Chiara Rossi

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RESEARCH EXPERIENCE

11/2023 - 10/2025

Marie Skłodowska-Curie Postdoctoral Fellow
University of Udine - DPIA, Nanoelectronic group

Study of Ferroelectric Schottky-Barrier Field Effect Transistors to be used as artificial synapses for neuromorphic computing, carried out by calibrated Sentaurus TCAD simulations and analytical modeling. Development of complete 2D and 3D TCAD workflows for different device architectures. Investigation of optimization strategies, including novel operation scheme for devices featuring a metal interlayer in the gate stack, in order to obtain multilevel operation even in highly scaled devices. TCAD simulations of devices employing amorphous gallium oxide as channel material for back-end-of-line integration. Development of compact models.

04/2021 - 10/2023

Post-doc researcher
Fraunhofer Institute - IISB

Involved in several research projects: TCAD process simulations of 3D nanostructures, with focus on nanowire oxidation and implantation, within the EU H2020 project MUNDFAB; compact modeling of the IISB in-house silicon carbide CMOS technology, available on EUROPRACTICE; modeling and simulation of MOSFETs at cryogenic temperatures within the Munich Quantum Valley (Bavarian project aimed at developing and operating competitive quantum computers); TCAD device simulations of CdTe X-Ray detectors within a project in collaboration with Siemens Healthineers.

11/2016 - 02/2021

PhD student
EPFL - Laboratory of Electron Device Modeling and Technology

Development of a novel approach for SPICE-compatible physics-based modeling of charge generation, transport and collection in a semiconductor substrate using the so-called Generalized Devices. Application of this new modeling strategy to simulate, using standard circuit simulator tool, several optoelectronic devices, such as photodiodes, solar cells, phototransistors and CMOS APS pixels (operation of sensor and in-pixel circuit and electrical crosstalk). Extension of the model to predict ionizing radiation effects in ICs, by including peculiar radiation effects in semiconductors, such as the funneling effect. Validation of the modeling approach by TCAD simulations of all the considered scenarios.

02/2016 - 08/2016

Master Thesis Intern
CERN - Experimental Physics department, Detector Technology group

Design, TCAD numerical simulation, fabrication in cleanroom and characterization of a metal-semiconductor-metal photodetector for light detection in microfluidic scintillation detectors, novel particle detectors under investigation at CERN Experimental Physics Department.

06/2015 - 08/2015

Summer Intern
EPFL - Laboratory of Microsystem 2

Design and optimization, using COMSOL and analytical modeling, of a novel pumping system to replace the syringe pumps for liquid circulation in a microfluidic platform used in long-term multiplexed analyses on Caenorhabditis elegans nematodes.

EDUCATION

11/2016 - 02/2021 **PhD in Microelectronics**

École Polytechnique Fédérale de Lausanne (EPFL), Microsystems and Microelectronics Doctoral School

09/2014 - 10/2016 **Master's Degree in Micro and Nano technologies for Integrated Systems - Nanotechnologies for ICTs**

École Polytechnique Fédérale de Lausanne (EPFL), Politecnico Di Torino, Grenoble Institut Nationaux Polytechnique (INP) - Phelma (joint degree)

Overall Grade: 110/110 (cum laude)

09/2011 - 10/2014 **Bachelor's Degree in Physics Engineering**

Politecnico Di Torino

Overall Grade: 110/110

RECOGNITIONS AND AWARDS

- **Marie Skłodowska-Curie Actions** (MSCA) **Postdoctoral Fellowship** (EASIFeT project)
- **Task manager** in the European Union's Horizon 2020 project MUNDFAB
- Performance bonus (**Leistungsprämie**) at Fraunhofer IISB
- **Best Poster Award**, EPFL Microsystems and Microelectronics Doctoral School
- Article **reviewer** for IEEE Transactions on Electron Devices Journal, IEEE Electron Device Letters, Silicon (Springer Nature), Journal of computational electronics (Springer Nature) and others, LAEDC and NEWCAS conferences
- ERASMUS scholarship
- Admitted and confirmed for every university years in Torino at one of the Italian University Colleges of Merit: "Collegio Universitario R. Einaudi" di Torino
- 2 Scholarships from "Collegio Universitario R. Einaudi": mobility scholarship and "one year free rent"

TEACHING EXPERIENCE

Teaching Assistant:

- Laboratory of the course "Science and Technology of Electricity", EPFL Bachelor's Degree in Electronic Engineering
- Theoretical course, "Electronics", EPFL Bachelor's Degree in Physics
- Laboratory course, "Lab in EDA based design" (Cadence Virtuoso simulator), EPFL Master's Degree in Micro and Nano technologies for Integrated Systems
- Laboratory of the course "Nanoelectronic Devices and Circuits with High Energy Efficiency for Internet-of-Things Applications" (SIMetrix simulator), University of Udine Master's Degree in Electronic Engineering

Internship Supervisor:

- Supervision of Master student summer internship on "Radiation Effects in ICs"
- Co-supervision of Master Thesis "Modelling of 4H-SiC CMOS transistors for high temperature operation"

SKILLS

- CAD and Simulations: **Sentaurus** Device and Process TCAD, Cadence **Virtuoso**, Cadence **Spectre**, ICCAP, Silvaco TCAD, SIMetrix
- Programming Languages: **Verilog-A**, Matlab, Python, C, LabVIEW
- Devices characterization (electrical characterizations, optical microscopy, scanning electron microscopy) and microfabrication in cleanroom

LIST OF PUBLICATIONS

- “Multilevel Operation in Scaled Back-End-of-Line Ferroelectric FETs with a Metal Interlayer ”, **C. Rossi**, D. Lizzit, D. Esseni, IEEE Access, vol. 13, 68525-68535, 2025, 10.1109/ACCESS.2025.3561255
- “Modelling and Design of Short Channel Ferroelectric FETs with a Metal Interlayer easing the Multilevel Operation ”, **C. Rossi**, D. Lizzit, D. Esseni, 2025 9th IEEE Electron Devices Technology & Manufacturing Conference (EDTM), 2025, Hong Kong,10.1109/EDTM61175.2025.11040846
- “Non-Volatile Reconfigurable Transistor via Ferroelectric Modulation: Fabrication Strategy and TCAD Simulations”, D. Nazzari, **C. Rossi**, V. Wahler, L. Wind, M. Sistani, D. Esseni, W. Weber, 2025 48th International Semiconductor Conference (CAS), Sinaia, Romania
- “TCAD modeling and simulation of self-limiting oxide growth and boron segregation during vertical silicon nanowire processing”, **C. Rossi**, J. Müller, P. Pichler, Paweł Piotr Michałowski, G. Larrieu, Materials Science in Semiconductor Processing, vol. 174, 108217, 2024, 10.1016/j.mssp.2024.108217
- “An analog to digital converter in a SiC CMOS technology for high-temperature applications”, J. Mo, Y. Niu, A. May, M. Rommel, **C. Rossi**, J. Romijn, G. Zhang, S. Vollebregt, Applied Physics Letters, 124, 152105, 2024 10.1063/5.0195013
- “Temperature Sensing Readout Circuits with 4H-SiC Technology”, M. A. Khan, P. G. Bahubalindruni, A. May, **C. Rossi** and M. Rommel, 2024 IEEE International Symposium on Smart Electronic Systems (iSES), New Delhi, India, 2024, pp. 60-63, 10.1109/iSES63344.2024.00023
- “Analysis and Design of an SiC CMOS Three-Channel DC-DC Synchronous Buck Converter for High-Temperature Applications”, A. Martinez, F. Torres, J. Marin, C. A. Rojas, J. Gak, M. Rommel, A. May, A. H. Wilson-Veas, M. Miguez, **C. Rossi**, M. Schraml, N. Calarco, Applied Sciences, 14(21), 9789, 2024, 10.3390/app14219789
- “Secondary ion mass spectrometry quantification of boron distribution in an array of silicon nanowires”, P. P. Michałowski, J. Müller, **C. Rossi**, A. Burenkov, E. Bär, G. Larrieu, P. Pichler, Measurements, vol. 211, 112630, 2023, 10.1016/j.measurement.2023.112630
- “Performance of vertical gate-all-around nanowire p-MOS transistors determined by boron depletion during oxidation”, **C. Rossi**, A. Burenkov, P. Pichler, E. Bär, J. Müller, G. Larrieu, Solid-State Electronics, vol. 200, 108551, 2023, 10.1016/j.sse.2022.108551
- “Design and Characterization of a Data Converter in a SiC CMOS Technology for Harsh Environment Sensing Applications”, Y. Niu, J. Mo, A. May, M. Rommel, **C. Rossi**, J. Romijn, G.Zhang, and S. Vollebregt, 2023 IEEE SENSORS, Vienna, Austria, 2023, pp. 1-4,10.1109/SENSORS56945.2023.10325061
- “A 4H-SiC CMOS Oscillator-Based Temperature Sensor Operating from 298 K up to 573 K”, N. Rinaldi, A. Rubino, R. Liguori, A. May, **C. Rossi**, M. Rommel, A. Rubino, G. D. Licciardo, L. Di Benedetto, Sensors, 23(24), 9653, 2023, 10.3390/s23249653
- “Modeling Funneling Effect With Generalized Devices for SPICE Simulation of Soft Errors”, **C. Rossi**, A. Chatel, J.-M. Sallese, IEEE Transactions on Electron Devices, vol. 68, issue 6, 2633, 2021, 10.1109/TED.2021.3076028
- “SPICE Simulation of Radiation Induced Charges and Currents in Silicon Substrate”, **C. Rossi**, J.-M. Sallese, Proceedings of the 2020 IEEE Latin America Electron Devices Conference (LAEDC), 10.1109/LAEDC49063.2020.9073366
- “Prediction of optically-triggered amplification in phototransistor with SPICE circuit simulators”, **C. Rossi**, J.-M. Sallese, 2020 SPIE Photonic West OPTO, Physics and Simulation of Optoelectronic Devices XXVIII, Volume 11274, 2020, 10.1117/12.2545771
- “Simulation of CMOS APS Operation and Crosstalk in SPICE with Generalized Devices”, **C. Rossi**, J.-M. Sallese, IEEE Journal of the Electron Devices Society, vol. 8, 376-384, 2019,10.1109/JEDS.2019.2956572
- “Full SPICE Simulation of a CMOS Active Pixel Sensor with Generalized Devices”, **C. Rossi**, J.-M. Sallese, Proceedings of the 2019 IEEE Latin America Electron Devices Conference (LAEDC), 10.1109/LAED.2019.8714732
- “Modeling Surface Recombination with Enhanced Devices Network for Optoelectronics”, **C. Rossi**, P. Buccella, C. Stefanucci, J.-M. Sallese, Proceedings of the16th IEEE International New Circuits and Systems Conference (NEWCAS), 2018, 10.1109/NEWCAS.2018.8585606
- “SPICE Modeling of Photoelectric Effects in Silicon with Generalized Devices”, **C. Rossi**, P. Buccella, C. Stefanucci, J.-M. Sallese, IEEE Journal of the Electron Devices Society vol. 6, 987-995, 2018, 10.1109/JEDS.2018.2817286
- “SPICE Modeling of Light Induced Charges and Currents in Silicon with Generalized Lumped Devices”, **C. Rossi**, P. Buccella, C. Stefanucci, J.-M. Sallese, Proceedings of the 47th IEEE European Solid-State Device Research Conference (ESSDERC), 2017, 10.1109/ESSDERC.2017.8066583