DANIEL LIZZIT

Curriculum Vitae

Polytechnic Department of Engineering and Architecture (DPIA)
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Education and Qualifications

02/2023 **Abilitazione Scientifica Nazionale (Scientific Abilitation)**.
Professore di seconda fascia (Associate Professor). S.C. 09/E3 - Elettronica. (National Scientific qualification as associate in the Italian higher education system for the disciplinary field of 09/E3 - Electronics).
Valid from 08/02/2023 until 08/02/2034

04/2016 **Ph.D. in Industrial and Information Engineering**, *University of Udine*, Italy.
Thesis title: "Advanced models for simulation of planar and gate-all-around nanoscale MOSFETs", Advisor Prof. Esseni David.

03/2012 **M.Sc. in Electronic Engineering (with honors)**, *University of Udine*, Italy.
Thesis title: "Advanced modelling of CMOS transistors with $Si_{1-x}Ge_x$ channel and $Si_{1-y}Ge_y$ substrate" Supervisor Prof. Selmi Luca, Co-advisors Prof. Palestri Pierpaolo and Prof. Esseni David.

11/2009 **B.Sc. in Electronic Engineering(with honors)**, *University of Udine*, Italy.
Thesis title: "Theoretical and experimental analysis of an EHD thruster". Supervisor Prof. Bettini Paolo, Co-advisor Prof. Bellina Fabrizio.

Employment History

04/2023 - now **Assegnista di borsa di ricerca**, *University of Udine*, Italy.
SSD: ING-INF/01, SC: 09/E3 Electronics. Polytechnic Department of Engineering and Architecture (DPIA). Research activity in the field of ferroelectric-based FETs and ferroelectric Tunneling Junctions for neuromorphic computing applications. Modelling of quantum transport in heterostructure between bulk metals and 2D semiconductor materials.

04/2020 - 04/2023 **Ricercatore a tempo determinato di tipo A - RTDa (Assistant Professor)**, *University of Udine*, Italy.
SSD: ING-INF/01, SC: 09/E3 Electronics. Polytechnic Department of Engineering and Architecture (DPIA). Research activity in the field of ferroelectric-based FETs and ferroelectric Tunneling Junctions for neuromorphic computing applications. Modelling of quantum transport in heterostructure between bulk metals and 2D semiconductor materials.

05/2017 - 03/2020 **PostDoctoral Research Associate**, *Elettra Sincrotrone Trieste*, Italy.
Responsible for operating and upgrading the CoSMoS (Combined Spectroscopy and Microscopy on Surfaces) facility installed on the branch-line of the SuperESCA (Super Electron Spectroscopy for Chemical Analysis) beamline. Collaboration with the scientific and technical staff of the beamline for the preparation of the equipment, the acquisition and the analysis of the collected data for in-house and user beamtimes. Development of an in-house acquisition and processing software for the CoSMoS end-station for non-spin resolved and spin resolved measurements. Research activity mainly focused on the growth and characterization of nanostructures mainly based on 2D materials (graphene and transition metal dichalcogenides (TMDs)) for applications in electronic devices and for catalytic processes.

03/2016 - 03/2017 **Research contract**, *University of Udine*, Italy.
Research contract at the Polytechnic Department of Engineering and Architecture (DPIA). Main activity: improvement of a TCAD tool developed during the Ph.D. to study the electronic transport in nanoscale multi-gate MOSFETs and nanowire MOS transistors with fairly-arbitrary cross sections including the most relevant scattering mechanisms (i.e. acoustic, polar and non-polar optical phonon scattering, coulomb scattering and surface roughness scattering).

01/2013 - **PhD student**, *University of Udine*, Italy.
12/2015 Main activity: modelling and simulation of planar and non-planar transistors. Improvement of a comprehensive semi-classical Monte Carlo solver for planar transistors including a new model to describe the surface-roughness scattering. Development of a simulation tool for nanowire MOSFETs with circular cross section.

05/2012 - **Research contract**, *University of Udine*, Italy.
12/2012 Main activity: Investigation of the strain induced effects in FinFET transistors with silicon-germanium channel and study of the electronic transport in MOSFETs with channel materials belonging to group III-V.

Research Activity

Research at the University of Udine.

During the Ph.D. he carried out research activities on semiconductors alternative to silicon and belonging to the III-V group of the periodic table, as well as alternative device geometries to planar MOSFETs, for ultimate device scaling. In this framework, the research activity has been focused on modeling developments and design options to reduce the applied voltage while maintaining or improving the device performance in terms of drive-current and sub-threshold parameters for nanoscale multi-gate-FETs and nanowire MOS transistors with fairly-arbitrary cross sections. The research has been conducted by using different methods to calculate the electronic band structure of the semiconductors and by using an in-house out-of-equilibrium transport solver developed during the Ph.D. period and in collaboration with the nanoelectronics group of the University of Udine.

His current research interests include the modelling and simulation of ferroelectric-based devices for neuromorphic computing systems capable to satisfy stringent constraints in terms of energy consumption, reliability and dynamic range. In this framework, ferroelectric based FETs and FTJs are envisaged to be good candidates for nanoscale electronic synapses given their demonstrated multiple resistance levels and low energy consumption. However, the dynamics of the polarization switching that determine the device operation are still debated, thus making the modelling and design of FeFETs and FJTs a stimulating and challenging research topic.

Moreover, his research activity is focused on the modelling and simulation of the charge transport through the interface between materials with different physical properties, that is, between a three-dimensional metal and a two-dimensional semiconductor. Among the most recently developed electron devices, those with low-dimensionality semiconductors (e.g. graphene, MoS_2, WS_2 and others) are becoming of increasing importance for ultimate CMOS technology. However, the lack of good Ohmic contacts to 2D materials sets a serious hindrance to many prospective applications. For this reason his research is focused on the modelling and simulation of the properties of such contacts by using an in–house developed *ab–initio* transport methodology.

Postdoctoral Research Fellow at Elettra Sincrotrone Trieste.

The research activity was carried out at the SuperESCA (Super Electron Spectroscopy for Chemical Analysis) beamline and at the CoSMoS (Combined Spectroscopy and Microscopy on Surfaces) branch-line where several surface science techniques allow for an in-depth structural and electronic characterization of materials. During a 3-years research period he has participated to the experimental activities for both in-house research projects and to assist external users. In-house research projects involved:

- the growth and investigation of the structural and electronic properties of single layer TMDs (MoS_2, WS_2,VS_2) grown on different substrates (Au(111), Ag(111), Ag(110)). Synchrotron radiation based photoelectron spectroscopy with high resolution (HR-XPS) or in the fast modality (fast-XPS) were used to characterize the growth. In particular fast-XPS was instrumental to find the optimum growth parameters and Photoelectron Diffraction (XPD) was then employed to find the structural parameters. Scanning Tunneling Microscopy (STM), Low Energy Electron Diffraction (LEED) and Microscopy (LEEM) added further insight into the extension of the grown layers and the structural order at the atomic level.
- the study of graphene supported on ferroelectric materials (e.g. PZT) to investigate on the nature of resistance hysteresis and anti-hysteresis behavior.
- the control of hydrogen adsorption on graphene and the thermodynamic stability of hydrogenated graphene to investigate on possible future developments of nanostructured carbon-based materials in the field of hydrogen storage.
- simulations of electron diffraction patterns of 2D materials (graphene, TMDs) for comparison with experimental data to derive structural properties and lattice parameters.
- development of an in-house acquisition and processing software for the CoSMoS end-station for non-spin resolved and spin resolved measurements.

Awards

2019 - 2021 **Beamtimes for experiments**.

He has been awarded for 3 beamtimes ($\sim$ 400 hours) at the Elettra Synchrotron facility. This experimental funding is estimated to be worth over 100 k€.

2016 **PhD Thesis award**.

Certificate of merit - 48^{th} Annual Meeting of the Associazione Gruppo Italiano di Elettronica.

2015 **Best Paper Award**.

45^{th} Eurpean Solid State Device Research Conference for the paper "Improved surface roughness modeling and mobility projections in thin film MOSFETs", O. Badami, E. Caruso, D. Lizzit, D. Esseni, P. Palestri, L. Selmi.

Service To The Scientific Community

2023 **Technical Program Committee (TPC) member**, Kobe, Japan 2023.

TPC member of the 2023 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD) devoted to technology computer-aided design (TCAD) and advanced modeling of novel semiconductor devices and nano electronic structures.

2022 **Local organizing commitee and Guest Editor**, Udine, Italy.

8th Joint International EUROSOI Workshop and International Conference on Ultimate Integration on Silicon (EUROSOI-ULIS 2022).

2012 - present **Reviewing activity**.

He is serving as referee for the following international, peer-reviewed journals: IEEE Transaction on Electron Devices, IEEE Journal of the Electron Devices Society, IEEE Electron Device Letters, Applied Physics Letters, Solid-State Electronics, Journal of Computational Electronics.

2017 - 2020 **Assistance to Synchrotron beamline users**, *Elettra Sincrotrone Trieste*, Trieste, Italy.

Support to the external users at the SuperESCA anc CoSMoS beamlines of the Elettra Synchrotron Radiation Facility, providing assistance during their beamtimes, in cooperation with the other members of the beamline staff.

Teaching

2022 - present **Lecturer, PhD courses in Industrial and Information Engineering**, *University of Udine*, Italy.
Title: "Ab-initio modelling of technologically relevant materials for electrical and electronic engineering", 4 hours.
Title: "Ferroelectric-based devices for low-power field-effect transistors and neuromorphic computing", 8 hours.

2020 - present **Lecturer, Electronic Circuits for High Frequencies**, *University of Udine*, Italy.
M.Sc. (Laurea Magistrale) in Electronic Engineering at the Polytechnic Department of Engineering and Architecture (DPIA). 24 hrs/year

2020 - present **Lecturer, Electronic Circuits and Systems**, *University of Udine*, Italy.
B.Sc. (Laurea Triennale) in Electronic Engineering at the Polytechnic Department of Engineering and Architecture (DPIA). 24 hrs/year

2020 - present **Supervision of students**, *University of Udine*, Italy.
He has acted as supervisor and thesis co-advisor for students in Electronic Engineering.

Contribution to projects and collaborations

2020 - present **BeFerroSynaptic project supported by the European Union (H2020 - GA:871737I)**.

2018 **Member of the working group of "Tecnologie Prioritarie per l'industria - X edizione"**.
Settore – Microelettronica e Semiconduttori for Elettra Sincrotrone Trieste S.C.p.A. Associazione Italiana per la Ricerca Industriale (AIRI)

2012 - 2016 **Collaboration with Taiwan Semiconductor Manufacturing Company (TSMC)**.
Collaboration during the Ph.D. period and the research period at the University of Udine which also founded part of my Ph.D. research activity

01/2014 - 01/2015 **III-V-MOS project (FP7-ICT-GA:619326)**.
Project founded by the European Commission under the 7th Framework Program and coordinated by Prof. Luca Selmi (University of Udine), and by the Italian IUNET consortium

05/012 - 12/2013 **FIRB "Futuro in Ricerca"**, project founded by the Italian MIUR (Futuro in Ricerca 2010).

Other skills

Technical skills and competences
- Experience in the development and implementation of models for electron transport in Field-Effect-Transistors
- Experience in software development, code debugging and optimization
- Knowledge of the Ultra-High-Vacuum experimental techniques for the growth and analysis of nanostructured materials
- Knowledge of several surface science techniques (STM, XPS, XPD, LEED, ARPES) and thin film preparation
- Device characterization using the probe station and instrumentation controlled via LabView
- Team management, writing articles and reports

Computer skills and competences
- Programming Languages: C, C++, deep knowledge of MATLAB and LabView
- Operating systems: Unix, Windows
- Applications: Latex, Microsoft Office, Cadence

Languages
- Italian: Native speaker
- English: Professional working proficiency

Publications

Peer-Reviewed Journal Articles

2023 Monica Pozzo, Tommaso Turrini, Luca Bignardi, Paolo Lacovig, Daniel Lizzit, Ezequiel Tosi, Silvano Lizzit, Alessandro Baraldi, Dario Alfè, and Rosanna Larciprete. Interplay among hydrogen chemisorption, intercalation, and bulk diffusion at the graphene-covered ni(111) crystal. *The Journal of Physical Chemistry C*, volume 127, pages 6938–6947, 2023.

2023 Daniel Lizzit, Pedram Khakbaz, Francesco Driussi, Marco Pala, and David Esseni. Ohmic behavior in metal contacts to n/p-type transition-metal dichalcogenides: Schottky versus tunneling barrier trade-off. *ACS Applied Nano Materials*, volume 6, pages 5737–5746, 2023.

2022 Mattia Segatto, Riccardo Fontanini, Francesco Driussi, Daniel Lizzit, and David Esseni. Limitations to Electrical Probing of Spontaneous Polarization in Ferroelectric-Dielectric Heterostructures. *IEEE Journal of the Electron Devices Society*, volume 10, pages 324–333, 2022.

2022 Gaetana Petrone, Francesca Zarotti, Paolo Lacovig, Daniel Lizzit, Ezequiel Tosi, Roberto Felici, Silvano Lizzit, and Rosanna Larciprete. The effect of structural disorder on the hydrogen loading into the graphene/nickel interface. *Carbon*, volume 199, pages 357–366, 2022.

2022 Daniel Lizzit, Pedram Khakbaz, Francesco Driussi, Marco Pala, and David Esseni. A study of metal-MoS_2 contacts by using an in-house developed ab-initio transport simulator. *Solid-State Electronics*, volume 194, page 108365, 2022.

2022 P. Khakbaz, F. Driussi, P. Giannozzi, A. Gambi, D. Lizzit, and D. Esseni. Engineering of metal-MoS_2 contacts to overcome Fermi level pinning. *Solid-State Electronics*, volume 194, page 108378, 2022.

2021 Hanna Pazniak, Mohamed Benchakar, Thomas Bilyk, Andrea Liedl, Yan Busby, Céline Noël, Patrick Chartier, Simon Hurand, Marc Marteau, Laurent Houssiau, Rosanna Larciprete, Paolo Lacovig, Daniel Lizzit, Ezequiel Tosi, Silvano Lizzit, Jérôme Pacaud, Stéphane Célérier, Vincent Mauchamp, and Marie-Laure David. Ion Implantation as an Approach for Structural Modifications and Functionalization of $Ti_3C_2T_x$ MXenes. *ACS Nano*, volume 15, pages 4245–4255, 2021. PMID: 33586963.

2021 Paulina Majchrzak, Klara Volckaert, Antonija Grubišić Čabo, Deepnarayan Biswas, Marco Bianchi, Sanjoy K. Mahatha, Maciej Dendzik, Federico Andreatta, Signe S. Grønborg, Igor Marković, Jonathon M. Riley, Jens C. Johannsen, Daniel Lizzit, Luca Bignardi, Silvano Lizzit, Cephise Cacho, Oliver Alexander, Dan Matselyukh, Adam S. Wyatt, Richard T. Chapman, Emma Springate, Jeppe V. Lauritsen, Phil D.C. King, Charlotte E. Sanders, Jill A. Miwa, Philip Hofmann, and Søren Ulstrup. Spectroscopic view of ultrafast charge carrier dynamics in single- and bilayer transition metal dichalcogenide semiconductors. *Journal of Electron Spectroscopy and Related Phenomena*, volume 250, page 147093, 2021.

2021 Rosanna Larciprete, Antonio Agresti, Sara Pescetelli, Hanna Pazniak, Andrea Liedl, Paolo Lacovig, Daniel Lizzit, Ezequiel Tosi, Silvano Lizzit, and Aldo Di Carlo. Mixed Cation Halide Perovskite under Environmental and Physical Stress. *Materials*, volume 14, 2021.

2021 Davide Curcio, Sahar Pakdel, Klara Volckaert, Jill A. Miwa, Søren Ulstrup, Nicola Lanatà, Marco Bianchi, Dmytro Kutnyakhov, Federico Pressacco, Günter Brenner, Siarhei Dziarzhytski, Harald Redlin, Steinn Ymir Agustsson, Katerina Medjanik, Dmitry Vasilyev, Hans-Joachim Elmers, Gerd Schönhense, Christian Tusche, Ying-Jiun Chen, Florian Speck, Thomas Seyller, Kevin Bühlmann, Rafael Gort, Florian Diekmann, Kai Rossnagel, Yves Acremann, Jure Demsar, Wilfried Wurth, Daniel Lizzit, Luca Bignardi, Paolo Lacovig, Silvano Lizzit, Charlotte E. Sanders, and Philip Hofmann. Ultrafast electronic linewidth broadening in the C $1s$ core level of graphene. *Phys. Rev. B*, volume 104, page L161104. American Physical Society, Oct 2021.

2021 Enrico Caruso, David Esseni, Elena Gnani, Daniel Lizzit, Pierpaolo Palestri, Alessandro Pin, Francesco Maria Puglisi, Luca Selmi, and Nicolò Zagni. Modeling Nanoscale III–V Channel MOSFETs with the Self-Consistent Multi-Valley/Multi-Subband Monte Carlo Approach. *Electronics*, volume 10, 2021.

2021 Luca Bignardi, Sanjoy K. Mahatha, Daniel Lizzit, Harsh Bana, Elisabetta Travaglia, Paolo Lacovig, Charlotte Sanders, Alessandro Baraldi, Philip Hofmann, and Silvano Lizzit. Anisotropic strain in epitaxial single-layer molybdenum disulfide on ag(110). *Nanoscale*, volume 13, pages 18789–18798. The Royal Society of Chemistry, 2021.

2021 Nicoleta G. Apostol, Marius A. Husanu, Daniel Lizzit, Ioana A. Hristea, Cristina F. Chirilă, Lucian Trupină, and Cristian M. Teodorescu. CO adsorption, reduction and oxidation on Pb(Zr,Ti)O_3(001) surfaces associated with negatively charged gold nanoparticles. *Catalysis Today*, volume 366, pages 141–154, 2021. Catalysis for the sustainable valorization of the resources.

2020 Federico Loi, Luca Sbuelz, Paolo Lacovig, Daniel Lizzit, Luca Bignardi, Silvano Lizzit, and Alessandro Baraldi. Growth Mechanism and Thermal Stability of a MoS_2–Graphene Interface: A High-Resolution Core-Level Photoelectron Spectroscopy Study. *The Journal of Physical Chemistry C*, volume 124, pages 20889–20897, 2020.

2020 Dario De Angelis, Francesco Presel, Naila Jabeen, Luca Bignardi, Daniel Lizzit, Paolo Lacovig, Silvano Lizzit, Tiziano Montini, Paolo Fornasiero, Dario Alfè, and Alessandro Baraldi. Interfacial two-dimensional oxide enhances photocatalytic activity of graphene/titania via electronic structure modification. *Carbon*, volume 157, pages 350–357, 2020.

2020 Manuel Bonilla, Sadhu Kolekar, Jiangfeng Li, Yan Xin, Paula Mariel Coelho, Kinga Lasek, Krzysztof Zberecki, Daniel Lizzit, Ezequiel Tosi, Paolo Lacovig, Silvano Lizzit, and Matthias Batzill. Compositional Phase Change of Early Transition Metal Diselenide (VSe_2 and $TiSe_2$) Ultrathin Films by Postgrowth Annealing. *Advanced Materials Interfaces*, volume 7, page 2000497, 2020.

2020 Giulia Avvisati, Pierluigi Gargiani, Daniel Lizzit, Manuel Valvidares, Paolo Lacovig, Caterina Petrillo, Francesco Sacchetti, and Maria Grazia Betti. Strong ferromagnetic coupling and tunable easy magnetization directions of Fe_xCo_{1-x} layer(s) intercalated under graphene. *Applied Surface Science*, volume 527, page 146599, 2020.

2020 Nicoleta Georgiana Apostol, Daniel Lizzit, George Adrian Lungu, Paolo Lacovig, Cristina Florentina Chirilă, Lucian Pintilie, Silvano Lizzit, and Cristian Mihai Teodorescu. Resistance hysteresis correlated with synchrotron radiation surface studies in atomic sp2 layers of carbon synthesized on ferroelectric (001) lead zirconate titanate in an ultrahigh vacuum. *RSC Adv.*, volume 10, pages 1522–1534. The Royal Society of Chemistry, 2020.

2019 Klara Volckaert, Habib Rostami, Deepnarayan Biswas, Igor Marković, Federico Andreatta, Charlotte E. Sanders, Paulina Majchrzak, Cephise Cacho, Richard T. Chapman, Adam Wyatt, Emma Springate, Daniel Lizzit, Luca Bignardi, Silvano Lizzit, Sanjoy K. Mahatha, Marco Bianchi, Nicola Lanata, Phil D. C. King, Jill A. Miwa, Alexander V. Balatsky, Philip Hofmann, and Søren Ulstrup. Momentum-resolved linear dichroism in bilayer $\mathrm{MoS_2}$. *Phys. Rev. B*, volume 100, page 241406. American Physical Society, Dec 2019.

2019 Habib Rostami, Klara Volckaert, Nicola Lanata, Sanjoy K. Mahatha, Charlotte E. Sanders, Marco Bianchi, Daniel Lizzit, Luca Bignardi, Silvano Lizzit, Jill A. Miwa, Alexander V. Balatsky, Philip Hofmann, and Søren Ulstrup. Layer and orbital interference effects in photoemission from transition metal dichalcogenides. *Phys. Rev. B*, volume 100, page 235423. American Physical Society, Dec 2019.

2019 Sanjoy K. Mahatha, Arlette S. Ngankeu, Nicki Frank Hinsche, Ingrid Mertig, Kevin Guilloy, Peter L. Matzen, Marco Bianchi, Charlotte E. Sanders, Jill A. Miwa, Harsh Bana, Elisabetta Travaglia, Paolo Lacovig, Luca Bignardi, Daniel Lizzit, Rosanna Larciprete, Alessandro Baraldi, Silvano Lizzit, and Philip Hofmann. Electron–phonon coupling in single-layer MoS_2. *Surface Science*, volume 681, pages 64–69, 2019.

2019 Daniel Lizzit, Mario I. Trioni, Luca Bignardi, Paolo Lacovig, Silvano Lizzit, Rocco Martinazzo, and Rosanna Larciprete. Dual-Route Hydrogenation of the Graphene/Ni Interface. *ACS Nano*, volume 13, pages 1828–1838, 2019.

2019 Luca Bignardi, Daniel Lizzit, Harsh Bana, Elisabetta Travaglia, Paolo Lacovig, Charlotte E. Sanders, Maciej Dendzik, Matteo Michiardi, Marco Bianchi, Moritz Ewert, Lars Buß, Jens Falta, Jan Ingo Flege, Alessandro Baraldi, Rosanna Larciprete, Philip Hofmann, and Silvano Lizzit. Growth and structure of singly oriented single-layer tungsten disulfide on Au(111). *Phys. Rev. Mater.*, volume 3, page 014003. American Physical Society, Jan 2019.

2019 H. Beyer, G. Rohde, A. Grubišić Čabo, A. Stange, T. Jacobsen, L. Bignardi, D. Lizzit, P. Lacovig, C. E. Sanders, S. Lizzit, K. Rossnagel, P. Hofmann, and M. Bauer. 80% Valley Polarization of Free Carriers in Singly Oriented Single-Layer WS_2 on Au(111). *Phys. Rev. Lett.*, volume 123, page 236802. American Physical Society, Dec 2019.

2018 Søren Ulstrup, Paolo Lacovig, Fabrizio Orlando, Daniel Lizzit, Luca Bignardi, Matteo Dalmiglio, Marco Bianchi, Federico Mazzola, Alessandro Baraldi, Rosanna Larciprete, Philip Hofmann, and Silvano Lizzit. Photoemission investigation of oxygen intercalated epitaxial graphene on Ru(0001). *Surface Science*, volume 678, pages 57–64, 2018. Surface Structure and Dynamics – in Honor of Karl-Heinz Rieder.

2018 Philipp Eickholt, Charlotte Sanders, Maciej Dendzik, Luca Bignardi, Daniel Lizzit, Silvano Lizzit, Albert Bruix, Philip Hofmann, and Markus Donath. Spin Structure of K Valleys in Single-Layer WS_2 on Au(111). *Phys. Rev. Lett.*, volume 121, page 136402. American Physical Society, Sep 2018.

2018 Harsh Bana, Elisabetta Travaglia, Luca Bignardi, Paolo Lacovig, Charlotte E Sanders, Maciej Dendzik, Matteo Michiardi, Marco Bianchi, Daniel Lizzit, Francesco Presel, Dario De Angelis, Nicoleta Apostol, Pranab Kumar Das, Jun Fujii, Ivana Vobornik, Rosanna Larciprete, Alessandro Baraldi, Philip Hofmann, and Silvano Lizzit. Epitaxial growth of single-orientation high-quality MoS_2 monolayers. *2D Materials*, volume 5, page 035012. IOP Publishing, apr 2018.

2018 O. Badami, D. Lizzit, F. Driussi, P. Palestri, and D. Esseni. Benchmarking of 3-D MOSFET Architectures: Focus on the Impact of Surface Roughness and Self-Heating. *IEEE Transactions on Electron Devices*, volume 65, pages 3646–3653, 2018.

2018 Fabian Arnold, Raluca-Maria Stan, Sanjoy K Mahatha, H E Lund, Davide Curcio, Maciej Dendzik, Harsh Bana, Elisabetta Travaglia, Luca Bignardi, Paolo Lacovig, Daniel Lizzit, Zheshen Li, Marco Bianchi, Jill A Miwa, Martin Bremholm, Silvano Lizzit, Philip Hofmann, and C E Sanders. Novel single-layer vanadium sulphide phases. *2D Materials*, volume 5, page 045009. IOP Publishing, jul 2018.

2017 D Lizzit, O Badami, R Specogna, and D Esseni. Improved surface-roughness scattering and mobility models for multi-gate FETs with arbitrary cross-section and biasing scheme. *Journal of Applied Physics*, volume 121, page 245301. AIP Publishing LLC, 2017.

2016 Enrico Caruso, Pierpaolo Palestri, Daniel Lizzit, Patrik Osgnach, David Esseni, and Luca Selmi. Quasi-Ballistic Γ - and L-Valleys Transport in Ultrathin Body Strained (111) GaAs nMOSFETs. *IEEE Transactions on Electron Devices*, volume 63, pages 4685–4692, 2016.

2016 Oves Badami, Enrico Caruso, Daniel Lizzit, Patrik Osgnach, David Esseni, Pierpaolo Palestri, and Luca Selmi. An Improved Surface Roughness Scattering Model for Bulk, Thin-Body, and Quantum-Well MOSFETs. *IEEE Transactions on Electron Devices*, volume 63, pages 2306–2312, 2016.

2015 P. Palestri, E. Caruso, F. Driussi, D. Esseni, D. Lizzit, P. Osgnach, S. Venica, and L. Selmi. State-of-the-art semi-classical Monte Carlo method for carrier transport in nanoscale transistors. In *2015 38th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)*, pages 1–8, 2015.

2015 Patrik Osgnach, Enrico Caruso, Daniel Lizzit, Pierpaolo Palestri, David Esseni, and Luca Selmi. The impact of interface states on the mobility and drive current of $In_{0.53}Ga_{0.47}As$ semiconductor n-MOSFETs. *Solid-State Electronics*, volume 108, pages 90–96, 2015. Selected papers from the 15th Ultimate Integration on Silicon (ULIS) conference.

2014 Daniel Lizzit, David Esseni, Pierpaolo Palestri, and Luca Selmi. A new formulation for surface roughness limited mobility in bulk and ultra-thin-body metal–oxide–semiconductor transistors. *Journal of Applied Physics*, volume 116, page 223702. AIP Publishing LLC, 2014.

2014 Daniel Lizzit, David Esseni, Pierpaolo Palestri, Patrik Osgnach, and Luca Selmi. Performance Benchmarking and Effective Channel Length for Nanoscale InAs, $In_{0.53}Ga_{0.47}As$, and sSi n-MOSFETs. *IEEE Transactions on Electron Devices*, volume 61, pages 2027–2034, 2014.

2013 Daniel Lizzit, Pierpaolo Palestri, David Esseni, Alberto Revelant, and Luca Selmi. Analysis of the Performance of n-Type FinFETs With Strained SiGe Channel. *IEEE Transactions on Electron Devices*, volume 60, pages 1884–1891, 2013.

Conference Proceedings

2022 M. Segatto, M. Massarotto, S. Lancaster, Q. T. Duong, A. Affanni, R. Fontanini, F. Driussi, D. Lizzit, T. Mikolajick, S. Slesazeck, and D. Esseni. Polarization switching and AC small-signal capacitance in Ferroelectric Tunnel Junctions. In *ESSDERC 2022 - IEEE 52nd European Solid-State Device Research Conference (ESSDERC)*, pages 340–343, 2022.

2022 Daniel Lizzit, Thomas Bernardi, and David Esseni. Multi-level Operation of FeFETs Memristors: the Crucial Role of Three Dimensional Effects. In *ESSDERC 2022 - IEEE 52nd European Solid-State Device Research Conference (ESSDERC)*, pages 344–347, 2022.

2022 D. Lizzit, P. Khakbaz, F. Driussi, M. Pala, and D. Esseni. Ab-initio transport simulations unveil the Schottky versus Tunneling barrier trade-off in metal-TMD contacts. In *2022 International Electron Devices Meeting (IEDM)*, pages 28.2.1–28.2.4, 2022.

2021 Daniel Lizzit and David Esseni. Operation and Design of Ferroelectric FETs for a BEOL Compatible Device Implementation. In *ESSDERC 2021 - IEEE 51st European Solid-State Device Research Conference (ESSDERC)*, pages 215–218, 2021.

2021 D. Esseni, R. Fontanini, D. Lizzit, M. Massarotto, F. Driussi, and M. Loghi. Ferroelectric based FETs and synaptic devices for highly energy efficient computational technologies. In *2021 5th IEEE Electron Devices Technology & Manufacturing Conference (EDTM)*, pages 1–3, 2021.

2018 D. Esseni, O. Badami, F. Driussi, D. Lizzit, M. Pala, P. Palestri, T. Rollo, L. Selmi, and S. Venica. New device concepts, transistor architectures and materials for high performance and energy efficient CMOS circuits in the forthcoming era of 3D integrated circuits. In *2018 IEEE 2nd Electron Devices Technology and Manufacturing Conference (EDTM)*, pages 236–238, 2018.

2016 M. Rau, E. Caruso, D. Lizzit, P. Palestri, D. Esseni, A. Schenk, L. Selmi, and M. Luisier. Performance projection of III-V ultra-thin-body, FinFET, and nanowire MOSFETs for two next-generation technology nodes. In *2016 IEEE International Electron Devices Meeting (IEDM)*, pages 30.6.1–30.6.4, 2016.

2016 O. Badami, D. Lizzit, R. Specogna, and D. Esseni. Surface roughness limited mobility in multi-gate FETs with arbitrary cross-section. In *2016 IEEE International Electron Devices Meeting (IEDM)*, pages 36.1.1–36.1.4, 2016.

2015 O. Badami, E. Caruso, D. Lizzit, D. Esseni, P. Palestri, and L. Selmi. Improved surface roughness modeling and mobility projections in thin film MOSFETs. In *2015 45th European Solid State Device Research Conference (ESSDERC)*, pages 306–309, 2015.

2014 P. Osgnach, E. Caruso, D. Lizzit, P. Palestri, D. Esseni, and L. Selmi. The impact of interface states on the mobility and the drive current of III-V MOSFETs. In *2014 15th International Conference on Ultimate Integration on Silicon (ULIS)*, pages 21–24, 2014.

2014 Enrico Caruso, Daniel Lizzit, Patrik Osgnach, David Esseni, Pierpaolo Palestri, and Luca Selmi. Simulation analysis of III–V n-MOSFETs: Channel materials, Fermi level pinning and biaxial strain. In *2014 IEEE International Electron Devices Meeting*, pages 7.6.1–7.6.4, 2014.

2013 Alberto Revelant, Pierpaolo Palestri, Patrik Osgnach, Daniel Lizzit, and Luca Selmi. On the optimization of SiGe and III-V compound hetero-junction Tunnel FET devices. In *2013 Proceedings of the European Solid-State Device Research Conference (ESSDERC)*, pages 49–52, 2013.

2013 Patrik Osgnach, Alberto Revelant, Daniel Lizzit, Pierpaolo Palestri, David Esseni, and Luca Selmi. Toward computationally efficient Multi-Subband Monte Carlo simulations of nanoscale MOSFETs. In *2013 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD)*, pages 176–179, 2013.

2013 Daniel Lizzit, David Esseni, Pierpaolo Palestri, and Luca Selmi. Surface roughness limited mobility modeling in ultra-thin SOI and quantum well III-V MOSFETs. In *2013 IEEE International Electron Devices Meeting*, pages 5.2.1–5.2.4, 2013.

2012 D. Lizzit, P. Palestri, D. Esseni, F. Conzatti, and L. Selmi. A Multi-Subband Monte Carlo study of electron transport in strained SiGe n-type FinFETs. In *2012 Proceedings of the European Solid-State Device Research Conference (ESSDERC)*, pages 322–325, 2012.

Contribution to conferences and workshops

Invited Contributions

2022 **Workshop: *BEOL Compatible Ferroelectric Device Technologies for Neuromorphic Computing***, *September, 19th, 2022*, Milan.
Invited oral contribution: *Modelling and device design options for BEOL-compatible ferroelectric-based transistors for neuromorphic applications*

Oral Contributions

2022 **68th Annual IEEE International Electron Devices Meeting, 9-13 December, San Francisco (California - USA)**, *Ab–initio transport simulations unveil the Schottky versus Tunneling barrier trade–off in metal–TMD contacts*.

2022 **IEEE 52nd European Solid-State Device Research Conference (ESSDERC), 19-22 September, Milan (Italy)**, *Multi-level Operation of FeFETs Memristors: the Crucial Role of Three Dimensional Effects*.

2021 **IEEE 51st European Solid-State Device Research Conference (ESSDERC), 13-22 September**, *Operation and Design of Ferroelectric FETs for a BEOL Compatible Device Implementation*.

2019 **AVS 66th International Symposium and Exhibition, October, Columbus (Ohio - USA)**, *Epitaxial Growth and Characterization of Single-Orientation Single-Layer Transition Metal Dichalcogenides on Au(111)*.

2019 **AVS 66th International Symposium and Exhibition, October, Columbus (Ohio - USA)**, *Dual-Route Hydrogenation of the Graphene/Ni Interface*.

2019 **Italian Synchrotron Radiation Society meeting (SILS), September, Camerino (Italy)**, *On the hydrogenation of the Graphene/Ni(111) system*.

2018 **MATERIALS Italian National Conference on Materials Science and Technology, October, Bologna (Italy)**, *Growth and characterization of Single Layer Transition Metal Dichalcogenides on Au(111)*.

2018 **34th European Conference on Surface Science (ECOSS-34), August, Aarhus (Denmark)**, *Epitaxial Growth of Single-Orientation High-Quality MoS_2 Monolayers on Au(111)*.

2018 **34th European Conference on Surface Science (ECOSS-34), August, Aarhus (Denmark)**, *Dual path hydrogenation of the graphene/Ni(111) interface*.

2018 **4th European Workshop on Epitaxial Graphene and 2D (EWEG2D), May, Salamanca (Spain)** , *Single-Orientation High-Quality MoS_2 Monolayers with Complete SpinPolarization*.

2018 **American Physical Society's March Meeting (APS march meeting), March, Los Angeles (California - USA)**, *Synthesis of large area and high quality MoS_2 monolayers on Au(111) with single domain orientation*.

2013 **45th GE Conference (Gruppo Italiano di Elettronica), June, Udine (Italy)**, *Performance of III-V nanoscale MOSFETs: a simulation study*.

2013 **IEEE International Electron Devices Meeting, December, Washington DC (USA)**, *Surface roughness limited mobility modeling in ultra-thin SOI and quantum well III-V MOSFETs*.

2012 **42nd European Solid State Device Research Conference (ESSDERC), September, Bordeaux (France)**, *A Multi-Subband Monte Carlo study of electron transport in strained SiGe n–type FinFETs*.

Udine, May 26, 2023.