

# Simone De Camillis

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## Professional Experience

### Research Fellow

Jan 2021 – Present

Australian National University, Dep. of Material Physics (Supervisor: Prof. Adrian Sheppard)

Australian National University, Dep. of Quantum Science (Supervisor: Prof. Jong Chow)



- Designed and developed interferometric-based optical systems for volumetric imaging of crystals and 3D mapping of inclusions.
- Modelled imaging errors caused by opto-mechanical distortions and environmental instabilities. Developed suitable correction algorithms and standard calibration procedures.
- Coordinating optical R&D projects of the SmartLight team, ensuring alignment and effective communication with all stakeholders.
- Assessing system limitations and providing actionable recommendations for improvement.
- Conducting statistical analysis of data and targeted 3D data visualisation to evaluate performance.

### Research Fellow

Jan 2019 – Jan 2021

Macquarie University (Supervisor: Em. Prof. Jim Piper)

ARC Centre of Excellence for Nanoscale BioPhotonics ([cnbplegacy.org.au/imaging](https://cnbplegacy.org.au/imaging))



- Led research projects to analyse the optical properties of quantum dots and nanoparticles, enabling advances in super-resolution microscopy.
- Developed a bench-top free-space confocal microscope upgrading hardware and software components to support biomedical imaging applications.
- Conducted numerical studies to assess the feasibility of Non-Linear Structured Illumination Microscopy (NL-SIM) applied to lanthanide nanoparticles.

### Instrumentation Engineer

Jan 2018 – Dec 2018

CEA Centre, Paris-Saclay, France (Supervisor: Dr. Olivier Boulade)



- Developed optical experiments to characterise the quantum efficiency and sub-pixel response of CMOS detectors for space applications.
- Designed and implemented numerical simulations of illumination patterns at the focal plane to guide experimental design.
- In collaboration with ESA (European Space Agency) and ONERA (The French Aerospace Lab).

### R&D Engineer

Jan 2017 – Dec 2017

General Electric - Grid Solutions, Lisburn, UK (Supervisor: Dr. Chris Calvert)



- Researched and assessed new electro-optical solutions for gas detection to support and enhance GE products.
- Conducted experiments and data analysis to validate the performance and reliability of impedance sensors in measuring hydrocarbon concentrations.
- Designed and implemented a correction algorithm using field data, enhancing the accuracy and extending the lifespan of gas sensing detectors.

## Skills

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|------------------------|--|
| <b>Leadership</b>      | <ul style="list-style-type: none"> <li>➤ Management of the SmartLight optical laboratories.</li> <li>➤ Head researcher for projects on microscopy (Macquarie) and spectroscopy (QUB).</li> <li>➤ Representative of early career researchers within the CNBP Centre of Excellence.</li> </ul>   |
| <b>Instrumentation</b> | <ul style="list-style-type: none"> <li>➤ Optics: Pulsed and continuous-wave lasers, polarisation control, harmonic generation, chirped pulse compensation, interferometry, spectral analysis, single-photon detection, fibre fusion splicing.</li> <li>➤ Imaging: confocal microscopy, super-resolution imaging, structured illumination microscopy, optical coherent tomography, transmission tomography, tunnelling electron microscopy.</li> <li>➤ Instrumentation for ultra-high vacuum and cryogenic conditions.</li> <li>➤ Analog/digital signal generation and processing.</li> </ul> |
| <b>Programming</b>     | <ul style="list-style-type: none"> <li>➤ Simulations and data analysis: Python, MATLAB, C, Fortran, ImageJ, Paraview.</li> <li>➤ Control software: LabVIEW, Python.</li> <li>➤ Optical and mechanical design: OpticStudio Zemax, SolidEdge, SolidWorks.</li> <li>➤ Drawings: Inkscape, Blender.</li> <li>➤ Version control: Git.</li> <li>➤ Editing: Latex, Office.</li> <li>➤ Project management: Jira, Confluence.</li> <li>➤ Geographic Information Systems: QGIS, ArcGIS Pro.</li> </ul>   |
| <b>Communication</b>   | <ul style="list-style-type: none"> <li>➤ 15 peer-reviewed papers published in international journals (see ORCID profile).</li> <li>➤ 6 talk/poster presentations at international conferences.</li> <li>➤ Teaching the postgraduate class Advanced Imaging Methods and Systems (PHYS8721, ANU, 2021-2023).</li> </ul>  |

## Training and Schools

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|---------------|---|
| Apr- May 2025 | <b>Introduction to ArcGIS Pro (GIS400 online course)</b> delivered by the Australian National University  |
| Apr 2025      | <b>Regression in Machine Learning</b> course delivered by the Queensland Cyber Infrastructure Foundation (QCIF).  |
| Mar 2025      | <b>Deep Learning for Image Classification</b> workshop delivered by the Queensland Cyber Infrastructure Foundation (QCIF).  |
| Jul 2024      | <b>Online course of “Introduction to Meteorology”</b> delivered by the Bureau of Meteorology.   |
| Feb-Apr 2024  | <b>Online courses “Optical Efficiency and Resolution” and “Design of High-Performance Optical Systems”</b> delivered by Coursera (University of Colorado Boulder).  |
| Jun 2018      | <b>School on visible and IR detection</b> at the Observatoire de Haute Provence, France. Instrumentation, detectors and data analysis for Astronomy and Astrophysics.   |
| Jan-Apr 2016  | <b>Visiting Researcher</b> at the Institute of Photonics and Nanotechnologies, Milan, Italy. Project: “Ultrashort UV pulse production for next-generation pump-probe measurements”.   |
| Jul-Aug 2013  | <b>PRACE Summer of High-Performance Computing</b> at the Univ. of Edinburgh, UK. Project: Developing post-processing visualisation procedures combining the advanced features of Paraview with the computational power of supercomputers. |
| July 2012     | <b>21<sup>st</sup> Summer School of Parallel Computing</b> at the Cineca centre, Bologna, Italy. Theory and practice of parallel computing, MPI, OpenMP, hybrid programming.  |

## Grants and Awards

Jan 2020	<b>Collaborative Seed grant</b> from Biophotonics Career Workshop at Swinburne University of Technology (AUD 2,500).
Nov 2020	<b>Postdoctoral Fellowship</b> from CNBP Centre of Excellence at Macquarie University.
Sep 2015	<b>Short-term Scientific Mission grant</b> from European COST Action (~AUD 4,100).
Jan 2015	<b>Travel grant</b> from European COST Action.
Dec 2013	<b>Short-term Scientific Mission grant</b> from European COST Action (~AUD 4,000).

## Education

### Doctor of Philosophy (Ph.D.) in Optical Physics

Oct 2013 – June 2017

*School of Mathematics and Physics, Queen's University Belfast, UK (Supervisor: Dr. Jason Greenwood)*

Thesis: "Ultrafast Dynamics in Gas-Phase Building Blocks of Life"

([pure.qub.ac.uk/en/studentTheses/ultrafast-dynamics-in-gas-phase-building-blocks-of-life](http://pure.qub.ac.uk/en/studentTheses/ultrafast-dynamics-in-gas-phase-building-blocks-of-life)).

### Laurea Magistrale (Master of Science) in Plasma and Condensed Matter Physics

Oct 2010 – July 2013

*University of Pisa, Italy (Supervisor: Prof. Francesco Califano)*

Thesis: "Fluid modelling of pressure anisotropy effects in a magnetized plasma" (Final mark: 110/110)

### Laurea Triennale (Bachelor of Science) in Physics

Oct 2008 – July 2010

*University of Pisa, Italy*

Final mark: 110/110 with honours