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 detection of defects/inclusions.
- Modelled imaging errors caused by opto-mechanical distortions and environmental instabilities. Developed suitable correction algorithms and standard calibration procedures.
- Coordinating optomechanical R&D projects of the SmartLight team, ensuring alignment and effective communication with all stakeholders.
- Assessing system limitations and providing actionable recommendations for machine optimisation.
- 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)

- 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 diverse imaging applications.
- Conducted numerical studies to assess the feasibility of Non-Linear Structured Illumination Microscopy (NL-SIM) for the detection of up-conversion 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 current GE product offerings.
- Conducted experiments and data analysis to validate the accuracy 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

Leadership
- Management of the SmartLight optical laboratories.
- Head researcher for projects on microscopy (Macquarie) and spectroscopy (QUB).
- Representative of early career researchers within the CNBP Centre of Excellence.

Instrumentation
- Optics: Pulsed and continuous-wave lasers, polarisation control, harmonic generation, chirped pulse compensation, interferometry, spectral analysis, single-photon detection, fibre fusion splicing.
- Imaging: confocal microscopy, optical-based super-resolution imaging, optical coherent tomography, transmission tomography, tunnelling electron microscopy.
- Instrumentation for ultra-high vacuum and cryogenic conditions
- Analog/digital signal generation and processing.

Programming
- Simulations and data analysis: Phyton, MATLAB, C, Fortran, ImageJ, Paraview.
- Control software: LabVIEW, Python.
- Optical and mechanical design: OpticStudio Zemax, SolidEdge, SolidWorks.
- Documents and planning: Jira, Confluence.
- Drawings: Inkscape, Blender.

Communication
- 15 peer-reviewed papers published in international journals (see ORCID profile)
- 6 talk/poster presentations at international conferences.
- Teaching the postgraduate class Advanced Imaging Methods and Systems (PHYS8721, ANU, 2021-2023).

Training and Schools

Mar 2025	**Deep Learning for Image Classification** workshop delivered by the Queenland Cyber Infrastructure Foundation
Feb-Apr 2024	**Online courses "Optical Efficiency and Resolution" and "Design of High-Performance Optical Systems"** delivered by Coursera (University of Colorado Boulder)
Jun 2018	**School on visible and IR detection** at the Observatoire de Haute Provence, France. Instrumentation, detectors and data analysis for Astronomy and Astrophysics.
Jan-Apr 2016	**Visiting Researcher** at the Institute of Photonics and Nanotechnologies, Milan, Italy Project: "Ultrashort UV pulse production for next-generation pump-probe measurements".

Grants and Awards

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