Victoria Klein

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Education

Supervisors: **Professor Jeroen S. W. Lamb** (Co-head of DynamIC), **Dr Kevin N. Webster** (Senior Teaching Fellow)

Oct 2019 - pres **Imperial College London**, PhD in Mathematics, EPSRC CDT for Mathematics of Random Systems, Department of Mathematics.

2018 - 2020 **Imperial College London**, MSc in Applied Mathematics, Department of Mathematics, 1st Class (83% average).

2015 - 2018 **Durham University**, BSc in Mathematics and Computer Science, 1st Class.

Research

Languages: *Python: JAX (Flax, Optax), PyTorch (Lightening)*, Github: @victoria-klein.

2021 - present **"Equivariant Neural Fields"** *V. Klein, R. Valperga, D. Knigge, K. N. Webster, E. Gavves, & J. S. W. Lamb* , working paper with code.

June 2023 **"Learning Lie Group Symmetry Transformations with Neural Networks"** *A. Gabel, V. Klein, R. Valperga et al.*, 2nd Annual Workshop on Topology, Algebra and Geometry in Machine Learning (TAG-ML) at the 40th International Conference on Machine Learning, Honolulu, Hawaii, USA (poster presentation & proceedings).
Detecting one-parameter subgroup symmetries of Lie groups, by parametrising the generator of the Lie algebra to learn the corresponding coefficients as well as the one-parameter distribution, in the original and latent space.

November 2021 **"Structure-preserving time-reversible symplectic neural networks for learning dynamical systems"** *R. Valperga, K. N. Webster, D. Turaev, V. Klein & J. S. W. Lamb*, Learning for Dynamics and Control Conference 2022 (oral presentation & proceedings), The Fields' Institute 3rd Symposium for Machine Learning and Dynamical Systems 2022 (poster presentation).
Learning Hamiltonian/symplectic systems that exhibit time-reversibility, using approximations of symplectic polynomials by the composition of polynomial Henon maps.

April 2020 **"Deep learning: Modelling continuous dynamical systems with known equivariances"** *V. Klein*, MSc Thesis.
Outlines approaches of learning systems in continuous time with symmetries by combining Neural ODE and CNN architectures.

Specialisation: *Mathematics of Machine Learning, Deep Learning & Neural Networks, Advanced Linear Algebra & Group Theory, Dynamical Systems, Stochastic Analysis.*

Additional: *SQL, MySQL, Haskell, Prolog, LaTeX.*

Awards

Jul 2022 **Dorris Chen Mobility Award 2022** *Department of Mathematics, Imperial College London.*

Apr 2022 **The Fields' Institute Travel Grant** *3rd Symposium for Machine Learning and Dynamical Systems, The Fields' Institute, Toronto.*

Invited talks

Jul 2023 Poster, 2nd Annual Workshop on Topology, Algebra and Geometry in Machine Learning (TAG-ML) at the 40th International Conference on Machine Learning, Honolulu, Hawaii, USA

Mar 2022 EPSRC CDT in Mathematics of Random Systems Seminar, Oxford University

May 2020 EPSRC CDT in Mathematics of Random Systems Spring Retreat, Imperial College London

Positions

Jan - May 2023 **Visiting academic researcher** *under Associate Professor E. Gavves*, VISLab, University of Amsterdam.
Funding: Dorris Chen Mobility Award 2022, EPSRC CDT for Mathematics of Random Systems

Oct 2021 & 2022 **Postgraduate representative**, Women in Maths Society, Imperial College London, 12 months.

Jun - Aug 2022 **Reading group co-organiser**, 'Oversmoothing and heterophilly in GNNs', Department of Computer Science, Imperial College London.

Teaching

Graduate *Deep Learning with Tensorflow*, Spring 2021, 22 & 23

2nd-yr UG *Differential Equations*, Spring 2022 | *Multivariable Calculus*, Winter 2021

1st-yr UG *Calculus and Applications*, Winter 2020 | *Intro to University Mathematics*, Winter 2020

Outreach

Apr 2021 & 22 "Women in Mathematics" Outreach Event, Imperial College London

Aug 2020 & 21 Mary Lister McCammon Fellowship Talk, Imperial College London

Sep - Dec 2020 Code First Girls Fellow, Code First Girls 2020 Fellowship Program

Aug - Dec 2020 Committee member, WomenInStem@IC Society, Imperial College London

Professional experience

Jun - Aug 2017 **J.P. Morgan** *Investment Banking Analyst*, 3 months.
Member of the Diversified Industries M&A desk, working on transactions within the Automotive and Chemicals sub-sectors, at the end of which a full-time analyst position was offered.

Apr 2016 **J.P. Morgan** *Investment Banking Spring Week*, 1 week.

Jul - Aug 2013 **Stanford University, Bio-X/School of Medicine** *Cardiothoracic Surgical Skills Intern*, 2 months.
A summer placement in Cardiothoracic Surgery with 4 hours/day surgical lab time whilst working with researchers from Stanford Bio-X to find non-invasive treatments for atrial septal defects.

Other

Languages English (native), German (conversationally proficient)

Interests Philosophy and volunteering as an A-level maths teacher with Tutor The Nation