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Luigi Feriani

Experience

2022–present **Senior Scientific Software Engineer**, *Australian Synchrotron - ANSTO*, Melbourne, Australia.

Designing, implementing, and testing the backend microservices architecture for spectroscopy group beamlines.

- Developing APIs and backend-for-frontend to connect web user interfaces to the experiment orchestration and hardware abstraction layer.
- Liaising with beamline staff to gather requirements and provide training on newly developed tools.
- Regularly presenting updates to product owners and other stakeholders, showcasing the progress achieved.
- Collaborating with fellow scrum team members to promptly incorporate product owners' feedback and deliver continuous improvement in a Scaled Agile Framework.
- Developing tools to consolidate data from various sources, on the fly, into a unified data product.
- Contributing to the development of tools widely employed by the Scientific Computing group at large.

2018–2022 **Postdoctoral Research Associate**, *Imperial College London*, London, UK.

Working as a Data Scientist and Software Developer with Laboratory duties.
Developing a high-throughput pipeline to design combinations of drugs that affect a complex phenotype in a controlled manner.

- Contributing to and maintaining Tierpsy Tracker, an open-source nematode tracker, pose-estimator, and extractor of behavioural features used by research laboratories around the world.
- Developing software solutions for data and image analysis, e.g. CNNs for image classification, to detect the cell-cycle stage of cancer cells, or contamination in multiwell plates.
- Liaising with imaging company to build a custom tracking system.
- Administering and maintaining several Linux imaging workstations.
- Programming a liquid handling robot to automate dilution, combination, and transfer of compounds.

2014–2018 **PhD in Physics**, *University of Cambridge*, Cambridge, UK.

Thesis: Understanding the Collective Dynamics of Motile Cilia in Human Airways.

Skills

Software Development
- Programming, data visualisation, and simulations: Python (5 years), MATLAB (6 years), C/C++
- Backend web development, leveraging FastAPI, Kafka, Redis, MongoDB, and relational databases
- Operating systems: Linux, macOS, Windows
- Experiment specification and orchestration: Bluesky Project
- Containerisation, orchestration, and build automation: Docker, GitHub actions, Kubernetes
- Scripting (bash), version control (git), high performance computing, databases (MySQL)

Data analysis
- Image and video analysis: segmentation, tracking, localisation, PIV, feature extraction
- Time series analysis: signal processing, smoothing, Fourier analysis, autocorrelation
- Convolutional Neural Networks for segmentation and classification
- Regression, clustering, classification, dimensionality reduction methods

Communication
- Preparation of scientific articles and technical documentation
- Public speaking, presenting complex information engagingly and with clarity
- Excellent oral communication skills with expert and non-expert audiences
- Experience liaising with industrial and research stakeholders, and gathering requirements
- Effective collaboration within multidisciplinary teams

Laboratory skills
- Optical microscopy, live-cell imaging, atomic force microscopy, programming of laboratory robots
- Micro-fabrication (soft lithography), Cavendish Lab course in machine workshop, wet lab skills

Languages
- Italian (native)
- English (fluent)
- French (basic)

Education

2014–2018 **PhD in Physics**, *University of Cambridge*, Cambridge, UK.
Thesis: Understanding the Collective Dynamics of Motile Cilia in Human Airways.
- Studied model systems for motile cilia in the airway epithelium.
- Developed a video analysis software to automatically measure the collective dynamics of *in vitro* samples of live human bronchial epithelial ciliated cells from high-speed microscopy videos (beating frequency, spatial and temporal coherence, collective travelling waves).
- Studied the efficacy of commercial and experimental drugs in restoring effective ciliary beating in samples from patients affected by Cystic Fibrosis.
- Improved a minimal model of beating cilia as free phase driven oscillators coupled via hydrodynamic interactions by coarse-graining the properties of the beating pattern using Resistive Force Theory.

2011–2013 **Master of Science in Physics**, *Università degli Studi di Parma*, Parma, Italy, *cum laude*.

2013 **Erasmus Exchange Program**, *University of Cambridge*, Cambridge, UK.

2008–2011 **Bachelor of Science in Physics**, *Università degli Studi di Parma*, Parma, Italy, *cum laude*.

Awards

2008–2010 **Scholarship by the Italian Society of Physics**, *Scientific Degrees Project*, endorsed by the Italian Ministry of University and Research.
Awarded for ranking 12th in a public competition open to all 1st-year Physics students in Italy, renewed by achieving a grade average greater than 27/30 throughout the Bachelor degree, with no grade below 24/30.

Teaching and Outreach

2015–2022 **Day-to-day mentoring**, *Imperial College London, and University of Cambridge*, UK.
Helping Part III (final year), Master, and PhD Students developing Python and MATLAB code.

2014–2017 **Demonstrator and (2016) coordinator**, *Physics at Work (outreach event)*, Cambridge, UK.

2014–2017 **Undergraduate Supervisions**, *University of Cambridge*, UK.

2014–2015 **Practical Demonstrations**, *ICTP,* Trieste, Italy*, and University of Cambridge*, UK.

Selected International Conference Presentations

Mar 2020 **APS March Meeting**, Denver, CO, USA.

Mar 2018 **Annual European Rheology Conference**, Sorrento, Italy.

Sep 2016 **Physics Meets Biology**, Cambridge, UK.

Jul 2016 **Out-of-Equilibrium & Active Soft Matter**, Roscoff, France.

Apr 2015 **Micro-flow and Survival**, Leiden, Netherland.

Selected Publications

2022 Barlow, I.L.,† **Feriani, L.**,† et al. "Megapixel camera arrays enable high-resolution animal tracking in multiwell plates." *Commun. Biol.*, 5(1), 1-13.

2021 McDermott-Rouse, A.,† Minga, E.,† Barlow, I.L., **Feriani, L.**, et al. "Behavioral fingerprints predict insecticide and anthelmintic mode of action." *Mol. Syst. Biol.*, 17(5), e10267.

2019 Chioccioli, M.,† **Feriani, L.**,† et al. "Phenotyping ciliary dynamics and coordination in response to CFTR-modulators in Cystic Fibrosis respiratory epithelial cells." *Nat. commun.*, 10(1), 1-11.

2017 **Feriani, L.**, et al. "Assessing the collective dynamics of motile cilia in cultures of human airway cells by multiscale DDM." *Biophy. J.*, 113(1), 109-119.

2015 **Feriani, L.**, Cristofolini, L., & Cicuta P. "Soft pinning of liquid domains on topographical hemispherical caps." *Chem. Phys. Lipids*, 185, 78-87.

† These authors contributed equally.

Personal Interests and Hobbies

Photography, task automation, hiking, swimming, learning latte art.