

# Cristiana Diaconu

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## EDUCATION

<b>Machine Learning Group, University of Cambridge</b> PhD in Machine Learning Supervised by <a href="#">Prof. Richard Turner</a> , Advised by <a href="#">José Miguel Hernández Lobato</a>	2023 - Present
<b>MEng in Information Engineering and Bioengineering, University of Cambridge</b> Part IIB Engineering <i>Distinction 83% - top of the Part IIB order of merit</i> , Part IIA 89%	2019-2021
<b>BA Hons Natural Sciences - Physics and Materials Science</b> Part IB <i>First Class Honours (I) - 79%</i> , Part IA <i>Upper Second Class (II.1) - 69%</i>	2017-2019

## PUBLICATIONS AND SELECT PREPRINTS

### [Gridded Transformer Neural Processes for Large Unstructured Spatio-Temporal Data](#)

Matthew Ashman\*, **Cristiana Diaconu\***, Eric Langezaal\*, Adrian Weller, Richard E. Turner

### [On Conditional Diffusion Models for PDE Simulations](#)

*Accepted at the Thirty-eighth Annual Conference on Neural Information Processing Systems (NeurIPS), 2024*

Aliaksandra Shysheya\*, **Cristiana Diaconu\***, Federico Bergamin\*, Paris Perdikaris, José Miguel Hernández-Lobato, Richard E. Turner, Emile Mathieu

### [Approximately Equivariant Neural Processes](#)

*Accepted at the Thirty-eighth Annual Conference on Neural Information Processing Systems (NeurIPS), 2024*

Matthew Ashman\*, **Cristiana Diaconu\***, Adrian Weller, Wessel P. Bruinsma, Richard E. Turner

### [Translation Equivariant Transformer Neural Processes](#)

*International Conference on Machine Learning (ICML), 2024*

Matthew Ashman, **Cristiana Diaconu**, Junhyuck Kim, Lakee Sivaraya, Stratis Markou, James Requeima, Wessel P. Bruinsma, Richard E. Turner

### [In-Context In-Context Learning with Transformer Neural Processes](#)

*Proceedings of the 6th Symposium on Advances in Approximate Bayesian Inference, 2024*

Matthew Ashman\*, **Cristiana Diaconu\***, Adrian Weller, Richard E. Turner

### [Guided Autoregressive Diffusion Models with Applications to PDE Simulation](#)

*AI4DiffEqtnsInSci Workshop at International Conference on Learning Representations (ICLR), 2024*

Federico Bergamin\*, **Cristiana Diaconu\***, Aliaksandra Shysheya\*, Paris Perdikaris, José Miguel Hernández Lobato, Richard E. Turner, Emile Mathieu

### [Denoising Diffusion Probabilistic Models in Six Simple Steps](#)

Richard E. Turner, **Cristiana Diaconu**, Stratis Markou, Aliaksandra Shysheya, Andrew Y. K. Foond, Bruno Mlodozieniec

## WORK EXPERIENCE

<b>Data Scientist/Machine Learning Engineer at L2S2</b>	2021 - 2023
<ul style="list-style-type: none"><li>Analysed and developed machine learning models on big medical data sets (1M+ datapoints); examples include predicting the mortality risk of patients using Hospital Episode Statistics (HES) data, investigating the risk of deterioration of elderly people by analysing vital signs data.</li><li>Developed an automatic pupil detection algorithm using the <b>OpenCV</b> library in <b>Python</b>.</li><li>Developed an emergency department simulator using a discrete event simulator (<b>Simpy</b> in <b>Python</b>).</li><li>Enhanced <b>Pandas</b> skills and developed medical coding skills, by working on the data development of the Emergency Care Data Set (ECDS) Max.</li></ul>	
<b>Data Analyst Summer Intern at Intropic</b>	2020
<ul style="list-style-type: none"><li>Performed an event study that analysed the impact of Passive Fund demand and supply, and proposed a simple long-short strategy based on the findings.</li><li>Produced a white paper used as sales material showing how Intropic's data can be leveraged to generate positive market adjusted returns.</li><li>Cleaned and processed the 4-year historical dataset on which the event study was performed; was responsible for the final version of the dataset that was shared with the clients.</li></ul>	

## Investment Banking Summer Intern at HSBC

2019

- Analysed over 25 companies within the technology, media & telecommunications (TMT) sector, performed financial modeling and assisted with marketing and execution work for potential buy- and sell-side M&A deals.

## RESEARCH AND PROJECTS

### Diffusion Models for Partial Differential Equations (PDEs) modelling

2023-Present

- Developing a probabilistic treatment of PDE modelling by leveraging diffusion models to solve the tasks of *forecasting* and *data assimilation*.
- Investigating the advantages and disadvantages of different conditioning mechanisms for diffusion models, including reconstruction guidance and amortising over the conditioning information.
- Implemented in **PyTorch** diffusion models based on the continuous-time formulation.

### Transformer Neural Processes (TNPs)

2023-Present

- Researching how to best include transformer techniques into neural processes (NPs), a family of models that combines the benefits of stochastic processes and neural networks.
- Investigating the influence of inductive biases such as translation equivariance in TNPs.

### High quality IT system for emergency care in developing countries

2023-2024

- Contributed to an open-source, **Django**-based application that can be used to provide emergency care in clinics/hospitals with limited technological resources (e.g. from developing countries).

### Cuff-less Blood Pressure Estimation

2020-2021

- Worked with a 2.4TB database to develop a combination of physical and machine learning-based models, with the aim to perform non-invasive cuff-less estimation of the arterial blood pressure.

### Image Processing

2020

- Implemented in **MATLAB** image compression techniques which lie at the basis of the JPEG (Joint Photographic Experts Group) standards.

## TEACHING EXPERIENCE

### Project Supervisor, University of Cambridge

2023-Present

- Co-supervised the projects of three fourth-year Engineering students, and of one student completing an MPhil in Machine Learning and Machine Intelligence.

### Undergraduate Supervisor, University of Cambridge

2023-Present

- Inference (3F8) - topics include Regression, Classification, Clustering, Sequence Modelling.
- Statistical Signal Processing (3F3) - topics include Probability, Markov Chains, Time Series models.

### Lab Demonstrator for the Lego Mindstorms exercise, University of Cambridge

2023-Present

### Private Tutor

2019-Present

- STEM subjects for pupils studying for final-year examinations and university level examinations.

## SCHOLARSHIPS AND AWARDS

### Cambridge Trust Scholarship

2023-2026

Awarded a full scholarship for a PhD in Machine Learning.

### The Institution of Civil Engineering Baker Prize

2021

Awarded for being the **highest candidate in the combined order of merit** in the Part IIB examinations from the Engineering Tripos.

### The Ruth Hendry Prize

2021

Awarded by Queens' College for outstanding distinction in examinations by a fourth year undergraduate.

### The James & Jean Bennett Prize

2021

Awarded by Queens' College for distinction in Engineering.

### Foundation Scholarship

2020

Awarded in recognition of obtaining a First in the fourth-year examinations.

### The Prigmore Prize

2020

Awarded by Queens' College for distinction in Engineering.

### Prizes and Medals at the Romanian Physics National Olympiad

2014-2017

### Silver Medal at the European Union Science Olympiad, Klagenfurt, Austria

2015

## SKILLS

**Computing** - Python, MATLAB, PyTorch, Tensorflow, Django, LaTeX

**Language** - Romanian: Mother Tongue, English: Fluent, Spanish: Advanced, German: Basic