(3), J. Boch(4), F. Manni(5)
1. ONERA, France, 2. ONERA/IES, France, 3. IES-CNRS, France, 4. Univ Montpellier, France, 5. CNES, France

Presenting Author: Alejandro Urena-Acuna

In this work, we present an evaluation methodology to determine the SET sensitivity through a heavy ion simulated fault injection technique on a LUT4 of the 7nm FinFET AMD Xilinx Versal FPGA

PB-4
Deep Underground Experiment and Simulation of Soft Error Characteristics in 14 nm FinFET and 28 nm SRAMs
Authors: Y. Dong(1), Z. Zhang(2), G. Lu(1)

1. China Electronic Product Reliability and Environmental Testing Research Institute., China, 2. China Electronic Product Reliability and Environmental Testing Research Institute, China

Withdrawn
Presenting author: Zhangang Zhang

Underground SER testing of 14/28nm SRAMs at CJPL recorded 16 errors (18.6% MCUs, max 7 cells) over 862 days. Hard/fake errors observed. High-altitude comparisons reveal Beijing SER trends. Monte Carlo simulations validate alpha-induced charge mechanisms.

PB-5
Investigation on SET Pulse Width Changes in Combinational Logic Circuits by Fault Injections
Authors: T. Yuta(1), T. Nakura(2)

1. Japan Aerospace Exploration Agency, Japan, 2. Fukuoka University, Japan

Presenting Author: Tsuchiya Yuta

We propose a measurement-based technique to investigate changes in Single-Event Transient pulse width caused by pulse propagation effects. The pulse width broadening is comparable to the original SET pulse width at the ion hit position.

PB-6
Static and Dynamic Tests on a 40-nm Commercial SRAM under Muons and Neutrons
Authors: J. Fabero(1), F. Franco(1), H. Mecha(1), M. Rezaei(1), A. Hillier(2), J. Lord(2), S. Cottrell(2), A. Colangeli(3), N. Funnesu(3), G. Pagano(3), J. Clemente(1)

1. Universidad Complutense de Madrid, Spain, 2. STFC Rutherford Appleton Laboratory, United Kingdom, 3. ENEA, Italy

Presenting Author: Francisco J Franco

The SBU and MCU cross sections for muons and 14-MeV neutrons of a commercial 40-nm CMOS SRAM were experimentally determined in static and dynamic modes. Events are more likely in static mode than in dynamic mode.

PB-7
Investigation of Single-Event Effects Induced by Heavy Ion Irradiation on GaN MMIC Power Amplifiers
Authors: H. Zhang, X. Jian, W. Xiaoqiang, L. Hongwei, T. Rui, J. Xing, W. Bin

China Electronic Product Reliability and Environmental Testing Research Institute, China

Presenting Author: H. Zhang

Withdrawn

This study investigates single-event effects in GaN MMIC power amplifiers, revealing significant performance degradation and single-event burnout in HEMTs and MIM capacitors. Mechanisms include electron trapping and dielectric rupture, confirmed by SEM and simulations.

PB-8
Single Event Effects of Power Bipolar Junction transistors
Authors: JF. Faillace, V. Gupta, B. Thomas, M. Muschitiello, A. Costantino, F. Krimmel, P. Hernandez, P. Heiskanen, F. Tonicello

European Space Agency, Netherlands

Presenting Author: Francesco Faillace

This work investigates the Single Event Effects radiation hardness level of power Bipolar Junction Transistors, with a main focus on Single Event Burnout. Several COTS devices were tested with heavy ions for SEE characterization.

PB-9L
Heavy Ion Induced Single Event Effects in 6.5 kV and 10 kV SiC Power MOSFETs and Comparison to the Depletion Capacitance Energy Model
Authors: S. Islam(1), A. Sengupta(1), D. Ball(1), J. Osheroff(2), K. Galloway(3), A. Witulski(1), S. Kosier(1), R. Schrimpf(1)

1. Vanderbilt University, USA, 2. NASA Goddard Space Flight Center, USA, 3. Vanderbilt university, USA

Presenting Author: Sajal Islam

Heavy ion irradiation of 6.5 kV and 10 kV SiC MOSFETs shows agreement with the depletion capacitance critical energy model. Leakage and failure regions are identified, extending the model's relevance to high-voltage SiC power devices.

PB-10L
Cumulative and Transient Effects in SELC II of Planar and Trench-Gate SiC Power MOSFETs

Authors: N. Für(1), H. Medeiros(1), M. Belanche guadas(1), A. Erlebach(1), M. Nagel(2), U. Grossner(3)

1. APS - ETH Zürich, Switzerland, 2. APS - ETH Zurich, Switzerland, 3. APS - ETH Zurich, Switzerland

Presenting Author: Natalija Für

Degradation in planar and trench-gate silicon carbide (SiC) power MOSFETs induced by heavy-ion irradiation (SELC II and SEB) has been further characterized and cumulative and transient behavior observed.

PC-1
Degradation Analysis of CMOS Image Sensors under Proton Irradiation for Star Sensor Applications

Authors: K. Li(1), J. Feng(1), L. Wen(1), J. Zhao(2), Y. Li(1)

1. Xinjiang Institute of Physics and Chemistry, Chinese Academy of Sciences, China, 2. KU Leuven, Department of Electrical Engineering, Belgium

Presenting author: Kunfang Li

This paper conducted irradiation experiment of CMOS image sensor with 30MeV protons, and analyzed the degradation for detection and positioning capability of star sensor according to degradation of CIS's Id, DCNU, QE and hot pixels.

PC-2
Radiation Hardness assessment of a CMOS-TDI Sensor System for Space-Borne Imaging Applications

Authors: G. Hirsch, A. Wirth, X. Amigues, E. Chernyavskiy, A. Eckardt

DLR, Germany

Presenting Author: Georg Hirsch

We irradiated a newly developed CMOS TDI sensor system with heavy ions, gamma rays, and protons. Radiation effects, including SEEs and dark current changes, were evaluated. We demonstrated the systems suitability for LEO missions.

PC-3
Nanoscale-Featured Integrated Photonic Devices in Harsh Radiation Environments

Authors: K. Arnold, N. Karom, R. Schrimpf, D. Fleetwood, S. Kosier, R. Reed, S. Weiss

Vanderbilt University, USA

Presenting Author: Kellen Arnold

Resilience to ionizing dose and displacement damage is shown for photonic crystals with features ≤ 100 nm, foretelling reliable next-generation integrated photonic devices for communications and quantum applications in harsh radiation environments.

PC-4
Radiation Effects on Red, Green and Blue Light Emitting Diodes

Authors: G. Ciachera(1), L. Weninger(1), D. Lambert(2), M. Darnon(1), A. Morana(3), V. Lalueca(4), J. Belloir(4), C. Durnez(4), C. Virmontois(4), N. Kerboub(4), J. Mekki(4), Y. Morilla(5), P. Martin_holgado(6), A. Romero(6), M. Gaillardin(2), P. Paillet(2), S. Girard(7)

1. Laboratoire Hubert Curien, France, 2. CEA, France, 3. Laboratory Hubert Curien, France, 4. CNES, France, 5. CNA, Spain, 6. Centro Nacional de Aceleradores (CNA), Spain, 7. Université de Saint Etienne, France

Presenting author: Geoffrey Ciachera

We investigate the impact of radiation (protons, gamma) on the electro-optical performances of RGB LEDs. Gamma-radiation up to 100 krad leads to no degradation while 15 MeV protons at different fluences degrade LEDs efficiency.

PC-5L
Novel Silicon Photomultipliers structures for ionizing-radiation effects mitigation

Authors: F. Acerbi(1), L. Parellada monreal(1), A. Gola(2)

1. FBK, Italy, 2. Fondazione Bruno Kessler (FBK), Italy

Presenting author: Fabio Acerbi

We developed new SiPM technologies with improved ionizing radiation hardness. For example, with active trench bias contact, or charge focusing. We tested them with X-rays showing a much better recovery of noise levels after irradiation.

PD-1
Machine Learning Assisted Modeling of Transient Dose Rate and Displacement Synergistic Effect for Circuit Simulation

Authors: L. Jian wen(1), L. Cai(1), W. Chen(1), Z. Zhang(1), W. Chen(2), C. Wang(2), J. Li(2), L. Ding(2), X. Guo(2)

1. the School of Microelectronics Science and Technology, Sun Yat-Sen University, China, 2. the National Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, China

Presenting Author: Lin Jian Wen

This paper proposes a machine learning-based ANN model to efficiently predict synergistic effects of transient dose rate and displacement damage on circuits, enabling accurate SPICE simulations for radiation reliability analysis in complex environments.

PD-2
TID Test of LNAs for Radiation-Tolerant Wireless Communication System Inside Nuclear Reactors

Authors: Y. Narukiyo(1), K. Yanaka(1), H. Hans(2), J. Mayeda(3), K. Yuasa(1), S. Kato(1), T. Ota(1), A. Shirane(1)

1. Institute of Integrated Research, Institute of Science Tokyo, Japan, 2. Institute of Integrated Research, Institute of Science Tokyo, Indonesia, 3. Institute of Integrated Research, Institute of Science Tokyo, USA

Presenting Author: Yasuto Narukiyo

To develop the transceiver for nuclear reactor, three different types of low-noise amplifiers (LNA) in the transceiver were designed for TID test conducted on each LNAs to evaluate their radiation tolerance under 50Mrad.

PD-3
Synergistic Behavior of Photocurrent of SPNP Bipolar Transistor under Sequential Pulsed γ -ray and Pulsed Neutron Irradiation

Authors: C. Wang(1), W. Chen(1), R. Li(1), J. Li(1), X. Guo(1), L. Ding(1), W. Ma(1)

1. National Key Laboratory of Intense Pulsed Radiation Simulation and Effect, Northwest Institute of Nuclear Technology, China

Presenting Author: Chenhui Wang

Synergistic behavior of SPNP's photocurrent under sequential pulsed γ -ray and neutron irradiation is explored taking into account the influence of transient ionizing damage caused by pulsed neutron, and new significant features of photocurrent are discovered.

PD-4
Displacement Damage Equivalence in GaN PIN Diodes: DPA Correlation in Proton, Neutron, and Heavy-Ion Irradiation Environment

Authors: Y. Xue(1), L. Ding(2)(1)

1. Northwest Institute of Nuclear Technology, China, 2. Northwest Institute of Nuclear Technology, China

Presenting Author: Yuanyuan Xue

This study focuses on GaN PIN diodes, systematically conducting irradiation experiments with protons, neutrons, and low-, medium-, and high-energy heavy ions to investigate the impact of different types and energy particles on device electrical parameters.

PD-5
Unveiling Synergistic Radiation Effects in AlGaIn/GaN HEMTs: A Comparative Study

Authors: A. Vilas boas(1), S. Alberton(2), P. Garcia(1), N. Medina(3), V. Aguiar(4), R. Giacomini(1), T. Cavalcante(5), L. Seixas(6), F. Saulo(6), F. Palomo_pinto(7), M. Guazzelli(8)

1. FEI, Brazil, 2. University of Sao Paulo, Institute of Physics, Brazil, 3. Instituto de Física da Universidade de São Paulo, Brazil, 4. University of Sao Paulo, Brazil, 5. Instituto de Estudos Avançados (IEAv), Brazil, 6. CTI, Brazil, 7. Universidad de Sevilla, Spain, 8. Centro Universitário FEI, Brazil

Presenting Author: Alexis Cristiano Vilas Bôas

The study analyzes 14 MeV neutron effects on a AlGaIn/GaN HEMT, in comparison to 1.25 MeV γ -rays and 10 keV X-rays, highlighting a combined effect between displacement damage (DD) and Total Ionizing Dose (TID).

PD-6
Effect of the Anti-Punchthrough Implant on the Total Ionizing Dose Response of Planar n-MOSFETs

Authors: G. Andreetta(1), G. Borghello(2), F. Faccio(2), S. Gerardin(3), M. Bagatin(1), A. Paccagnella(1), S. Bonaldo(1)

1. University of Padova, Italy, 2. CERN, Switzerland, 3. DEI - Padova University, Italy

Presenting Author: Gabriele Andreetta

This work evidences the key role of anti-punchthrough implants on the TID sensitivity of planar n-MOSFETs. Its implant depth and distribution can significantly affect off-leakage and threshold voltage shifts.

PD-7
Impact of Proton Irradiation on Carbon Nanotube 6-T SRAM Cell

Authors: T. Ren(1), Q. Zheng(1), H. Xu(2), X. Li(1), N. Gao(2), Q. Guo(1), J. Cui(1), Y. Li(1)

1. Key Laboratory of Functional Materials and Devices for Special Environments, Xinjiang Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, China, 2. Beijing HuaTan YuanXin Electronics Technology Ltd. Co., Beijing, China, China

Presenting Author: Tongfei Ren

The impact of proton irradiation on CNT 6-T SRAM cell and CNTFET is investigated. Unlike previous observations, the SNM variation and the threshold voltage shift exhibit a non-monotonic trend with irradiation fluence.

PD-8
Experimental and Simulation Studies on Threshold Voltage Shift of Carbon Nanotube MOSFET Induced by 60Co Radiation

Authors: N. Cui(1), B. Mei(1), Y. Sun(1), P. Li(1)

1. China Aerospace Components Engineering Center, China

Presenting Author: Naiyuan Cui

This paper investigates the fundamental mechanism of radiation effects in top-gate carbon nanotube (CNT) MOSFET. The effects of Schottky junction contact annealing and total ionizing dose on CNT-based devices are distinctly different.

PD-9
Total Ionizing Dose Effect on CMOS Power Amplifiers for 2.4 GHz Wi-Fi Chipset

Authors: K. Yanaka(1), Y. Narukiyo(1), H. Hans(2), J. Mayeda(3), K. Yuasa(1), S. Kato(1), T. Ota(1), A. Shirane(1)

1. Institute of Integrated Research, Institute of Science Tokyo, Japan, 2. Institute of Integrated Research, Institute of Science Tokyo, Indonesia, 3. Institute of Integrated Research, Institute of Science Tokyo, USA

Presenting Author: Kotaro Yanaka

This paper investigates TID effects on Power Amplifiers (PAs) for 2.4 GHz Wi-Fi chipsets in a reactor containment vessel. Both PAs functioned up to 30 Mrad, with larger-gate-width PAs showing greater performance variation.

PD-10L
SEEs and TID Effects in Digital-to-Time Converters for Fractional-N Phase-Locked Loops

Authors: Q. Ma(1), J. Zhao(2), L. Van der elst(1), P. Leroux(3), J. Prinzie(1)

1. KU Leuven, Belgium, 2. KU Leuven, China, 3. Leuven University, Belgium

Presenting Author: Qichao Ma

This paper investigates how SETs and TID effects degrade the performance of a DTC through laser and X-ray testing. An RTL model is used to study how these degradations impact fractional-N PLLs.

PD-11L
Effects of Displacement Damage on the Structural and Electrical Properties of Ferroelectric Hafnium Zirconium Oxide Capacitors

Authors: S. Jaszewski(1), C. Mckay(2), D. Hughart(2), J. Cain(2), M. Henry(2)

1. Sandia National Laboratories, , 2. Sandia National Laboratories, USA

Presenting Author: Samantha Jaszewski

This study examines the effects of displacement damage on hafnium zirconium oxide capacitors, revealing a dose-dependent degradation in ferroelectric properties and demonstrating the importance of phase control for ferroelectric devices based on this material.

PD-12L
Total Ionizing Dose Sensitivity of 7-nm FinFETs

Authors: M. Gorbunov(1), A. Caglar(2), M. Van de burgwal(2), L. Berti(3), G. Thys(3), T. Schulte(4), J. Vanden berk(4), D. Geys(4)
1. Imec, Belgium, 2. IMEC, Belgium, 3. imec, Belgium, 4. Magics Technologies NV, Belgium

Presenting Author: Maxim Gorbunov

We present the latest results for the total ionizing dose (TID) sensitivity of 7-nm FinFETs. N- and P-FinFETs with various geometries were irradiated up to 300 krad(Si) at three different bias conditions.

PE-1
Rust vs. C: Evaluating Soft Error Sensitivity

Authors: A. Martinez_alvarez(1), D. Gonzalez montesoro(1), R. Bastos(2), S. Cuenca-asensi(1), A. Serrano-cases(1)
1. University of Alicante, Spain, 2. Univ. Grenoble Alpes / TIMA laboratory, France

Presenting author: Sergio Cuenca-Asensi

This paper evaluates Rust as an alternative to C for developing reliable applications in radiation-prone environments. Despite its memory safety mechanisms, Rust outperforms C in SDC cross-section under radiation, suggesting enhanced reliability in such conditions

PE-2
Impact of Atmospheric Neutrons on Semantic Segmentation Correctness

Authors: B. Coelho(1), M. Saveriano(1), C. Frost(2), P. Rech(1)
1. University of Trento, Italy, 2. ISIS Neutron and Muon Facility, United Kingdom

Presenting author: Bruno Coelho

We test semantic segmentation models on TPUs and observe tolerable, mild, and critical mispredictions. We correlate errors with raw corrupted output and input image characteristics, showing that even few corrupted pixels can drastically change classifications.

PE-3
Comparative Analysis of Software Redundancy on RISC-V architecture: Bare-metal vs Linux

Authors: S. Cuenca-asensi(1), E. Abma romero(1), M. Ijzelendoorn(1), P. Martin_holgado(2), A. Serrano(3), A. Martinez_alvarez(1)
1. University of Alicante, Spain, 2. Centro Nacional de Aceleradores (CNA), Spain, 3. Alicante University, Spain

Presenting author: Sergio Cuenca-Asensi

Fault-tolerance techniques were evaluated under proton irradiation on a RISC-V SoC. Results reveal consistent SDC and SEFI cross-sections across software stacks, with higher SEFI sensitivity in Linux, and emphasize cache optimizations relevance to reliability.

PE-4
A Lockstep-based Solution for a Radiation-Resilient RISC-V FPGA-Based Architecture

Authors: H. Closquinet(1), F. Miller(2), L. Noizette(2), Y. Helen(3), P. Girard(4), T. Vayssade(5), A. Virazel(5)
1. LIRMM / Nucléutudes, France, 2. Nucléutudes, France, 3. DGA, France, 4. CNRS, France, 5. LIRMM, France

Presenting author: Hugo Closquinet

This paper presents a RISC-V architecture that implements redundancy by Lockstep. This method ensures an efficient fault detection and correction in harsh environments while optimizing resources usage. Fault injection through emulation has validated this approach.

PE-5
AI-Driven Anomaly Detection in Satellite Telemetry for Space Mission Assurance

Authors: F. Buccellato(1), D. Nicolini(1), E. Vacca(1), L. Sterpone(1)
1. Politecnico di Torino, Italy

Presenting author: Federico Buccellato

We present a data-driven anomaly detection framework for satellite telemetry, enhancing space mission assurance by identifying faults without labeled data, enabling early detection and increased reliability in dynamic orbital environments.

PE-6L
Radiation Heavy-Ion Fault Analysis of URSA: a Reconfigurable Systolic Array for CNN Acceleration in SRAM-based APSoC
Authors: U. Maffazioli(1), F. Limakastensmidt(1), F. Benevenuti(2)

1. UFRGS, Brazil, 2. Universidade Federal do Rio Grande do Sul, Brazil

Presenting author: Ulisses Maffazioli

This work presents a fault-tolerant reconfigurable SA for CNN inference in SRAM-based APSoCs. We evaluate trade-offs in performance, area, and reliability. Radiation experiments validate reliability improvements from array sizing, memory configurations, hardware redundancy, and scrubbing.

PE-7L
Single Event Upset Effects on Deep Neural Networks: A Model and Dataset-Level Perspective
Authors: P. Trevor(1), D. Loveless(1)

1. Indiana University, USA

Presenting author: Peyton Trevor

This study systematically evaluates single-bit upset resilience in over 47 CNNs fine-tuned on remote sensing data, revealing per-architecture and per-sample vulnerability variation and underscoring the importance of model and input-specific robustness in radiation-prone applications.

PE-8L
Reliability Assessment of Fault-Tolerant ZynqNet AI Accelerators in SRAM-Based APSoC
Authors: E. Marañón(1), F. Benevenuti(1), F. Kastensmidt(1)

1. UFRGS, Brazil

This work presents a reliability and area trade-off analysis of fault-tolerant ZynqNet AI accelerator designs running a 4-layer CNN model trained on the SAT-6 dataset, validated through emulated fault injection and heavy-ion irradiation tests.

PF-1
A Timing-Slack-Driven Hardening Method for Single-Event Effects Mitigation Without Circuit Performance Degradation
Authors: R. Song(1), C. Hu(1), J. Shao(1), Y. Chi(1), B. Liu(1), B. Liang(1), J. Chen(1), Z. Wu(1)

1. National University of Defense Technology, China

Presenting author: Ruiqiang Song

The proposed method replaces commercial flip-flops with hardened flip-flops or inserts filter instances based on timing slack values. Experimental results demonstrate that the proposed method enhances tolerance to single-event effects without degrading circuit performance.

PF-2
Enhancing SEL Immunity in Commercial Technology for Aerospace Applications through Process-Based Solutions
Authors: L. Montagner(1), D. Truyen(2), J. Wong(3), E. Leduc(2)

1. Microchip Technology Rousset, France, 2. Microchip Technology, France, 3. Microchip Technology, USA

Presenting author: Laurence Montagner

We developed a method to harden 0.18μm commercial technology against SEL for aerospace applications. TCAD simulations guided process-based solutions, implemented and validated through heavy-ion testing on test vehicles, confirming the complete elimination of SEL vulnerabilities.

PF-3
Hardened Logic Cells Against Soft Errors with $3.75 \times 10^{-8} \text{ cm}^2$ Cross-section for Combinational Circuits in 28nm CMOS Process
Authors: Y. Li(1), C. Chen(2), J. Zhang(1), B. Zhang(1), F. Lang(1), Y. Hu(1), W. Zhan(3), X. Zeng(1)

1. State Key Laboratory of Integrated Chips and Systems, Fudan University, China, 2. State Key Laboratory of Integrated Chips and Systems, Fudan University, China, 3. Anqing Normal University, China

Presenting author: Yan Li

This paper proposes SFOL, a low-cost hardening technique for combinational cells that filters transients and suppresses SETs. Fabricated in 28nm CMOS, SFOL reduces SET pulses by 96% and cross-section by 4x compared to standard cells.

PF-4
Irradiation Hardening of p-GaN HEMT Based on AlN Polarization Regulation Mechanism
Authors: W. Fan(1), J. Qiu(2), W. Huang(3), J. Shen(2), D. Zhang(1)

1. Fudan University, China, 2. China Resources Microelectronics (Chongqing) Limited, China, 3. Jiangnan University, China

Presenting author: Wenqi Fan

AlN polarization in post-irradiation HEMT can enhance the GaN layer charge sharing and suppress DIBL effect. Gate carrier transport model is proposed to reveal that AlN reduces irradiated traps and has an effective irradiation-hardening ability.

PF-5
Leveraging Tap Cell as a Soft Error Mitigation Method for Advanced CMOS Combinational Circuits without Additional Area Overhead
Authors: C. Zhang(1), C. Chen(2), F. He(1), H. Yin(1), Y. Li(1), X. Zeng(1)

1. State Key Laboratory of Integrated Chips and Systems, Fudan University, China, 2. State Key Laboratory of Integrated Chips and Systems, Fudan University, China

Presenting author: Chenyu Zhang

This paper proposes a layout-level tap cell placement method to mitigate SET in combinational circuits, achieving 5–11% SER reduction with no area overhead and minimal power and delay impact.

PG-1
Universal Approach to Measuring Focused Beam Size for Pulsed-Laser SEE Testing
Authors: T. Crane(1), J. Hales(1), A. Ildefonso(2), D. Mcmorrow(1)

1. U.S. Naval Research Laboratory, USA, 2. Indiana University, USA

Presenting author: Trevor Crane

The single-event effect response induced by pulsed-laser testing depends strongly on the focused beam size. This work presents a universal approach for accurately measuring this focused beam size aimed at improving repeatability and traceability.

PG-2
New Fusion Linear Accelerator for Radiation Effects (FLARE) 14 MeV Steady State Neutron Testing Facility and Potential Use Cases
Authors: S. Burger(1), G. Becerra(1)

1. SHINE Technologies, LLC, USA

Presenting author: Gabriel Becerra

SHINE Technologies has conducted multiple radiation effects tests since late 2023 with customers to demonstrate functionality and collect data at FLARE, its new 14 MeV fusion neutron radiation testing facility.

PG-3
Timepix3 and silicon diode measurements at the AmBe neutron source at CERN, and their comparison with Monte Carlo simulations
Authors: D. Prelipcean(1), G. Lerner(1), R. Garcia(1)

1. CERN, Switzerland

Presenting author: Daniel Prelipcean

The neutron induced event-by-event energy deposition in a Timepix3 and a silicon diode detector is investigated using an AmBe source, and compared with Monte Carlo simulations performed with the FLUKA.CERN and G4SEE codes.

PG-4
A Compact Silicon Pixel System for Particle Detection for Space Radiation Dosimetry
Authors: V. Yeroshenko(1), F. Bezerra(2), M. Kachel(3), R. Sefri(3), J. Baudot(3), F. Morel(3), S. Callier(1), A. Perdon(1), J. Fleury(1)

1. Weeroc, France, 2. CNES, France, 3. IPHC, France

Presenting author: Vsevolod Yeroshenko

We developed a compact CubeSat format device based on Monolithic Imager CMOS Monolithic Active Pixel Sensor technology. It is aimed at measuring the dose and identifying the type of radiation in the space environment.

PG-5
RADFET- dosimeter as dose rate measurement tool

Authors: B. Podlepetsky(1), A. Rodin(2), A. Zhukov(2)
 1. MEPhI, Russian Federation, 2. NRNU MEPhI, Russian Federation

Presenting author: Boris Podlepetsky

The possibilities of using n-channel MOSFET (called aRADFET) to measure the dose rate of ionizing radiation were investigated. Compact electro-physical models were proposed to interpret obtained results.

PG-6
Irradiation Research at HZB: Current Capabilities and Future Potential

Authors: A. Dittwald(1), J. Bundesmann(1), A. Denker(1), G. Kourkafas(1), T. Faselow(1)
 1. Helmholtz-Zentrum Berlin für Materialien und Energie, Germany

Presenting author: Alina Dittwald

HZB provides proton irradiation with flexible time structure up to 68 MeV, scattered (40 mm) and focused beam, intensities up to 10^{13} p/cm² at several target stations and gamma irradiation up to 10 krad/h (H₂O)

PG-7
Validation of the ICPO medical 194 MeV proton line for radiation testing of electronic devices

Authors: F. Bezerra(1), A. Bonfrate(2), A. Patriarca(2), R. Ferrand(2), L. De marzi(2), N. Kerboub(1), J. Mekki(1)
 1. CNES, France, 2. Institut Curie, France

Presenting author: Francoise Bezerra

The 194 MeV proton line located at ICPO, proton-therapy center near Paris was recently validated for radiation testing of electronic devices by CNES, the French space agency. Beam characteristics, dosimetry and validation results are presented.

PG-8L
Facility intercomparison towards reliable very-high-energy heavy ion dosimetry for space electronics testing at CERN

Authors: N. Emriskova(1), A. Waets(1), R. Garcia alia(1)
 1. CERN, Switzerland

Presenting author: Natalia Emriskova

A benchmark dosimetry method using silicon diode measurements and FLUKA simulations was applied across very-high-energy heavy ion facilities to enable intercomparison and support the development of the emerging CERN beam line for space electronics testing.

PG-9L
Ultracompact platform for radiation testing of electronics via laser-accelerated high energy electrons

Authors: S. Milton(1), C. Neacsu(1), B. Hegelich(1)
 1. TAU Systems, USA

Presenting author: Catalin C. Neacsu

We report on electron-based SEE-testing of electronics, where purposefully prepared electron packets mimic heavy ions. This compact platform accesses independently controllable high-LETs and -ranges for μ m-accurate testing, offering a viable alternative to large ion facilities.

PG-10L
The proton and heavy ion irradiation facility at UMCG-PARTREC

Authors: B. Jones(1), A. Gerbershagen(2), H. Kremers(1), M. Goethem(2)
 1. Particle Therapy Research Center (PARTREC), Biomedical Sciences Department, University Medical Center Groningen, University of Groningen, Netherlands, 2. Particle Therapy Research Center (PARTREC), Department of Radiation Oncology, University Medical Center Groningen, University of Groningen, Netherlands

Presenting author: Brian Nathaniel Jones

The specifications of the irradiation facility for up to 190 MeV protons and heavy ions up to xenon at 30 MeV/u for radiation harness testing in air at UMCG-PARTREC will be presented.

PH-1
Charge Collection in Solid State Detector: 2D Solver Extension for Semiconductor System

Authors: P. Caron(1), Q. Gibaru(1), M. Chabot(2), E. Rauly(2), V. Bolin(1), G. Gourves(1), J. Guerard(1), S. Bourdarie(1)
1. ONERA, France, 2. IJClab, France

Presenting author: Pablo Caron

In continuation of previous studies on the use of transients as a means of particle identification, this study explores the limits of 2D simulations and propose an extension of the equations to overcome these limitations.

PH-2
Towards Single Trap Monitoring in MOSFET Total Ionizing Dose Effects

Authors: A. Michalowskaforsyth(1), S. Ramazanoglu(1)
1. Graz University of Technology, Austria

Presenting author: Alicja Michalowska Forsyth

We present TID experiment with continuous frequency monitoring in a custom ring oscillator dedicated to study CMOS random-telegraph-noise. Analysis reveals discrete step-like events, suggesting observation of individual trapping/detrapping occurrences. Step-up events dominate pre-rebound, step-down after.

PH-3
Impact of P₂O₅ and N₂ Annealing on the TID Response of 4H-SiC Gate Oxides for space applications

Authors: V. Kotagama(1), R. Arne(1), M. Yildirim(1), N. Iosifidis(1), N. Arnold(1), V. Kilchytska(2), D. Flandre(2), V. Shah(1), M. Antoniou(1), P. Gammon(1)
1. University of Warwick, United Kingdom, 2. Universite Catholique de Louvain, Belgium

Presenting author: Virendra Malin Kotagama

The TID response of 4H-SiC MOSCAPs with thermal and ALD oxides is evaluated under Co-60 irradiation. A 30-minute P₂O₅ annealed oxide shows exceptional immunity, with minimal flatband voltage shift and density of interface states deviation.

PH-4
Comparative Analysis of SEGR and SEB Susceptibility in Si and SiC MOSFETs Using TCAD Modeling

Authors: C. Marques(1), A. Michez(2), T. Labau(1), R. Germanicus(3), F. Wrobel(2)
1. Delphea, France, 2. Université de Montpellier - IES, France, 3. CRISMAT LAMIPS, France

Presenting author: Cleiton Marques

This work compares Si and SiC VDMOSFETs under heavy-ion irradiation using TCAD simulations. Results reveal that SiC devices exhibit greater sensitivity to SEGR and SEB compared to their Si counterparts.

PH-5
Gate Oxide Degradation Mechanism Induced by Heavy Ion in SiC MOSFETs

Authors: Y. Xiao(1), L. Chaoming(1), Z. Jiaming(1), W. Tianqi(1), Q. Chunhua(1), H. Mingxue(1)
1. Harbin Institute of Technology, China

Presenting author: Yiping Xiao

This paper demonstrates a sequential degradation mechanism in the oxide, progressing from latent damages to microdose, and ultimately to the formation of microbreak, which is related to the initial ion-induced damage exacerbated under subsequent strikes.

PI-1
Safe Avionics Reuse Through Mission-Specific Radiation Modeling

Authors: E. Vacca(1), A. Cui(1), S. Azimi(1), L. Sterpone(1), M. Cardi(2), F. Parigi(2), M. Pavoni(2), D. Calvi(2), A. Zanotti(2), F. Corradino(2), E. Sanguineti(2), F. Nichele(3), F. Perez lissi(4), P. Martino(4), I. Carnelli(4)
1. Politecnico di Torino, Italy, 2. Tyvak International srl, Italy, 3. Tyvak International, Italy, 4. European Space Agency, Netherlands

Presenting author: Eleonora Vacca

We assess reusing HERA CubeSat avionics for the upcoming RAMSES mission to Apophis by simulating radiation exposure on the CubeSat structure with GEANT4, through a mission-specific radiation environment analysis.

PI-2
Potential Feasibility of Using Deposition Energy Spectra from In-Flight Single-Layer Silicon Detectors for SEE Rate Estimation

Authors: J. Wang(1), X. Zhu(1), G. Shen(1), B. Yuan(1), C. Wang(1), X. Xu(1), L. Zhang(1), Y. Ma(1)

1. National Space Science Center, Chinese Academy of Sciences, China

Presenting author: Jieyi Wang

In-flight single-layer silicon detectors on M15 and M16 satellites recorded deposition energy spectra, where SEE-silicon spectrum differences arise from geometric chord-length effects, enabling single-area silicon detectors to estimate SEE rates.

PI-3
Particle Environment Measured On-Board SVOM during First Year at Low Earth Orbit

Authors: A. Claret(1), L. Bouchet(2), O. Godet(2), S. Schanne(1)

1. CEA, France, 2. IRAP, France

Presenting author: Arnaud Claret

This paper presents the in-flight feedback from the Sino-French SVOM (Space based Variable Object Monitor) space mission from the point of view of the South Atlantic Anomaly intercepted in LEO orbit at 625 km.

PI-4
Space Radiation Monitor Response Functions Construction: Satellite Geometry Guidelines

Authors: R. Bocherens(1), P. Caron(1), S. Bourdarie(1), A. Woelffle(2)

1. Onera, France, 2. DGA, France

Presenting author: Remi Bocherens

Reconstructing particle fluxes in radiation belts requires in-flight measurements and the detector's response function. Since satellite geometries are often confidential, this study proposes guidelines for using degraded geometries to preserve the quality of reconstructed data.

PI-5
Monte Carlo Magneto-Atmospheric Package for SEP and GCR Atmospheric Showers

Authors: L. Favier(1), F. Miller(2), P. Laurent(3)

1. AIM CEA-IRFU / Nucléotides, France, 2. Nucléotides, France, 3. AIM CEA-IRFU, France

Presenting author: Leo Favier

A Magneto-atmospheric Monte-Carlo simulation package is developed to simulate the propagation of Solar Energetic Particles and Galactic Cosmic Rays from the exosphere to the ground to calculate prompt and albedo particle fluxes, and energy spectra.

J1
Ensuring Compliance to Low Cross-Section Destructive SEEs in Particle Accelerator Control System Production Batches: A Large-Sample Testing Approach

Authors: R. Ferraro(1), A. Zimmaro(1), A. Scialdone(2), G. Foucard(1), S. Danzeca(3), A. Masi(3)

1. CERN, France, 2. CERN, Italy, 3. CERN, Switzerland

Presenting author: Rudy Ferraro

This paper addresses the qualification of control system electronics for destructive Single Event Effects in the CERN accelerator complex, linking environmental constraints and failure rate targets to define test levels for production batch compliance.

PJ-1
Using hardware environment emulation and laser testing for early SEE evaluation of an FPGA design

Authors: I. Colin(1), V. Pouget(2), F. Wrobel(3), P. Lamberbourg(4), G. Prévond(4), A. De bibikoff(4)

1. Safran Data Systems & Montpellier University, France, 2. IES-CNRS, France, 3. Université Montpellier, France, 4. Safran Data Systems, France

Presenting author: Ismael Colin

We evaluate a method for early SEE evaluation of an FPGA design based on embedded emulation of hardware environment combined with laser testing. Influence of laser scanning parameters on the observed event ratios is explored.

PJ-2**System-Level Risk Assessment for Single-Event Latchup Based on Historical Data****Authors:** R. Ladbury(1), M. Joplin(2)

1. NASA GSFC, USA, 2. NASA Goddard Space Flight Center, USA

Presenting author: Raymond Ladbury

A flexible system risk analysis tool based on historical SEL data allows assessment of design and testing strategies even at very early stages. The analysis can be refined as test data become available.

PJ-3**Stochastic Worst-Case Test Vectors for ASIC Devices in Single Event Environment****Authors:** A. Abou-auf(1), M. Abdelrazik(1), M. Mahmoud(2), A. Ibrahim(1), M. Wael(1)

1. The American University in Cairo, Egypt, 2. Cairo Univeristy, Egypt

Presenting author: Ahmed Abou-Auf

A novel stochastic algorithm to identify worst-case vectors in ASIC devices under a single event environment. This new approach utilizes a novel methodology to determine probability of failure in ASICs under a single event environment

PJ-4**Complementary single event evaluation method that combines pulse-laser and heavy-ion results for radiation hardness verification of space COTS upscreen****Authors:** H. Lee(1)

1. QRT Inc, Korea, Republic of

Presenting author: Hyeokjae Lee

In this article, we present a new evaluation method called the complementary single event evaluation method, which hybridizes pulse-laser and heavy-ion test results for radiation hardness with space COTS up-screen

DW-1
Single Event Effects on a Dual Narrow-Band and Wideband RF Agile Transceiver
Authors: J. Budroweit(1), F. Stehle(1), F. Eichstaedt(1)

1. DLR e.V., Germany

Presenting author: Jan Budroweit

Heavy-Ion induced single event effects (SEE) test results of the latest highly integrated and radio frequency (RF) agile dual-band and wideband transceiver, the Analog Devices ADRV9002, are presented.

DW-2
X-Ray Impact on Analog References in 110 nm ST BCD9s Technology
Authors: A. Benfante(1), D. Crippa(1), A. Veggetti(1), S. Mattiazzo(2), M. Bagatin(2), S. Gerardin(2)

1. STMicroelectronics, Italy, 2. University of Padova, Italy

Presenting author: Dennis Crippa

In this work, we investigate the Total Ionizing Dose response under X-ray of voltage and current analog references manufactured in ST 110 nm BCD9s technology platform. Drift of main parameters has been quantified and analyzed.

DW-3
Temperature Dependence of High Dose Rate Silicon Diode Gamma Detectors
Authors: K. Stoev(1), E. Simova(2)

1. CNL, Canada, 2. Canadian Nuclear Laboratories, Canada

Presenting author: Krassimir Stoev

Small diode-based gamma radiation sensors, developed at Canadian Nuclear Laboratories, are used for measuring high dose-rate gamma fields. Current work presents characterization of such devices over temperature range to 80 °C at different gamma dose-rates.

DW-4
Design and Radiation Qualification of a New User Interface for the LHC Beam Interlock System
Authors: R. Secondo(1), A. Colinet(1), S. Danzeca(1), R. Ferraro(1), G. Foucard(1), G. Lerner(1), C. Martin(1), I. Romera ramirez(1), J. Uythoven(1)

1. CERN, Switzerland

Presenting author: Raffaello SECONDO

The new BIS User Interface (CIBUv2) was qualified in radiation. Components were tested with focused protons, before a system level validation at CHARM. The results confirmed reliability and readiness for operation in a HL-LHC environment.

DW-5
Heavy-ion Single Event Effects Characterization of the HMC438 Divide-by-5 Static Divider
Authors: R. Dungan(1), A. Gazdzhyan(1), J. Ng(1), T. Tran(1), W. Fischer(1), F. Medrano(1), R. Oviedo(1)

1. Northrop Grumman

Presenting author: Rutger Dungan

The HMC438 divide-by-5 static divider was tested for single event effects using heavy-ion irradiation. Cross sections were determined over a range of LET values. Weibull fits were made to the data and SEE rates determined.

DW-6
Radiation Evaluation of the TPS7H1121-SP Radiation-Hardened 2.25V to 14V Input, 2A Low Dropout (LDO) Linear Regulator
Authors: A. Marinelarena(1), M. Trevino(1), T. Lew(1)

1. Texas Instruments, USA

Presenting author: Anthony Marinelarena

Single Events Effects characterization and Total Ionizing Dose results for the TPS7H1121-SP Low Dropout (LDO) Linear Regulator is summarized, showing very robust SEE performance up to LET_{EFF}=75MeV-cm²/mg and excellent TID performance up to 100krad(Si).

DW-7
Qualification of Gallium-Nitride High Electron Mobility Transistors for the 10 MHz Radio-Frequency systems in the CERN Proton Synchrotron

Authors: G. Gnemmi(1), C. Ohmori(2), S. Energico(3), M. Paoluzzi(3), C. Rossi(3), S. Ramberger(3)
1. , Switzerland, 2. KEK, Japan, 3. CERN, Switzerland

Presenting author: Giulia Gnemmi

CERN's 10 MHz RF system in the Proton Synchrotron will be upgraded with a solid-state GaN driver, replacing obsolete RF tube amplifiers. Radiation qualification is essential to ensure reliable operation in harsh accelerator environments

DW-8
Heavy ion Single Event Effect Tests of Commercial-off-the-shelf components

Authors: M. Steffens(1), S. Hoeffgen(1), J. Kuhnhen(1), F. Siebert(1), A. Zentgraf(1), G. Furano(2), M. Poizat(3), M. Tali(3)
1. Fraunhofer INT, Germany, 2. ESA/TEC-EDD, Netherlands, 3. ESA, Netherlands

Presenting author: Michael Steffens

This paper presents SEE results with heavy ions on COTS components. The DUTs are from various device families ranging from a voltage reference to a highly integrated GaN FET power stage with integrated gate driver.

DW-9
Evaluation of LGAD Performance Degradation due to TID Aging Under 10 keV X-ray Irradiation

Authors: T. Silva(1), A. Vilas bôas(2), F. Palomo_pinto(3), M. Pavanello(1), R. Giacomini(1), N. Medina(4), M. Guazzelli(5)
1. FEI, Brazil, 2. FEI - Fundação Educacional Inaciana "Padre Sabôia de Medeiros", Brazil, 3. Universidad de Sevilla, Spain, 4. Instituto de Física da Universidade de São Paulo, Brazil, 5. Centro Universitário FEI, Brazil

Presenting author: Thalia Silva

This study evaluates the impact of 10 keV X-ray TID on LGAD's robustness. Beyond 91 krad(Si), significant electrical degradation leads to irreversible damage and charge multiplication loss, compromising device performance.

DW-10
Radiation Characterization of a LEON5FT-based SoC on the DARE65T Platform

Authors: L. Tambara(1), M. Gorbunov(2), M. Van de burgwal(2), L. Berti(3), J. Hellström(1), A. Oliveira(1), J. Andersson nerén(1)
1. Frontgrade Gaisler AB, Sweden, 2. Imec, Belgium, 3. imec, Belgium

Presenting author: Lucas Tambara

This work presents the radiation characterization of a Frontgrade Gaisler's LEON5FT-based SoC implemented on Imec's DARE65T platform. Results show the effectiveness of both the platform and the processor's fault tolerance in handling radiation-induced effects.

DW-11
Total Ionizing Dose and SEE Testing of the TPS7H4012-SP and TPS7H4013-SP 14V Synchronous Buck Converter

Authors: K. Rakos(1), A. Marinelarena(1)
1. Texas Instruments, USA

Presenting author: Kyle Rakos

Texas Instruments tests and discusses single-event effects and total ionizing dose of the TPS7H4012-SP and TPS7H4013-SP family of radiation-hardened, plastic package, 14V, synchronous buck converters optimized for use in a space environment.

DW-12
SEE characterization for a 12.8GHz & 10 bits ADC used in real and in I/Q mode

Authors: O. Bonnet(1), S. Renane(1), A. Dezzani(1), H. Barneoud(1), F. Malou(2), N. Kerboub(2), J. Mekki(2)
1. Teledyne e2v, France, 2. CNES, France

Presenting author: Olivier Bonnet

The device tested during these two SEE campaigns is a 10-bit single channel ADC capable of Ka-band operation. SEL, SEFI and SEU were performed during this SEE campaign up to a LET of 94MeV.

DW-13
Investigation of TID Effects on COTS PN and PiN Photodiodes with Impedance Spectroscopy

Authors: P. Casolaro(1), V. Izzo(2), R. Vari(2), C. Principe(2), A. Vanzanella(2), A. Imtiaz(3), A. Aloisio(1)

1. University of Naples Federico II, Italy, 2. National Institute for Nuclear Physics (INFN), Italy, 3. University of Padua, Italy

Presenting author: Pierluigi Casolaro

Impedance spectroscopy modeling and techniques were used to investigate TID effects in COTS photodiodes. The analysis revealed distinct time constants and radiation-induced changes, highlighting the value of impedance spectroscopy for characterizing devices under TID irradiation.

Withdrawn

DW-14
VSC8574RT - Microchip - Quad Port, Dual Media Gigabit Ethernet PHY Single Event Effects & Total Ionizing Dose performances

Authors: B. Treuillard(1), G. Bourgcazan(2), J. Bernard(3), V. Beranger(3), K. De saint jan(1), L. Montagner(4), P. Fournier(4), F. Malou(5), D. Dangla(5)

1. Microchip Technology Nantes, France, 2. Microchip, France, 3. Microchip Technology, France, 4. Microchip Technology Rousset, France, 5. CNES, France

Presenting author: Benjamin TREUILLARD

This paper reports the results of Single Event Effects (SEE) and Total Ionizing Dose (TID) test campaigns conducted by Microchip on VSC8574RT Quad Port, Dual Media Gigabit Ethernet PHY.

DW-15
Study of SEE and TID effects According to the Development of NAND Technology

Authors: W. Kim(1)

1. QRT, Korea, Republic of

Presenting author: Woongki Kim

This paper shows the difference to SEE and TID according to the development of NAND devices. It was confirmed that the SEE and TID characteristics were depended on decoder are and technology of NAND.

DW-16
High-Resolution Space Radiation Monitoring in LEO Orbit Onboard JoeySat for Radiation Effects Studies and Space Weather Research

Authors: C. Granja(1), J. Jakubek(1)

1. Advacam, Czech Republic

Presenting author: Carlos Granja

The pixel detector Timepix3 onboard OneWeb JoeySat provides detailed wide-range space radiation data in orbit. Mapping over long periods a model can provide radiation monitoring and threshold alarms for onset of radiation effects.

Withdrawn

DW-17
Radiation Evaluation of the Texas Instruments TPS7H3024-SP Radiation Hardened Four-Channel Supervisor with Watchdog

Authors: T. Lew(1), A. Marinelarena(1), J. Cruz-colon(1), S. Khan(2)

1. Texas Instruments, USA, 2. Texas Instruments Inc., USA

Presenting author: Tyler Lew

Single Events Effect (SEE) characterization and total ionizing dose (TID) results for the TPS7H3024-SP 14-V integrated four-channel supervisor are summarized, showing very robust SEE performance up to LET_{EFF}=75 MeV-cm²/mg and excellent TID behavior.

DW-18
Total Ionizing Dose Characterization of Microchip Programmable Current Limiting Power Switch LX7712

Authors: R. Stevens(1), D. Johnson(2)

1. Microchip, USA, 2. Microchip Technology, USA

Presenting author: Russell Stevens

The 100krad, 50krad and 25krad total ionizing dose characterization results of Microchip Technology's radiation-hardened Programmable Current Limiting Power Switch LX7712, are presented.

DW-19
TID and SEE Response of the INA129 Instrumentation Amplifier

Authors: J. Cardenas chavez(1), D. Hiemstra(2), B. Saha(1), A. Noguera cundar(3), L. Chen(1)

1. University of Saskatchewan, Canada, 2. MDA, Canada, 3. Univeristy of Saskatchewan, Canada

Presenting author: Jaime Cardenas Chavez

TID effects on INA129 instrumentation amplifier were studied using low dose rate ⁶⁰Co irradiation and Two-Photon Absorption laser was employed to replicate the SEE behavior obtained from heavy ion experiments.

DW-20
TID Response Characterization of the LP2951 Low Dropout Voltage Regulator

Authors: A. Noguera cundar(1), D. Hiemstra(2), J. Cardenas chavez(1), D. Feist(1), L. Chen(1)

1. University of Saskatchewan, Canada, 2. MDA, Canada

Presenting author: Adriana Noguera Cundar

TID effects on the LP2951 low dropout voltage regulator were studied using low dose rate ⁶⁰Co irradiation. The study tested 36 input/load combinations, revealing significant performance degradation at lower input voltages and load currents.

DW-21
Radiation response data of power units for the university small satellite ROMEO

Authors: T. Löffler(1), K. Waizenegger(1), J. Burgdorf(1), N. Bonidis(1)

1. Universität Stuttgart, Germany

Presenting author: Thorben Löffler

A collection of heavy-ion and proton radiation test results of power devices for the component selection of the satellite ROMEO [1] is presented. Further, an analysis predicts latch-up rates of selected devices during orbital lifetime.

DW-22
Correlation Between Interface Engineering and Radiation Resistance of Nanoscale Devices

Authors: C. Kang(1), K. Su jin(1), L. Yongsu(1), P. Jeong min(1)

1. Korea Atomic Energy Research Institute, Korea, Republic of

Presenting author: Chang Goo kang

The effects of interface engineering of two kind of nanoscale devices, MoS₂ transistors and ZnO TFTs, were investigated against gamma-ray and proton irradiation. The irradiation degradation of device can be significantly minimized by interface engineering.

DW-23
TID Effects on Opal Photonic Crystal Films

Authors: K. Stoev(1), E. Simova(2), H. Fudouzi(3)

1. CNL, Canada, 2. Canadian Nuclear Laboratories, Canada, 3. National Institute for Materials Science, Japan

Presenting author: Krassimir Stoev

Opal films are thin layers of colloidal crystals deposited on plastic sheets. The opal films were irradiated with x-rays to TID of 1 Mrad, and their performance was evaluated at different accumulated doses.

DW-24
Effect of Low Energy Proton Irradiation on Optocoupler Performance: Analysing the Role of Packaging

Authors: A. Romero_maestre(1), J. De_martin_hernandez(1), P. Martin_holgado(1), M. Dominguez(2), B. Campanini(3), Y. Morilla(4)

1. Centro Nacional de Aceleradores (CNA), Spain, 2. ALTER, Spain, 3. Micropac, USA, 4. CNA, Spain

Presenting author: Amor Romero_Maestre

This work analyzes the radiation effects of low-energy protons on the same type of optocoupler using different packages, as well as distinct LED wavelengths within the same package. The study focuses on the CTR degradation.

DW-25

ATA6571RT CAN FD Transceiver with High-Voltage WAKE Pin Single Event Effects & Total Ionizing Dose

Authors: J. Bernard(1), H. Meneu(1), R. Bouakaz(1), F. Malou(2), D. Dangla(2), B. Treuillard(1), V. Beranger(1), K. De saint jan(1), G. Bourg-cazan(1), E. Leduc(1)

1. Microchip Technology, France, 2. Centre National d'Etudes Spatiales, France

Presenting author: Jean-Guy BERNARD

This paper reports results of Single Event Effects (SEE) and Total Ionizing Dose (TID) conducted by Microchip on the CAN FD transceiver ATA6571RT.

DW-26

TID response characterization of COTS Operational Amplifiers

Authors: M. Sharma(1), J. Cardenas chavez(1), D. Hiemstra(2), A. Noguera cundar(1), L. Chen(1)

1. University of Saskatchewan, Canada, 2. MDA, Canada

Presenting author: Manasi Sharma

This study evaluated the Total Ionizing Dose response of four different COTS operational amplifiers using low dose rate 60Co irradiation. Results revealed all amplifiers remained functional up to 30 krad(Si).

DW-27

A Radiation-hardened Time-to-Digital Converter chip with 8 ps Single-Shot Precision

Authors: B. Van bockel(1), N. Jadhav(1), D. Hendrickx(1), Y. Cao(1), H. Marien(1)

1. Magics Technologies, Belgium

Presenting author: Bjorn Van Bockel

A rad-hard-by-design time-to-digital converter ASIC with 8ps single-shot precision is radiation qualified for space in 2025. The electrical performance is presented and its excellent radiation performance for SEE and TID is demonstrated.

DW-28

Guide to the 2024 RADECS Radiation Effects Data Workshop Session

Authors: D. Hiemstra(1)

1. MDA Space, Canada

Presenting author: David Hiemstral

The 2024 RADECS Data Workshop Session has been reviewed and a table prepared to facilitate the search for radiation response data by part number, type, or effect.

DW-29 L

SEE and beam characterization with high energy heavy ions at HIMAC

Authors: M. Cecchetto(1), K. Bilko(2), R. Garcia(1), S. Kodaira(3), J. Autran(4)

1. CERN, Switzerland, 2. Université Jean Monnet, France, 3. Quantum Science and Technology (QST), Japan, 4. Institut de Physique de Rennes (IPR), France

Presenting author: Matteo Cecchetto

Single Event Effect cross sections and energy deposition in a silicon diode were measured with high energy heavy ions at HIMAC, in Japan, by varying LETs through PMMA degraders.

DW-30 L

Effect of temperature on SEEs in SiGe HBT exposed to proton and heavy ion beams

Authors: J. Zhang(1), W. Hajdas(2)

1. Xidian University, China, 2. Pau Sherrer Institute, Switzerland

Presenting author: Jinxin Zhang

The effect of temperature on SEE in SiGe HBT was tested in proton and heavy-ion exposed. The cryogenic and room temperature were applied during proton test. Heavy-ion irradiations were conducted at -125°C, 25°C and +125°C.

DW-31 L**Neutron and Total Ionizing Dose Effect on OLF400 Darlington Optocoupler**

Authors: B. Jun(1), W. Boley(2), T. Fanous(2), D. Ramirez(2)
1. Northrop Grumman Information Systems, USA, 2. NGMS, USA

Presenting author: Bongim Jun

The effects of neutron and ionizing radiation on Darlington OLF400 optocouplers are studied. The current transfer ratio decreases with increasing displacement and ionizing dose. The CTR recovers as a function of annealing time.

DW-32 L**SEE Characterization of the 4 Tb 3DFN4T16LB1862 and 8 Tb 3DFN8T16LB2821 3D NAND flash memories for space application**

Authors: P. Kohler(1), A. Bosser(1), A. Sellai(1), P. Wang(1)
1. 3D PLUS, France

Presenting author: Alexandre Bosser

This paper presents the investigation of heavy-ion induced SEE (Single-Event Effects) carried out on a 3D PLUS 4Tb 3D NAND flash memory. The test data reveals that the DUT is suitable for space applications.

DW-33 L**LM5113-Q1 SEE Radiation Test Report**

Authors: T. Giroud(1), B. Vandoren(1)
1. Arcsec NV, Belgium

Presenting author: Thomas Giroud

This study explores Single Event Effect testing on the TI LM5113-Q1 Half Bridge GaN Driver. Heavy ions were used to irradiate the device at the RADEF facility in Finland.

DW-34 L**Characterisation of AMD Versal FPGA Transceivers Under Heavy-Ion Radiation**

Authors: A. Gonzalez(1), A. Ferrer florit(1), M. Farras casas(1), S. Parkes(2), P. Maillard(3), K. O'neil(3)
1. STAR-Barcelona S.L., Spain, 2. STAR-Dundee Ltd, United Kingdom, 3. AMD Inc., USA

Presenting author: Alberto Gonzalez

This paper presents heavy-ion characterisation of AMD Versal FPGA transceivers, revealing their radiation sensitivity. Results show that SpaceFibre robustly mitigates errors, enabling a 100 Gbit/s link under radiation with error rates reduced by 1000x

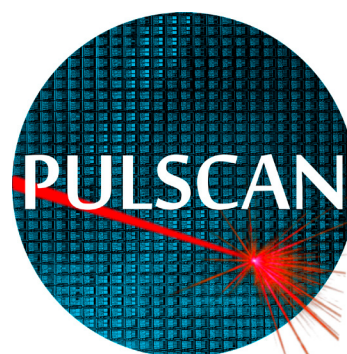
DW-35 L**Heavy Ion SEE Results of Analog Devices µModule DC/DC Converters**

Authors: A. Omprakash(1), M. Byers(1), M. Herrera(1), F. Lara(1), A. Huynh(1), K. Kobayashi(1), F. Biacan(1)
1. Raytheon Technologies, USA

Presenting author: Anup Omprakash

Heavy ion SEE results are presented for two Analog Devices µModule DC/DC Converters: LTM4642 and LTM8024.





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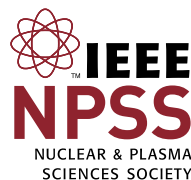


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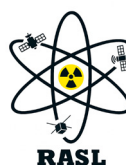
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