Luca Presotto

Assistant Professor ("RTDb")
Applied physics, focused on imaging

Areas of expertise

PET imaging | Dementia imaging | Image reconstruction | Motion correction | Kinetic modelling | Absolute quantification | Biomarker development | Image Processing | Neuroscience | Artificial Intelligence | Automated image analysis

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Professional experiences

University of Milano-Bicocca, Milano (IT) 2022 - present

Assistant Professor ("RTDb") – applied physics

Research and teaching of image processing methods, with a specific focus on life-science techniques. Supervisor of multiple theses work (bachelor and master level)

Research topics:

- Model based image reconstruction
- Development of methods for automated image analysis
- Development of models of immune response

Teaching duties:

- "Medical imaging and big data" in "Data science" master degree course
- "Imaging and spectroscopy for environment and health" in "Artificial Intelligence" bachelor course

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IXICO, London (UK) 2021 – 2022

Senior PET Scientist

Research and development in PET image analysis for Alzheimer disease research

Key achievements and responsibilities:

- Recalibration of the "Centiloid" pipeline. Analysis of the procedure to improve reproducibility and robustness
- Development of an CT based protocol to analyse PET images without the need for attenuation correction

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IRCCS Ospedale San Raffaele, Milan (IT) 2017- 2022

Research Associate

Working as the nuclear medicine unit expert on all methodological/technical aspects

Key achievements and responsibilities:

- Setting up a new PET/CT preclinical scanner and optimizing acquisition protocols
- Worked on the installation and optimization of a new PET/MR hybrid scanner
- Developed a new toolbox to analyse murine brain image within the SPM software package
- Harmonize PET acquisitions for prospective clinical trials (including a multi-center study on AD, "Interceptor")
- Develop strategies to analyse non-harmonized PET data for retrospective multi-centre data analysis
- Establish the analysis algorithm for neurodegenerative brain PET studies
- Automate the analysis of brain PET images for studies involving more than 200 subjects each
- Tutor Master students (in physics) about PET physics projects (scatter correction)
- Studied attenuation correction in PET/MR scanners

Vita-Salute University, Milan (IT) 2015 – 2017

Research Associate

Working in a neuroscience team focused on neurodegenerative diseases studied by PET. Projects involved quantifying amyloid load (multiple tracers), neuroinflammation (PK-11195), dopamine transporters (11C-FE-CIT), and glucose metabolism.

Key responsibilities and achievements

- Developed a novel technique to perform absolute quantification more robustly of the PK-11195 tracer
- Developed a novel and automated amyloid quantification procedures for setups in which MR scans are not present
- Studied motion correction techniques in PET reconstruction

- Wrote standard operating procedures to harmonize PET acquisition and reconstruction for a multi-center clinical trial in mild cognitive impairment ("Reti-AD" project).

IBFM – National Research Council, Segrate (IT) 2013 – 2015

Post-doctoral researcher

Worked in a project about improvement in PET reconstruction and quantification

Key achievements and responsibilities:

- Developed a data-driven algorithm to extract motion information from PET data themselves
- Implemented an algorithm to fix automatically attenuation correction mismatches in cardiac PET studies

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Milano-Bicocca University 2010 – 2013

PhD Student

Thesis project about quantification and motion correction in cardiac PET

Key achievements and responsibilities:

- Clinical implementation of kinetic modelling for absolute quantification of 13N-NH3 myocardial perfusion
- Studied motion correction strategies for cardiac PET
- Implemented "double-gated" reconstruction protocols to compensate both respiratory and cardiac motion

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Awards, grants and PI responsibilities

2023: Principal Investigator in a PRIN-PNRR project "Multiple Emission Tomography" (development of a Compton camera for nuclear medicine applications)

2023: Awarded as participant a Ministry of Health grant ("Ricerca Finalizzata Giovani"). Role: AI-based analysis of multimodal images in Parkinson disease

2021: Principal Investigator in an industry-sponsored clinical trial to study the feasibility of using hybrid PET/MR scanners to perform radiotherapy planning

2020: Awarded the scientific qualification ("Abilitazione Scientifica Nazionale") as associate professor ("Professore di seconda fascia") in the 02/D1 sector (Physics applied to biology and medicine, cultural heritage, and environment).

2019: First prize in the international "Tomographic Reconstruction and Analysis Challenge" hosted by the IAEA (International Atomic Energy Agency of the United Nations).

2018: Co-Investigator in the grant "HYPERDIRECT", to study clustering techniques for in-vivo hybrid PET/MR imaging in glioblastoma. The study was financed after ranking 9th among 190 projects in the ministry of health yearly call for "Ricerca Finalizzata Giovani Ricercatori 2018".

Bibliographic data

Scopus h-factor: 23 Scopus author ID: 52564081500;

Peer reviewed indexed documents: 70. ORCID: 0000-0002-8809-0877

Education

2017 - 2020: "Specializzazione in fisica medica" (medical physics expert) at Milano University. Thesis title: "Attenuation Correction in a hybrid PET/MR system: limits and possible solutions". 68/70 vote

2010 - 2013: PhD in physics and astronomy at the Milano-Bicocca University. Thesis title: "Development and Implementation of quantitative methods for cardiac applications of Positron Emission Tomography".

2007-2009: Master degree in physics at the Milano-Bicocca University. Vote: 103/110

Thesis title: "Calibration of the CMS electromagnetic calorimeter using isolated electrons".

2004-2007: Bachelor degree in physics at the Milano-Bicocca University. Vote 108/110

Thesis title: "Test of RPC prototypes with mechanical quenching"

Language & technology skills

Languages: Italian (mother tongue), English (very fluent)
Technology: MATLAB, Python (including Tensorflow/Keras)

Other relevant experiences

Invited researcher to Tel-Aviv university for a collaboration in agent-based modelling of biological systems.

Invited to give seminars to multiple academic institutions including the Ottawa Heart Institute, Scuola Caldirola in Italy, CWI in Amsterdam, Werner-Siemens imaging center in Tuebingen.

Spent 3 long periods of time (>3 months each) in Geneva (CH) at the European Center for Nuclear Physics (CERN), once for a stage between the undergrad and the master degree course, twice for the master thesis.