

# Davide Truccolo

## Education

- 11/2020 – current ■ **Ph.D. student in Industrial and Information Engineering**,  
University of Udine, Italy.  
Field: Electromagnetic fields  
Thesis title: *Modeling of graphene geometrical rectifiers*. Supervisor: Prof. Michele Midrio, co-supervisor: Prof. Pierpaolo Palestri  
Expected date of defence: March 2025
- 2017 – 2020 ■ **M.Sc. Physics**,  
University of Trieste, Italy.  
Field: Condensed matter physics  
Thesis title: *Development of graphene Golay micro-cell arrays for THz detection*. Supervisor: Dr. Marco Lazzarino
- 2013 – 2017 ■ **B.Sc. Physics**,  
University of Trieste, Italy.  
Thesis title: *Characterization of CVD diamond detectors for the Belle II radiation monitoring system*. Supervisor: Prof. Lorenzo Vitale, co-supervisor: Prof. Livio Lanceri

## Working position

- 2021 – current ■ **Research fellow (Assegno di ricerca)**,  
University of Udine, Italy.  
Field: Study of nano antennas and/or metal meta-surfaces for the concentration of electromagnetic radiation at THz, and the study of the rectification properties of diodes made with MIM structures (Metal-Insulator-Metal) and/or with asymmetrical bidimensional structures that use graphene. The activity has been carried out within the framework of the European project GreEnergy - Wideband optical antennae for use in energy harvesting applications - CUP G29C20000680006" Supervisor: Prof. Michele Midrio

## Research Activity

### PhD Research (2020-2024)

My research activity has been primarily dedicated to the development of Monte Carlo simulators for the analysis of graphene-based devices. Specifically, my PhD work focused on the investigation of graphene ballistic rectifiers. In addition to the simulation analysis, I conducted experimental measurements (I-V characterization) on these devices. Furthermore, I explored the behavior of antennas at optical frequency from both theoretical and experimental perspectives. Theoretical studies were performed using FDTD-based simulators, while the experimental work involved characterization and measurements of antenna performance.

### M.Sc Research (2019-2020)

I conducted my Master's thesis research at the CNR-IOM laboratories in Trieste (Italy) where I received a training in micro-fabrication techniques. Specifically, I worked with the major lithographic process and I learned the transfer process of CVD graphene onto silicon oxide substrates. In addition to fabrication activity, I carried out graphene sample characterization using AFM to analyze surface morphology and structural properties.

### B.Sc Research (2017)

I completed my Bachelor's thesis at the INFN laboratories in Trieste (Italy). During this period, I focused on the characterization of diamond detectors exposed to both  $\beta$  and  $\alpha$  radiation.

## Skills

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Languages	English: Full professional proficiency. Italian: Native
Numerical Simulation	Comsol
Coding	MATLAB, Python, Latex, C, C++
Office Automation	Microsoft Office Suite, Microsoft Word, Microsoft Excel, Microsoft Power-Point

## Research Publications



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### Journal Articles

- 1 D. Truccolo, P. Palestri, D. Esseni, S. Boscolo, and M. Midrio, "Comprehensive analysis of graphene geometric diodes: Role of geometrical asymmetry and electrostatic effects," *IEEE Transactions on Electron Devices*, 2024.
- 2 M. Midrio, L. Pierantoni, S. Boscolo, D. Truccolo, and D. Mencarelli, "Nano-antenna array for high efficiency sunlight harvesting," *Optics Express*, vol. 30, no. 5, pp. 7017–7034, 2022.
- 3 D. Truccolo, S. Boscolo, D. Esseni, M. Midrio, and P. Palestri, "Modeling and optimization of graphene ballistic rectifiers," *Solid-State Electronics*, vol. 194, p. 108314, 2022.

### Speaker at Conferences and Workshops

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- 2024  Workshop at IEEE European Solid-State Device Research Conference (ESSDERC), 9-12 September 2024, Bruges (Belgium) with the presentation titled *Monte Carlo Simulations of Graphene Ballistic Diodes*
- 2022  8th Joint International EUROSIO International Conference on Ultimate Integration on Silicon (EUROSIO-ULIS), May 18–20, 2022, Udine (Italy) with the presentation titled *Modeling and optimization of graphene ballistic rectifiers*