

# Newsletter #4

January 2021 – May 2021



*ELICSIR: Enhancement of Scientific Excellence and Innovation Potential in Electronic Instrumentation for Ionizing Radiation Environments*

## ***Welcome to the fourth ELICSIR project newsletter!***

This period in the project implementation was dedicated to research, education and the exchange of experiences and good practices.



Project website: [elicsir-project.eu](http://elicsir-project.eu)

Type of action: Coordination and Support

Topic: H2020-WIDESPREAD-2018-2020

Call: WIDESPREAD-3-2018-TWINNING



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857558.

# JANUARY 2021

## Miloš Krstić from IHP participated in the 19<sup>th</sup> Workshop “High Performance SiGe BiCMOS Technology Platform for Innovative RF and Photonic ICs”

Prof. Dr. Miloš Krstić, a member of the ELICSIR project team from IHP, participated in the 19<sup>th</sup> Workshop “High Performance SiGe BiCMOS Technology Platform for Innovative RF and Photonic ICs”.

He gave a talk “Rad-Hard Evaluation for Space Applications” related to space activities of IHP, in which he promoted the ELICSIR project. His presentation was followed by more than 50 participants from the industry and academia.

### Outline

IHP works on radhard technologies in space and extreme harsh environments

SGB25RH is already fully evaluated against ESCC standards and the technology is EPPL listed. The evaluation of SG13RH supported by the ESA component group consists of different activities and this overview gives an overall status of the progress.

- 1 Introduction
- 2 Ongoing Evaluation of SG13RH – Test structures developed by IHP
- 3 IHP Processes and PDKs for Space Applications
- 4 Representative Results, Future Plans and Roadmap

### IHP Processes and PDKs for Space Applications

Summary I of III

Status : Jan 2021

	SGB25V/RH	SG13S/RH
Process Description	SiGe HBTs n-p-n Peak $f_t$ / $f_{max}$ 75/95GHz 250nm CMOS ( $V_{DD}$ =2.5V/ $V_{GS}$ =5.8nm)	SiGe HBTs n-p-n Peak $f_t$ / $f_{max}$ 220/340GHz 130nm Dual Gate –Oxide CMOS ( $V_{DD}$ =1.2V / $V_{GS}$ =1.7nm / $T_{ox}$ =2nm / 7nm)
Applications	Mixed-Signal MMIC/ASICs up to 10-Band	Mixed-Signal MMIC/ASICs up to 10-Band
Commercial Qualification	<ul style="list-style-type: none"> <li>Not Qualified 2019</li> <li>active &amp; stable &gt; 10 years (2005)</li> <li>No QML/QPL</li> </ul>	<ul style="list-style-type: none"> <li>completed 2014</li> <li>No QML/QPL</li> </ul>
Radiation Assessment (Analog)	<ul style="list-style-type: none"> <li>completed</li> <li>PASS TID 800krad(Si) no ELDERS</li> <li>TID &gt; 500krad(Si)</li> <li>PASS TID 100krad(Si)</li> <li>Characterized up to 500krad(Si)</li> <li>TID &gt; 500krad(Si)</li> </ul>	<ul style="list-style-type: none"> <li>completed</li> <li>PASS TID &gt; 1210krad(Si) no ELDERS</li> <li>TID &gt; 200 (HV) / 500 (LV) krad(Si)</li> <li>PASS TID 50krad(Si) (LV)</li> <li>Characterized up to 500krad(Si)</li> <li>TID &gt; 900krad(Si)</li> </ul>

### 25 Gb/s TIA & 40 Gb/s VCSEL Driver ICs

- 3- and 4-channel power efficient ICs
  - resulted from the EU MERLIN/ROBIN Project
- Channel-independent digital control via SPI
- gain, noise optimization, pre-emphasis, output amplitude adjustments, channel on/off switching
- Power-on-reset (PoR) circuit for autonomous start-up
- Non-zero preset value for each control register

25 Gb/s at 64 mW/channel

40 Gb/s at 40 mW/channel

### Space Networks and ongoing Projects

- Space Region
- Trans Border Integration of the Space Sector Partners
  - IHP (Germany)
  - CEK PAN (Poland)
- MORAL - Export-free rad-hard  $\mu$ controller for space apps
  - Develop a completely European, ITAR-free  $\mu$ controller for space apps
  - Based on the novel Peaktop architecture (incl. novel ISA)
  - Formally-verified C compiler, RTOS and toolchain
  - Demonstrator board
- ELICSIR - Enhancement of Scientific Excellence and Innovation Capacity in Electronic Instrumentation for Ionizing Radiation Environments (WIDESPREAD)
  - University of Niš (Serbia) – coordinator
  - IHP (Germany)
  - Typical Institute (Ireland)
  - University of Granada (Spain)

## Prof. Goran Ristić, project coordinator, presented the ELICSIR project at the Kick off meeting of VIDIS Project.

### ELICSIR project

www.elicsir-project.eu  
www.elicsir.elfak.rs

Goran S. Ristić  
Faculty of Electronic Engineering, University of Niš, Niš, Serbia  
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### Work packages:

- WP1: Staff and students training
- WP2: Establishment of sustainable collaboration
- WP3: Boosting of networking capacity
- WP4: Dissemination, outreach and exploitation
- WP5: Project management

VIDIS Project, Kick off meeting, 28.01.2021.

### Papers published within the ELICSIR project

- Peer-reviewed journals:  
S. Ilić, A. Jevtić, S. Stanković, G. Ristić, "Floating-gate transistor with dynamic biasing as a radiation sensor", Sensors, 20 (11), 3329, 2020. Impact factor: 3.031; <https://doi.org/10.3390/s20113329>

- International conferences:  
M. Andjelkovic et al., "Design of Radiation Hardened RADFET Readout System for Space Applications," 2020 23rd Euromicro Conference on Digital System Design (DSD), Kranj, Slovenia, 2020, pp. 484-488, <https://doi.org/10.1109/DSD51259.2020.00082>

VIDIS Project, Kick off meeting, 28.01.2021.

MARCH 2021

## Experiments at Vinča Institute of Nuclear Sciences



4 March – Stefan Ilić performed experiments for studying the recharging process of commercial floating-gate MOS transistors at the [Department of Radiation and Environmental Protection, Vinča Institute of Nuclear Sciences](#), Belgrade, Serbia.

The manuscript with those results was sent for consideration to the [ESREF 2021 Conference](#). Accepted papers from this conference will be published in a special issue of [the Microelectronics Reliability Journal](#).

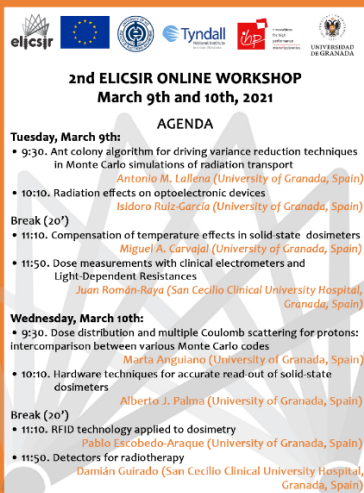
### Radiation experiments for studying the commercial PIN diode

13-15 March – Radiation experiments for studying the commercial PIN diode, planned with the colleagues from UGR and IHP, were performed at the [Department of Radiation and Environmental Protection, Vinča Institute of Nuclear Sciences](#), Belgrade. Because of epidemiological measures, only Goran Ristić and Stefan Ilić could participate in the experiments. When the pandemic situation improves, joint radiation experiments will be performed at the Radiotherapy Unit of the University “San Cecilio” Hospital in Granada, KU Leuven, Belgium, or GSI Center for Heavy Ion Research in Darmstadt, Germany, as planned.



## 2<sup>nd</sup> ELICSIR ONLINE WORKSHOP

The 2<sup>nd</sup> ELICSIR Online Workshop was held on March 9 and 10, 2021. Organized by the University of Granada, the workshop gathered more than 100 participants who attended very interesting presentations.



**2nd ELICSIR ONLINE WORKSHOP**  
March 9th and 10th, 2021

**AGENDA**

**Tuesday, March 9th:**

- 9:30. Ant colony algorithm for driving variance reduction techniques in Monte Carlo simulations of radiation transport  
*Antonio M. Lallena (University of Granada, Spain)*
- 10:10. Radiation effects on optoelectronic devices  
*Isidoro Ruiz-García (University of Granada, Spain)*
- Break (20')
- 11:10. Compensation of temperature effects in solid-state dosimeters  
*Miguel A. Carvajal (University of Granada, Spain)*
- 11:50. Dose measurements with clinical electrometers and Light-Dependent Resistances  
*Juan Román-Raya (San Cecilio Clinical University Hospital, Granada, Spain)*

**Wednesday, March 10th:**

- 9:30. Dose distribution and multiple Coulomb scattering for protons: intercomparison between various Monte Carlo codes  
*Marta Anguiano (University of Granada, Spain)*
- 10:10. Hardware techniques for accurate read-out of solid-state dosimeters  
*Alberto J. Palma (University of Granada, Spain)*
- Break (20')
- 11:10. RFID technology applied to dosimetry  
*Pablo Escobedo-Araque (University of Granada, Spain)*
- 11:50. Detectors for radiotherapy  
*Damián Guirado (San Cecilio Clinical University Hospital, Granada, Spain)*

Day 1, 09.03.2021

- [Goran S. Ristić \(University of Niš, Serbia\), Short project presentation](#)
- [Antonio M. Lallena \(University of Granada, Spain\), Ant colony algorithm for driving variance reduction techniques in Monte Carlo simulations of radiation transport](#)
- [Isidoro Ruiz-García \(University of Granada, Spain\), Radiation effects on optoelectronic devices](#)
- [Miguel A. Carvajal \(University of Granada, Spain\), Compensation of temperature effects in solid-state dosimeters](#)
- [Juan Román-Raya \(San Cecilio Clinical University Hospital, Granada, Spain\), Dose measurements with clinical electrometers and Light-Dependent Resistances](#)



Thank you very much for your attention and participation in this event!

We wish a very successful work!

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2nd ELICISIR ONLINE WORKSHOP - March 9th and 10th, 2021




HARDWARE TECHNIQUES FOR ACCURATE READ-OUT OF SOLID-STATE DOSIMETERS

Alberto J. Palma – University of Granada

2<sup>nd</sup> WORKSHOP ELICISIR PROJECT, 9-10.03.2021





## Day 2, 10.03.2021

- [Marta Anguiano \(University of Granada, Spain\), Dose distribution and multiple Coulomb scattering for protons: intercomparison between various Monte Carlo codes](#)
- [Alberto J. Palma \(University of Granada, Spain\), Hardware techniques for accurate read-out of solid-state dosimeter](#)
- [Pablo Escobedo-Araque \(University of Granada, Spain\), RFID technology applied to dosimetry](#)
- [Damián Guirado \(San Cecilio Clinical University Hospital, Granada, Spain\), Detectors for radiotherapy](#)
- [Jan Swakoń \(Polish Academy of Sciences, Krakow, Poland\), Irradiation possibilities with proton beams at IRI PAN \(Guest Speaker\)](#)

## ELICISIR Project Team organised Twinning Project Days

This event, organized on March 24 and 25, gathered 18 twinning project coordinators from the last two calls from neighbouring and non-EU countries.

### Wednesday, March 24, 2021

- [Goran Ristić, Serbia: ELICISIR project - \[www.cordis.europa.eu/project/id/857558\]\(http://www.cordis.europa.eu/project/id/857558\)](#)
- [Tanja Ćirković Veličković, Serbia: FoodEnTwin project - \[www.cordis.europa.eu/project/id/810752\]\(http://www.cordis.europa.eu/project/id/810752\)](#)
- [Liviú Marsavina, Romania: SIRAMM project - \[www.cordis.europa.eu/project/id/857124\]\(http://www.cordis.europa.eu/project/id/857124\)](#)
- [Anatolie Sidorenko, Moldova: SPINTECH project - \[www.cordis.europa.eu/project/id/810144\]\(http://www.cordis.europa.eu/project/id/810144\)](#)
- [Ivana Gadjanski, Serbia: DRAGON project - \[www.cordis.europa.eu/project/id/810775\]\(http://www.cordis.europa.eu/project/id/810775\)](#)
- [Ion Tiginyanu, Moldova: NanoMedTwin project - \[www.cordis.europa.eu/project/id/810652\]\(http://www.cordis.europa.eu/project/id/810652\)](#)
- [Natalija Perišić, Serbia: MIGREC project - \[www.cordis.europa.eu/project/id/857261\]\(http://www.cordis.europa.eu/project/id/857261\)](#)
- [Ana Kuveždić Divjak, Croatia: TODO project - \[www.cordis.europa.eu/project/id/857592\]\(http://www.cordis.europa.eu/project/id/857592\)](#)
- [Aram Manukyan, Armenia: MaNaCa project - \[www.cordis.europa.eu/project/id/857502\]\(http://www.cordis.europa.eu/project/id/857502\)](#)
- [Dejan Vukobratović, Serbia: INCOMING project - \[www.cordis.europa.eu/project/id/856967\]\(http://www.cordis.europa.eu/project/id/856967\)](#)



ONLINE EVENT FOR TWINNING PROJECT COORDINATORS

March 24 and 25, 2021

**Twining projects: Experiences and obstacles**

Presentation and discussion main points:

- About the project
- Experiences and obstacles in project execution and management
- Covid-19: how is your project coping?

Organized by the ELICISIR project team  
([www.elicisir-project.eu](http://www.elicisir-project.eu))

Thursday, March 25, 2021

**Enhancement of Scientific Excellence and Innovation Potential in Electronic Instrumentation for Ionising Radiation Environments – ELICSIR**  
[www.elicsir-project.eu](http://www.elicsir-project.eu)

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Twinning Project Days: 24 – 25 March, 2021

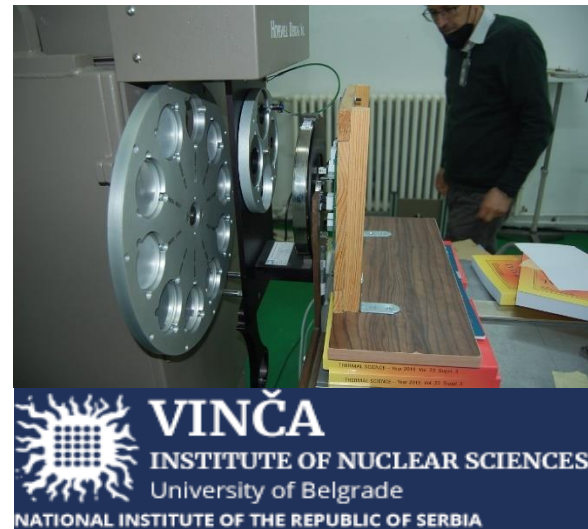


- [Kamen Kozarev, Bulgaria: STELLAR project - www.cordis.europa.eu/project/id/952439](http://www.cordis.europa.eu/project/id/952439)
- [Nicolae Lucanu, Romania: BRAINTWIN project - www.cordis.europa.eu/project/id/952378](http://www.cordis.europa.eu/project/id/952378)
- [Serhii Dzyadevich, Ukraine: BIONANOSENS project - www.cordis.europa.eu/project/id/951887](http://www.cordis.europa.eu/project/id/951887)
- [Nenad Filipović, Serbia: SGABU project - www.cordis.europa.eu/project/id/952603](http://www.cordis.europa.eu/project/id/952603)
- [Miloš Davidović, Serbia: VIDIS project - www.cordis.europa.eu/project/id/952433](http://www.cordis.europa.eu/project/id/952433)
- [Bojana Obradović, Serbia: ExcellMater project - www.cordis.europa.eu/project/id/952033](http://www.cordis.europa.eu/project/id/952033)
- [Goran Stojanović, Serbia: GREENELIT project - www.cordis.europa.eu/project/id/951747](http://www.cordis.europa.eu/project/id/951747)
- [Biljana Basarin, Serbia: EXtremeClimTwin project - www.cordis.europa.eu/project/id/952384](http://www.cordis.europa.eu/project/id/952384)

**APRIL & MAY 2021**

**Radiation experiments at Vinča Institute of Nuclear Sciences**

Radiation experiments planned with project partners were performed at the Department of Radiation and Environmental Protection, Vinča Institute of Nuclear Sciences, Belgrade. The ELICSIR Project team members who participated in this activity were young researchers from all higher education levels, so this experience is very important and valuable to them. Experiment participants were led by prof. Goran Ristić, Project Coordinator, who overlooked the entire process together with the representatives of the Vinča Institute. The experiments were performed by two PhD students, Stefan Ilić and Luka Spahić, one MSc student, Aleksandar Jevtić, as well as one BSc student, Strahinja Dimitrijević.



**VINČA**  
INSTITUTE OF NUCLEAR SCIENCES  
University of Belgrade  
NATIONAL INSTITUTE OF THE REPUBLIC OF SERBIA



**Gregor Kramberger visited EF-UNINIS**

Dr. Gregor Kramberger from the Jozef Stefan Institute, Ljubljana, Slovenia, visited EF-UNINIS as an external consultant on the ELICSIR project related to TCT research. During the visit, Dr. Kramberger spent most of the time at the Applied Physics Laboratory, sharing the knowledge and experience with ELICSIR project team-members.

## 2<sup>nd</sup> ELICSIR Online Training School

organizer: Tyndall National Institute, Ireland



*Day 1, 21.04.2021*

- ❖ [Aleksandar Jaksic \(private consultant, former Tyndall National Institute, Ireland\), Introduction to semiconductor radiation detectors](#)
- ❖ [Russell Duane \(Tyndall National Institute, Ireland\), Tyndall RADFETs – from wafer to a finished product](#)
- ❖ [Russell Duane \(Tyndall National Institute, Ireland\), Introduction to Technology Computer Aided Design \(TCAD\)](#)

The 2<sup>nd</sup> ELICSIR Online Training School was held on April 21 and 22, 2021, organized by the Tyndall National Institute, Ireland. The programme of this two-day online event included seven very interesting presentations which are available on the Project website. Almost 50 participants had the opportunity to hear not only scientific presentations but also get some career advice and tips for doing better research.

*Day 2, 22.04.2021*

- ❖ [Aleksandar Jaksic \(private consultant, former Tyndall National Institute, Ireland\), My research career – interesting anecdotes and useful tips](#)
- ❖ [Marko Zavrtanik \(Jozef Stefan Institute, Slovenia\), Jozef Stefan Institute – facilities and research](#)
- ❖ [María Sofía Martínez-García \(Autonomous University of Madrid, Spain\), Response to ionizing radiation of commercial and RADFET transistors](#)
- ❖ [Marko Andjelkovic \(IHP, Germany\), Particle Detectors for Self-Adaptive Fault-Tolerant Systems](#)