Giovanni De Felice

PH.D. STUDENT · COMPUTER SCIENCE · UNIVERSITY OF LIVERPOOL

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Personal Profile

I am a Ph.D. student in Computer Science at the University of Liverpool (UK). I received my Master's degree in experimental particle physics from the University of Pisa (IT). I conducted my thesis within the Mu2e experiment at the Fermi National Laboratory (US). I am currently based in Lugano (CH), where I will be collaborating with the Graph Machine Learning Group, under the supervision of Cesare Alippi, until May 2024.

I am zealous about interdisciplinary research between Machine Learning (ML) and Science. Primarily, looking for a post-doc position (or an internship opportunity) at the intersection between machine learning and particle physics.

Education

University of Liverpool — *Liverpool, UK*

Ph.D. in Computer Science — *Nov 2020 - Present*

- **Project:** "Spatio-Temporal Machine Learning and Data Mining with applications in Material Science"

University of Pisa — *Pisa, Italy*

Master's Degree in Particle Physics — *Sept 2018 - Oct 2020*

- **Courses:** Statistical Data Analysis, Monte Carlo Methods, Computing Methods for Experimental Physics and Data Analysis, Particle Physics Laboratory, Fundamental Interactions, Particle Physics, Astroparticles, Accelerator Machines, Theoretical Physics, Discrete Symmetries.
  Avg. grade: 29.5 / 30
- **Thesis:** "An updated estimate of the Mu2e experiment sensitivity"
- **Grade:** 110 / 110 cum laude

University of Pisa — *Pisa, Italy*

Bachelor's Degree in Physics — *Sept 2015 - Sept 2018*

- **Thesis:** "The experimental and statistical aspects of the research for $H \to Z\gamma$ at CMS"
- **Grade:** 109 / 110

Scientific Lyceum Ignazio Vian — *Bracciano, Rome, Italy*

High School Diploma — *Sept 2010 - Aug 2015*

- **Thesis:** "Crisis of physical sciences - even watches are clouds (K.Popper)"
- **Grade:** 100 / 100

Research Projects

Spatio-Temporal Machine Learning on multivariate data — *Liverpool, UK*

University of Liverpool — *Nov 2020 - Present*

- From a collection of Multivariate Time-Series, predictions of entirely missing channels;
- Spatio-Temporal Graph Neural Networks for Virtual Sensing tasks.
- Dense spatio-temporal extrapolation with Gaussian Processes and Neural Processes.

Time Series analysis — *Liverpool, UK*

University of Liverpool — *May 2022 - Present*

- Similarity and kernel design for time series data;
- Reservoir Computing and dynamical system theory.

Weathering Predictions of Paint Formulations — *Liverpool, UK*

Beckers Group / University of Liverpool — *Nov 2020 - Present*

- Predict longer term performances from past history and climatic data;
- Predict performances in untested locations from climatic data;
- Extract formulatory information from data.

Research visits and internships

Swiss AI lab IDSIA, at Università della Svizzera Italiana — *Lugano, Switzerland*

Visiting researcher at the Graph Machine Learning Group — *Nov 2023 - Present*

- Applications of Graph-based methods for modeling Multivariate Spatio-Temporal data.
- Climate representation and modeling.

Fermi National Accelerator Laboratory — *Batavia, IL (USA)*

DOE-INFN Summer Students — *Jul 2019 - Sept 2019*

- Improved model for antiproton production from protons on heavy nuclei.
- Numerical integration of the production cross-section.
- Comparative study of the antiproton background in the Mu2e muon beamline and experiment.

University of Goettingen — *Goettingen, Germany*

HASCO Summer School — *Jul 2019 - Jul 2019*

- Advanced lessons on frontier topics in theoretical and experimental particle physics.
- **Final grade:** A with special mention

Publications

- **G. De Felice**, A. Cini, D. Zambon, V.Gusev, C. Alippi. "Graph-based Virtual Sensing from Sparse and Partial Multivariate Observations." *under review at ICLR 2024*.
  coming soon...
- **G. De Felice**, J. Y. Goulermas, and V. Gusev. "Time Series Kernels based on Nonlinear Vector AutoRegressive Delay Embeddings." *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)*. 2023.
  `https://openreview.net/forum?id=UBUWFEwn7p`
- O. Federico, **G. De Felice**, R. Savani, V. Gusev, and M. Rosseinsky. "Enhancing Extrapolation in Materials Science through Contrastive Learning of Chemical Compositions." *AI for Accelerated Materials Design-NeurIPS 2023 Workshop*. 2023.
  `https://openreview.net/forum?id=3Huw3pa8TR`
- O. Federico, **G. De Felice**, V. Gusev, and T. Sparks. "Not as simple as we thought: a rigorous examination of data aggregation in materials informatics." *chemrxiv*. 2023.
  `https://chemrxiv.org/engage/chemrxiv/article-details/64d212414a3f7d0c0dced297`
- **G. De Felice**, V. Gusev, J. Y. Goulermas, M. Gaultois, M. Rosseinsky, C. V. Gauvin, "Spatio-Temporal Weathering Predictions in the Sparse Data Regime with Gaussian Processes", *NeurIPS 2022 AI for Science: Progress and Promises*. 2022.
  `https://openreview.net/forum?id=wHP9Y5T83A5`
- Mu2e Collaboration, "Mu2e Run I Sensitivity Projections for the Neutrinoless $\mu^- \to e^-$ Conversion Search in Aluminum", *Universe*, 9(1), p.54. 2023.
  `https://www.mdpi.com/2218-1997/9/1/54`
- **G. De Felice**, "An updated estimate of the Mu2e experiment sensitivity", *Master's degree thesis*. 2020.
  `https://www.osti.gov/biblio/1763411`

Talks

- Internal talk to the Executive Management team of the Beckers Group.
- "Addressing materials weathering with Spatio-Temporal Machine Learning", speaker at *"Machine Learning Applications for Chemical Materials Development and Discovery"*, University of Liverpool, 26 Jan 2022.
- Three talks in two *Mu2e Collab. Meeting*, Jun 2020 and Oct 2020.

Skills

Programming Python, Matlab, C/C++, Root.

Miscellaneous Shell (Bash), LaTeX (Overleaf/TexStudio), Microsoft Windows, Linux, MacOS, Microsoft Office, Git.

Soft Skills Inter-disciplinary Vision, Creativity, Teamwork, Time Management, Scientific Writing, Oral Presentation.

Languages

English	Professional proficiency, (C1 level, IELTS overall band score: 7.5/9)
Italian	Native proficiency
French	Basic proficiency

Interests

Music and Classical Piano

Italian Conservatory Journey for Classical Piano and related experiences

- **Classical Piano Degree Admission:** Higher institute of musical studies Pietro Mascagni, Livorno, Italy. Grade: 8/10 (2nd place) (2015);
- **Mid-term exam:** Conservatory Alfredo Casella, l'Aquila, Italy. Grade: 9/10 (2013);
- **Solfeggio and theory of music:** Conservatory Nino Rota, Monopoli, Bari, Italy (2011);
- **GRADE 1 exam:** The Associated Board of the Royal Schools of Music, Varese, Italy. Grade: pass with distinction (2007);
- Alto Saxophone (2022);
- Keyboard live concerts in Italy and France (2013-2015), Pianist in a theater-dance spectacle (2014), Orchestra and Chamber Music (2010-2015).

Others

Other interests and activities

- **Sports:** I love and practice Swimming, Basketball, Skiing, Fishing and Mountain Hiking;
- **Voluntary:** I participated as a voluntary in multiple Special Olympics Italia events;
- **Computer assembly:** I love following the development of PC hardware and assembling desktops.

References available upon request.