

CURRICULUM VITAE
di
LUCA GIANNONI

*Il sottoscritto LUCA GIANNONI,
consapevole che le dichiarazioni false comportano l'applicazione delle sanzioni penali previste
dall'art. 76 del D.P.R. 445/2000, dichiara che le informazioni riportate nel seguente curriculum vi-
tae, redatto in formato europeo, corrispondono a verità.*

17/10/2022

FIRMA

A handwritten signature in black ink, appearing to read 'Luca Giannoni', written in a cursive style.

LUCA GIANNONI

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EDUCATION

Doctorate of Philosophy (PhD) in Medical Imaging

Oct 2020

University College London (UCL), United Kingdom

- *Supervisors:* Dr. Ilias Tachtsidis; Dr. Frédéric Lange.
- *Thesis title:* "Hyperspectral Imaging of the Haemodynamic and Metabolic States of the Exposed Cortex".
- Part of the Brain Injury and Trauma Monitoring using Advanced Photonics (BitMap) ITN, project no. 675332.
- Affiliated to the Engineering and Physical Sciences Research Council (EPSRC) Centre for Doctoral Training (CDT) in Medical Imaging

Master of Science (M.Sc.) in Nuclear Engineering

July 2016

Università di Pisa (UniPi), Italy

- *Final grade:* 110/110 *cum laude* (with honours).
- *Thesis title:* "Design, Development and Investigations of a Novel X-ray Fluorescence and X-ray Luminescence Computed Tomography System for Theranostic Applications".
- *Supervisors:* Prof. Francesco d'Errico (UniPi); Prof. Ling-Jian Meng (UIUC); Dr. Valerio Giusti (UniPi).
- Thesis preparation and research conducted at the Department of Nuclear, Plasma and Radiological Engineering (NPRE), University of Illinois at Urbana-Champaign (UIUC), USA.

Bachelor of Science (B.Sc.) in Nuclear, Safety and Security Engineering

Oct 2013

Università di Pisa (UniPi), Italy

- *Final grade:* 110/110.
- *Thesis title:* "Exposure to Low Doses of Ionizing Radiations: Is the Linear No-Threshold Model Valid?".
- *Supervisor:* Prof. Marino Mazzini.

EDUCATION EXPERIENCE

Exchange Graduate Student in Nuclear, Plasma and Radiological Engineering

Aug 2015 – May 2016

Department of Nuclear, Plasma and Radiological Engineering (NPRE)

University of Illinois at Urbana-Champaign (UIUC), IL, United States

- *Semesters:* Fall 2015 and Spring 2016.
- *GPA:* 4.0/4.0.
- *Research and Academic Supervisor:* Prof. Ling-Jian Meng.
- Performed main research for the Master of Science (M.Sc.) thesis, working as Visiting Researcher with Prof. L. J. Meng in the Radiation Detection and Imaging (RDI) group.
- Attended and completed NPRE graduate courses and seminars.
- Attended and completed Bioengineering (BIOE) graduate courses.

WORK AND RESEARCH EXPERIENCE

Postdoctoral Researcher (Assegnista di Ricerca)

Sept 2020 – Present

*European Laboratory for Non-Linear Spectroscopy (LENS),
Istituto Nazionale di Ottica, Consiglio Nazionale delle Ricerche (CNR-INO),
Sesto Fiorentino, Italy*

- *Research Group:* Biophotonics, Prof. Francesco Saverio Pavone (PI).
- Developed, assembled and tested hardware and software for a dual three-photons (3P)/two-photons (2P) fluorescence microscope (FM) based on Thorlabs Bergamo™ setup, for in vivo neuroimaging in pre-clinical animal models (mice, zebrafish) and organoids.
- Performed laser beam alignments, laser beam size measurements, pulse-width autocorrelation measurements and optimisation for calibration of the custom-developed 3PFM setup.
- Developed low-cost, transportable and compact biomedical hyperspectral imaging (HSI) devices for imaging and guided-surgery in clinical settings (neurosurgery and dermatology).
- Performed Monte Carlo simulations of optical diffusion in skin tissue and chronic lesions with Meshed-Monte Carlo (MMC) code for experimental HSI system development and optimisation.

Marie Curie Early Stage Researcher (ESR)

Sept 2016 – Sep 2019

*Department of Medical Physics and Biomedical Engineering,
University College London (UCL), United Kingdom*

- *Research Group:* Biomedical Optics Research Laboratory (BORL), Multimodal Spectroscopy (MMS) group, Dr. Ilias Tachtsidis (PI).
- *Collaborations:* 1) Department of Neuroinflammation, UCL Institute of Neurology (Prof. Kenneth J. Smith); 2) School of Computer Science, University of Birmingham (Prof. Hamid Dehghani);
- Designed, developed and tested a hyperspectral imaging (HSI) system for monitoring oxygenation, haemodynamics and metabolism on the exposed cortex of small animal models (mice and rats).
- Conducted investigations on haemodynamics and metabolism of the exposed cortex of mice and rats during induced hypoxia, anoxia and hyperoxia, using the developed HSI system.
- Conducted investigations on haemodynamics of the exposed cerebral cortex of rats after administration of different experimental vasodilation drugs for multiple sclerosis (MS) treatment, using the developed HSI system.
- Tested and investigated of the suitability of a commercial hyperspectral snapshot camera to perform brain metabolic monitoring in small animals (mice) targeting cytochrome-c-oxidase (CCO).
- Designed and conducted imaging and validation studies on tissue-mimicking (blood, water, Intralipid and yeast), liquid optical phantoms using the developed HSI system.
- Developed and validated data processing algorithms for visible and near-infrared (NIR) HIS data to reconstruct maps of changes in haemodynamics and metabolism on the exposed cortex of small animal models (mice and rats).

RESEARCH EXPERIENCE (CONT.)

- Performed Monte Carlo simulations of optical diffusion in cerebral tissue models with Meshed-Monte Carlo (MMC) code for experimental system validation and development.
- Developed a Monte Carlo computational optical framework for HSI of brain tissue haemodynamics and metabolism.
- Conducted investigations using broadband near-infrared spectroscopy (bNIRS) for monitoring haemodynamics and metabolism on the exposed spinal cord of control and experimental autoimmune encephalomyelitis (EAE) rats after administration of different experimental vasodilation drugs for multiple sclerosis (MS) treatment.

BitMap Research Secondment (1 week)

Dec 2017

School of Computer Science, University of Birmingham (UoB), United Kingdom

- *Supervisor:* Prof. Hamid Dehghani.
- Trained on NIRFAST software for brain NIRS.
- Created an integration and conversion MATLAB platform between MMC and NIRFAST software.
- Developed NIRFAST-based finite element method (FEM) model for hyperspectral imaging (HSI) of brain tissue.
- Performed FEM simulations of optical diffusion in biological tissue with NIRFAST for experimental system validation and development.

Visiting Researcher

Aug 2015 – June 2016

*Department of Nuclear, Plasma and Radiological Engineering (NPRE),
University of Illinois at Urbana-Champaign (UIUC), IL, United States*

- *Research Group:* Radiation Detection and Imaging (RDI) group, Prof. Ling-Jian Meng (PI).
- *Collaborations:* 1) Department of Radiology, University of Chicago (Prof. Patrick J. La Riviere); 2) Department of Radiology, Massachusetts General Hospital, Harvard University (Prof. Quanzheng Li); 3) Department of Bioengineering, University of Illinois at Urbana-Champaign (Prof. Andrew Smith, Prof. Dipanjan Pan);
- Developed and designed a novel laboratory setup and instrumentation for benchtop X-ray Fluorescence Computed Tomography (XFCT) and X-ray Luminescence Computed Tomography (XLCT).
- Developed and validated algorithms for geometric calibration of imaging detectors and geometries for XFCT and XLCT applications.
- Designed and conducted imaging experiments for studying x-ray photodynamic therapy (XPDT) and radiation therapy with metal nanoparticles (Y_2O_3 , LaF_3 , HfO_2 and Quantum Dots).
- Quantification and comparison of energy-modulated XF and XL signals of different metal nanoparticles.
- Designed and manufactured agarose-gel phantoms and 3D-printed phantoms for imaging experiments on XFCT, XLCT and XPDT.
- Designed and tested sensitivity of collimation systems for X-ray imaging setups and for XF and XL signal collection.
- Developed and implemented data processing codes in MATLAB and C for imaging and quantification with XFCT and XLCT.

RESEARCH INTERESTS

- Biomedical optics and biophotonics.
- Optical microscopy and imaging.
- Optical engineering and advanced photonics.
- Design and development of optical systems and devices.
- Numerical methods and computational simulations for optical systems.
- Design and development of medical imaging systems and devices.
- Multiphoton Fluorescence Microscopy (MFM).
- Wide-field optical imaging (WFOI)
- Functional near-infrared spectroscopy (fNIRS) and diffuse optical tomography (DOT).
- Biomedical hyperspectral (HSI) and multispectral imaging (MSI).
- Neuroimaging and functional imaging.
- Monte Carlo models and methods for biomedical optical imaging.
- Nuclear medicine and radiological imaging modalities.
- X-ray fluorescence (XF) and X-ray luminescence (XL) imaging modalities for diagnostics and cancer treatment therapy.
- Novel applications and improvements of CdTe semiconductor detectors, CCD, EMCCD and CMOS cameras for nuclear medicine and imaging with ionizing radiations.

PUBLICATIONS

Number of citations: 82

h-index (Scopus): 4

i10-index (Google Scholar): 1

FIRST AUTHOR:

Giannoni, L., Lange, F., Sajic M., Smith K. J. and Tachtsidis, I., "A hyperspectral imaging system for mapping haemoglobin and cytochrome-c-oxidase concentration changes in the exposed cerebral cortex", *IEEE Journal of Selected Topics in Quantum Electronics*, 27(4): 1-11, July-August 2021, DOI: [10.1109/JSTQE.2021.3053634](https://doi.org/10.1109/JSTQE.2021.3053634).

Giannoni, L., Lange, F., Sajic M., Smith K. J. and Tachtsidis, I., "hNIR: a hyperspectral imaging system for mapping changes in haemoglobin and cytochrome-c-oxidase on the exposed cerebral cortex of mice", In: Boudoux C., Maitland, K. et al (eds), *Biophotonics Congress 2021*, Optica Publishing Group, April 2021, DOI: [10.1364/BRAIN.2021.BW3B.5](https://doi.org/10.1364/BRAIN.2021.BW3B.5).

Giannoni, L., Lange F. and Tachtsidis, I., "Investigation of the quantification of hemoglobin and cytochrome-c-oxidase in the exposed cortex with near-infrared hyperspectral imaging: a simulation study", *Journal of Biomedical Optics* 25(4): 046001, April 2020, DOI: [10.1117/1.JBO.25.4.046001](https://doi.org/10.1117/1.JBO.25.4.046001).

Giannoni, L., Lange, F. and Tachtsidis, I., "A near-infrared hyperspectral imaging system for quantitative monitoring of hemodynamics and metabolism on the exposed cortex of mice", *Proc. SPIE 11074, Diffuse Optical Spectroscopy and Imaging VII*, 1107413, July 2019, DOI: [10.1117/12.2526599](https://doi.org/10.1117/12.2526599).

Giannoni, L., Lange, F. and Tachtsidis, I., "Hyperspectral imaging of the hemodynamic and metabolic states of the exposed cortex: Investigating a commercial snapshot solution", In: Thews O., LaManna J., Harrison D. (eds), *Oxygen Transport to Tissue XL. Advances in Experimental Medicine and Biology*, vol 1072, Springer, August 2018, DOI: [10.1007/978-3-319-91287-5_3](https://doi.org/10.1007/978-3-319-91287-5_3)

Giannoni, L., Lange, F. and Tachtsidis, I., "Hyperspectral imaging solutions for brain tissue metabolic and hemodynamic monitoring: past, current and future developments", *Journal of Optics* 20(4):044009, March 2018, DOI: [10.1088/2040-8986/aab3a6](https://doi.org/10.1088/2040-8986/aab3a6).

PUBLICATIONS (CONT.)

Giannoni, L., Mazzini, M., "Exposure to Low Doses of Ionizing Radiations: Is the Linear No-Threshold Model Valid?", *22nd International Conference on Nuclear Engineering, Volume 6: Nuclear Education, Public Acceptance and Related Issues; Instrumentation and Controls (I&C); Fusion Engineering; Beyond Design Basis Events*, 2015, DOI: [10.1115/ICONE22-30967](https://doi.org/10.1115/ICONE22-30967).

SECOND AUTHOR:

Lange, F., **Giannoni, L.** and Tachtsidis, I., "The Use of Supercontinuum Laser Sources in Biomedical Diffuse Optics: Unlocking the Power of Multispectral Imaging", *Applied Sciences*, 11(10): 4616, May 2021, DOI: [10.3390/app11104616](https://doi.org/10.3390/app11104616).

George, G., **Giannoni, L.** and Meng, L.J., "Energy-modulated x-ray fluorescence and luminescence emissions from therapeutic nanoparticles", *Physics in Medicine & Biology* 64(3): 035020, January 2019, DOI: [10.1088/1361-6560/aaec3](https://doi.org/10.1088/1361-6560/aaec3).

CONFERENCES ATTENDANCE

ORAL PRESENTATIONS:

Giannoni, L., Lange, F., Sajic M., Smith K. J. and Tachtsidis, I., "hNIR: a Hyperspectral Imaging System for Mapping Changes in Haemoglobin and Cytochrome-C-Oxidase on the Exposed Cerebral Cortex of Mice", *2021 OSA Biophotonics Congress: Optics in The Life Sciences*, Virtual Meeting, 12-16 April, 2021.

Giannoni, L., Lange F. and Tachtsidis, I., "A near-infrared hyperspectral imaging system for quantitative monitoring of hemodynamics and metabolism on the exposed cortex of mice", *2019 SPIE European Conference on Biomedical Optics (ECBO 2019)*, Munich, Germany, June 23-25, 2019

Giannoni, L., Lange F. and Tachtsidis, I., "Hyperspectral imaging of the hemodynamic and metabolic states of the exposed cortex", *45th Annual Meeting of the International Society on Oxygen Transport to Tissue (ISOTT 2017)*, Halle, Germany, August 19-23, 2017.

Giannoni, L., George, J., Lai, X., and Meng, L.J., "Design and Feasibility Study of a Full-Ring X-ray Fluorescence Emission Computed Tomography System based on Small-Pixel CdTe Detectors for Real-Time Monitoring of X-ray Induced and Nanoparticle Mediated Radiation Therapy", *Society of Nuclear Medicine and Molecular Imaging 2016 Annual Meeting (2016 SNMMI Annual Meeting)*, San Diego, USA, June 11-15, 2016.

Giannoni, L., Mazzini, M., "Exposure to low doses of ionizing radiations: Is the linear no-threshold model valid?", *2014 22nd ASME International Conference On Nuclear Engineering (ICONE22)*, Prague, Czech Republic, July 7–11, 2014.

POSTER PRESENTATIONS:

Giannoni, L., Lange, F. and Tachtsidis, I., "Near infrared hyperspectral imaging of the hemodynamic and metabolic states of the exposed cortex: in vivo investigation on small animal models", *2nd fNIRS UK Conference (fNIRS UK 2019)*, Birmingham, UK, September 26-27, 2019.

Giannoni, L., Lange, F. and Tachtsidis, I., "A Monte Carlo hyperspectral imaging framework simulating hemodynamic and metabolic monitoring of the exposed cortex", *2nd fNIRS UK Conference (fNIRS UK 2019)*, Birmingham, UK, September 26-27, 2019.

Giannoni, L., Lange F. and Tachtsidis, I., "Hyperspectral imaging of the hemodynamic and metabolic states of the exposed cortex: System development and applications", *fNIRS 2018, Biennial Meeting of the Society of Functional Near-Infrared Spectroscopy*, Tokyo, Japan, October 5-8, 2018.

Giannoni, L., Lange F. and Tachtsidis, I., "Hyperspectral imaging of the hemodynamic and metabolic states of the exposed cortex: A Monte Carlo investigation", *45th Annual Meeting of the International Society on Oxygen Transport to Tissue (ISOTT 2017)*, Halle, Germany, August 19-23, 2017.

TEACHING AND TUTORING EXPERIENCE

Consultant

Nov 2019 – Jan 2020

Polaris & Dawn International, China

- Coaching and mentoring international students applying for a PhD in Medical imaging at University College London (UCL).
- One-to-one sessions with students, including preparation and review of CV, preparation to interviews, supervisor selection, preparation of the application online to the PhD programme.

PhD Tutor

Feb 2018 – Jan 2019

The Brilliant Club, United Kingdom

- Summer placement (April to June 2018) at St. Edwards RC Primary School, Upton Park, London (Key Stage 2); Course topic: *How many engineers does it take to make ice cream?*
- Fall placement (Oct. to Dec. 2018) at Valentines High School, Ilford, London (Key Stage 5); Course topic: *Shining light into brain activity.*
- Designed, organized and taught 7-week tutorials on STEM research for high-performing pupils in low-participating schools.
- Designed and assessed periodic homework and a final, graded written assignments, providing also feedback on it to the pupils.

PUBLIC ENGAGEMENT EXPERIENCE

MetaboLight

Dec 2016 – Sep 2019

*Department of Medical Physics and Biomedical Engineering,
University College London (UCL), United Kingdom*

- Website: <http://metabolight.org>
- Funded by Wellcome Trust (104580/Z/14/Z)
- Organized science communication and engagement activities for the general public about the research of the MMS group at UCL.
- Organized and led workshops and seminars on biomedical optics and fNIRS, mainly for students, physics teachers and clinicians.
- Organized and led the MetaboLight exhibition stand at The Royal Society Summer Science Exhibition 2019, London, UK, and at the 2018 Big Bang Fair in Birmingham, UK.
- Organized and led the MetaboLight exhibition stands at UCL research open days and other festivals (2017 Norwich Science Festival, Norwich, UK and 2018 Summer Big Bang Fair, Sutton, UK).
- Contributed to write articles and sections in the MetaboLight magazines concerning biomedical optics and medical physics.
- Contributed to the Twitter page, Facebook page and website of the MetaboLight project for dissemination and advertising.

WORKSHOPS AND PROFESSIONAL TRAINING

- BitMap training on NIRFAST (UoB).
- BitMap laboratory training on Time-Domain (TD) NIRS (Politecnico di Milano).
- BitMap training on Diffuse Correlation Spectroscopy (DCS) (ICFO).
- fNIRS 2016 Training Course on tissue optics and NIRS (2016 fNIRS Biennial Meeting).

WORKSHOPS AND PROFESSIONAL TRAINING (CONT.)

- Introductory course to Python (UniFi).
- Statistics for Researcher (UCL Doctoral School training).
- RELAP/SCDAPSIM User Training Workshop (UniPi).

CERTIFICATIONS AND LICENCES

LabVIEW Core 2	July 2018
<ul style="list-style-type: none">• Course length: 3 days.• Successful completion.• Released by <i>National Instruments, USA</i>.	
UCL Enterprise Boot Camp	Feb 2018
<ul style="list-style-type: none">• Course length: 3 days.• Successful completion.• Released by <i>UCL Innovation and Enterprise</i>.	
Animal (Scientific Procedures) Act 1986 Personal Licence (PIL)	Dec 2017
<ul style="list-style-type: none">• Licence No. <i>I7AE8AFCA</i>• Released by <i>Home Office, UK</i>.	
LabVIEW Core 1	Mar 2017
<ul style="list-style-type: none">• Course length: 3 days.• Successful completion.• Released by <i>National Instruments, USA</i>.	
General Revised Test (GRE®)	Mar 2016
<ul style="list-style-type: none">• Verbal Reasoning: 160/170 (85th Percentile).• Quantitative Reasoning: 160/170 (76th Percentile).• Analytical Writing: 4/6 (56th Percentile).• Released by <i>Educational Testing Service, USA</i>.	
International English Language Test (IELTS), Academic	Sept 2014
<ul style="list-style-type: none">• Overall Score: 8/9 (Listening: 8.5/9, Reading: 8.5/9, Writing: 7.5/9, Speaking: 7.5/9).• Released by <i>British Council, London, UK</i>.	

TECHNICAL SKILLS

Windows and Microsoft Office suite: Advanced level

Mac OS X: Advanced level

Linux: Advanced level

MATLAB: Advanced level

Python: Intermediate level

C++: Intermediate level

OriginPro: Advanced level

LabVIEW: Advanced level

OpticStudio (Zemax): Intermediate level

ImageJ (FIJI): Advanced level

ScanImage: Advanced level

Cobra 7: Basic level

Amide: Basic level

Meshed-Monte Carlo (MMC): Advanced level

TECHNICAL SKILLS (CONT.)

Monte Carlo Extreme (MCX): Advanced level

Geant4: Intermediate level

NIRFAST: Intermediate level

Iso2mesh: Advanced level

Sefexa: Advanced level

LANGUAGES

Italian: Native Language

English: Fluent

Spanish: Intermediate

REFERENCES

Ilias Tachtsidis, *Professor in Biomedical Engineering*

Department of Medical Physics and Biomedical Engineering

University College London (UCL), London, UK

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Hamid Dehghani, *Professor of Medical Imaging*

School of Computer Science

University of Birmingham, Birmingham, UK

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Ling-Jian Meng, *Full Professor*

Department of Nuclear, Plasma and Radiological Engineering

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LINKS

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Google Scholar: <https://scholar.google.com/citations?user=9mx-M14AAAAJ&hl=en>

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SCOPUS: <https://www.scopus.com/authid/detail.uri?authorId=56085122900>