SERESSA 2022

5th to 9th of December at CERN, Geneva

Opening Ceremony

19th International School on the Effects of Radiation on Embedded Systems for Space Applications

SERESSA History

- The Birth – Nov. 2005 – Manaus (Brazil)
  - Ricardo Reis (UFRGS)
  - 33 attendees
  - Only theoretical courses, a book was prepared.

- The Childhood – Nov. 2006 – Sevilla (Spain)
  - Jose Luis Huertas (IMSE)
  - 55 attendees
  - First on-line demos

- The Teenage edition – Dec. 2007 – Buenos Aires (Argentina)
  - Martin Alurralde (CONAE), Daniel LUPI (INTI)
  - 76 attendees
  - SERESSA book edited by SPRINGER

- The Maturity edition – Dec. 2008 – Palm Beach (US)
  - Ken Label (NASA)
  - 91 attendees

SERESSA History

The Maturity edition (cnt'd)

- Dec. 2009 – Takasaki (Japan)
  - Satoshi Kuboyama (JAXA)
  - 81 attendees
- Dec. 2010 – São João dos Campos (Brazil)
  - Odair Lelis Gonzalez (IEAV)
  - 107 attendees
- Dec. 2011 – Toulouse (France)
  - Françoise Bezerra (CNES) and Sophie Duzellier (ONERA)
  - 76 attendees
- Dec. 2012 – Ansan (South Korea)
  - Dan Alexandrescu (IROC) and Massimo Violante (POLITO)
  - 48 attendees

SERESSA History

The Maturity edition (cnt'd)

- Dec. 2013 – Moscow (Russia)
  - Vasily Anashin (JSC-ISDE)
  - 139 attendees
- Dec. 2014 – Bariloche (Argentina)
  - Fernanda Kastensmidt (UFRGS)
  - 76 attendees
- Dec. 2015 – Puebla (Mexico)
  - Roberto Murphy (INAOE)
  - 48 attendees

SERESSA History

The Maturity edition (cnt'd)

- Nov. 2016 – Montreal (Canada)
  - Otman Ahit Mohammed (Concordia Univ.) and Claude Thibault (ETS)
  - 80 attendees
- Oct. 2017 – Munich (Germany)
  - Otman Ahit Mohammed (Concordia Univ.) and Jaime Estela (Spectrum ARC GmbH)
  - 63 attendees
- Nov. 2018 – Noordwijk (The Netherlands)
  - Véronique Ferlet-Cavrois (ESA) and Gregoire Deprez (ESA)
  - 131 attendees
- Dec. 2019 – Sevilla (Spain)
  - Yolanda Morilla Garcia (CNA) and Pedro Martín-Holgado (CNA)
  - 76 attendees

SERESSA History

The Maturity edition (cnt'd)

- Nov. 2020 – Porto Alegre (Brazil) – **Virtual**
  - Ricardo Reis (UFRGS) and Fernanda Kastensmidt (UFRGS)

- Oct. 2021 – Porto Alegre (Brazil) – **Virtual**
  - Ricardo Reis (UFRGS) and Fernanda Kastensmidt (UFRGS)

*Pictures from Unsplash.

SERESSA 2022 – Geneva, Switzerland

General Chairs
- Raoul VELAZCO (CNRS-TIMA, France) and Ygor AGUIAR (CERN, Switzerland)

Program Chair
- Jaime ESTELA (Spectrum Aerospace, Germany)

Local Chair
- Rubén GARCÍA ALÍA (CERN, Switzerland)

Poster Chairs
- Ygor AGUIAR (CERN, Switzerland) and Andrea CORONETTI (CERN, Switzerland)

- 24 lectures + 2 software trainings
  - USA 6, France 5, Germany 5, Switzerland 4, Italy 2, The Netherlands 1, Spain 1, Canada 1 and Brazil 1.
  - More than 140 attendees!

- Supported by the **CERN R2E project** and **RADNEXT European project** (Grant agreement No 101008126)

Technical Program

18th International School on the Effects of Radiation on Embedded Systems for Space Applications

from **Monday, 5 December 2022 (07:30)** to **Friday, 9 December 2022 (19:00)**

Monday, 5 December 2022	Tuesday, 6 December 2022	Wednesday, 7 December 2022	Thursday, 8 December 2022	Friday, 9 December 2022
08:00 **Registration**				
08:30 **School Opening**				
09:00 **Fundamental Mechanisms of Non-Destructive SEEs in Devices and Circuits**	09:00 **Introduction to G4SEE: a toolkit for simulating radiation effects in electronics I** - David Lucsanyi (CERN)	09:00 **Introduction to G4SEE: a toolkit for simulating radiation effects in electronics II** - David Lucsanyi (CERN)	09:00 **Introduction to OMERE: a tool for space environment and radiation effects on electronics devices I**	09:00 **Introduction to OMERE: a tool for space environment and radiation effects on electronics devices II**
09:50 **Coffee Break**	09:50 **Coffee Break**	09:50 **Coffee Break**	09:50 **Coffee Break**	09:50 **Coffee Break**
10:10 **SEE effects on VLSI devices: challenges and solutions** - Luca Sterpone	10:10 **Radiation Hardness Assurance (RHA)** - Stephen Buchner (Naval Research Laboratory)	10:10 **The Value of "Test-As-You-Fly": Modernizing FPGA Experimentation And Data Analysis for Critical Space Missions** - Melanie Berg (Founder/CEO of Space R3 LLC)	10:10 **Accelerator Radiation Environment and Neutron Effects in Electronics** - Matteo Cecchetto (CERN)	10:10 **Mitigation of Soft Errors at Circuit Level** - Ricardo Reis (UFRGS)
11:00 **Sensitivity characterization of SRAM-based FPGA against SEU and SET**	11:00 **COTS in (Deep) Space** - Hans-Juergen Sedlmayr (DLR)	11:10 **Radiation Hardening by Software: Advanced FDIR and Redundancy Concepts with COTS in Space**	11:00 **Introduction to 'Radiation to Materials': methodologies and examples** - Matteo Ferrari	11:00 **CELESTA project**
12:00 **Lunch break**	12:00 **Lunch break**	12:00 **Lunch break**	12:00 **Lunch break**	12:00 **Lunch break**
13:30 **TID Mechanisms in Nanometer-Scale Microelectronic Technologies** - Stefano Bonaldo (University of Padova)	13:30 **Radiation Mitigation Techniques for Mixed-Signal Circuits** - Daniel Loveless (University of Tennessee Chattanooga)	13:30 **System-Level Design and Radiation Test Methodologies based on a novel Software-Defined Radio Architectu…**	13:30 **Analyzing data extracted from radiation tests in advanced SRAMs**	13:30 **Exam**
14:20 **Modeling Cumulative Radiation Effects in Semiconductor Devices and Integrated Circuits** - Hugh Barnaby (ASU)	14:20 **The RADNEXT irradiation facility network** - Andrea Coronetti (CERN - University of Montpellier (FR))	14:20 **The Phoenix GPS Receiver for Rocket and Satellite Applications: An Example for the Successful Utilization…**	14:20 **Accurate Abstraction and High Level Modeling and Validation of SEE in Electronic Systems**	14:10 **School Closure**
15:10 **Coffee Break**	15:10 **Coffee Break**	15:10 **Coffee Break**	15:10 **Coffee Break**	14:40 **Visits to CERN installations**
15:30 **Error rate prediction for programmable circuits: methodology, tools and studied cases**	15:30 **The challenges of testing COTs devices at European Irradiation Facilities**	15:30 **Single-Event Effect Criticality Analysis** - Anthony Sanders Jonathan Allen Pellish	15:30 **Poster Session**	
16:20 **Modelling and prediction of Single Event Transient and Single Event Upset** - Frédéric Wrobel	16:20 **Fundamentals of the Pulsed-Laser Technique for Single-Event Effects Testing**			
		19:00 **Social Dinner**		

Software Training

- 2-hour training sessions
- Hands-on experience
  - Bring your own computer

Installation guidelines are already available on Indico.

SERESSA 2022

Introduction to G4SEE:

a toolkit for simulating radiation effects in electronics

Dávid Lucsányi, CERN

Abstract:

G4SEE, a novel Geant4-based Monte Carlo simulation toolkit is being developed at CERN for the radiation effects community, and released as a free and open-source code. It has been already demonstrated and validated experimentally by measurements of inelastic energy deposition single events of monoenergetic neutrons below 20 MeV. These two hands-on lectures will give an introduction on how to use the G4SEE toolkit in simple, but real-life scenarios to simulate, analyse and better understand the nuclear physics of Single Event Effects induced by neutrons and protons in microelectronic structures.

G4SEE website: https://cern.ch/g4see

Short Bio:

Dávid Lucsányi was graduated at Budapest University of Technology and Economics (BME) in 2016 as an Applied Physicist specialised in Nuclear Technologies. He joined CERN TOTEM experiment as a Technical student to work on solid-state detector R&D, then European Space Agency (ESA) as a Young Graduate Trainee (YGT) working on the development of Pyxel astronomical imaging detector effect modelling framework. Since 2020, he is working in CERN Radiation To Electronics (R2E) project as a Fellow on Monte Carlo simulations and analyses of Single Event Effects (SEE) and development of the G4SEE simulation toolkit. In his freetime, he works for Puli Space Technologies, as the Lead Payload Scientist of the NASA prize winner PLWS lunar neutron spectrometer instrument.

Organizers:

SERESSA 2022

Introduction to OMERE:

a tool for space environment and radiation effects on electronics devices

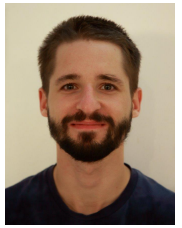
Léo Coïc, TRAD

Abstract:

This talk introduces the OMERE freeware and its capabilities. OMERE is a tool developed by TRAD with the support of the CNES according to the need of major actors of the European space industry. It is dedicated to accurately model the space environment for earth and interplanetary missions with industry approved and up to date environment models as well as estimate its effect on electronic devices. During this talk the main capabilities of the OMERE software will be showcased and we will go through the different steps necessary to perform calculations.

Short Bio:

Léo Coïc is a radiation engineer at TRAD. He received his master's degree in Space Systems Engineering from ESTACA (France) in 2020. Focused on the effects of radiation on electronic devices, his main activities involve working on single event effects analyses for the industry and R&D studies focused on simulation and experimental characterization of single event effects sensitivity in advanced technologies.



Organizers:

Poster Session

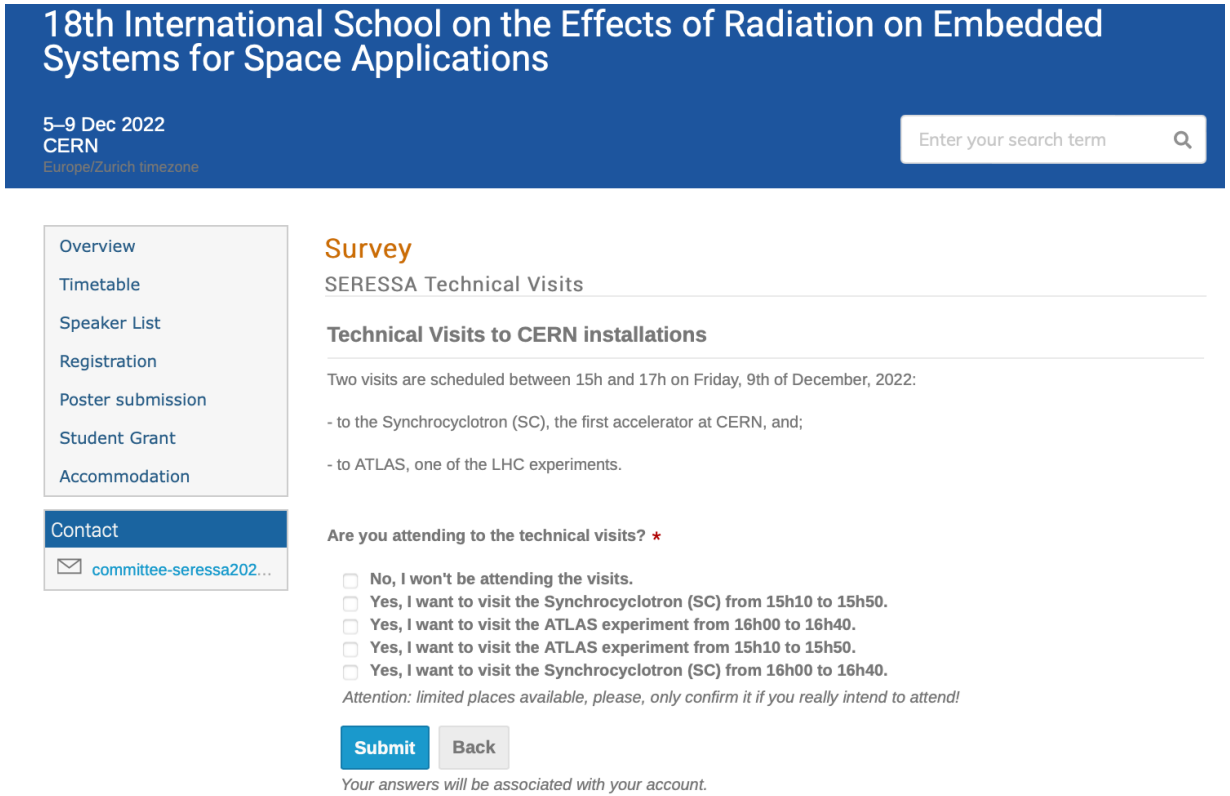
- On **Thursday, 08/12**, from 15:30 to 16:30.
  - It will take place in the hall next to the conference room
  - 25 student posters were selected.

- Students should print it in the standard A0 format in portrait orientation and they can be hang during the morning.

- Posters that are not presented will not be considered for the **Best Student Poster award**.
  - The award announcement will take place in the closing ceremony.

Technical Visits

Limited places, therefore, only fill out the form if you're really intending to participate to the visit.



- On **Friday, 09/12**, from 15h to 17h.
  - to the Synchrocyclotron (SC), the first accelerator at CERN, and;
  - to ATLAS, one of the LHC experiments

- Please, fill in the visits survey available on Indico by **Wednesday (07/12)**: https://indico.cern.ch/event/1098043/surveys/3775

R2E student grant

- 5 student grants:
  - **Arijit Sengupta**, USA
  - **Saulo Alberton**, Brazil
  - **Mahammadreza Rezaei**, Spain
  - **Stefano Marinaci**, Belgium
  - **Luca Weninger**, France

SERESSA 2022

5th to 9th of December at CERN, Geneva

R2E

CERN R2E Student Grant

Application Deadline
September 15th, 2022.

The Radiation to Electronics (R2E) project at CERN will provide five (5) student grants to support outstanding and highly motivated students willing to enhance their knowledge in radiation effects in electronics.

To participate to the selection process, check our website:

https://indico.cern.ch/e/SERESSA2022

Organizers: iima, SPECTRUM AEROSPACE GROUP, CERN, RADNEXT

Welcome and enjoy **SERESSA** 2022!