

# IRA J. S. SHOKAR

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**Research Interests:** Probabilistic Deep Learning, Reduced Order Models, Accelerating Forecast Models, Stochastic PDEs, Aleatoric Uncertainty Quantification, Forecast Predictability.

## EDUCATION

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### Pembroke College, University of Cambridge

Oct 2021 – Present

*PhD Applied Mathematics - Application of Artificial Intelligence.*

- Topic: 'Deep learning to develop reduced-order-models of chaotic and stochastically forced fluids to enable insight into the underlying dynamics and extreme events'
- Co-Supervised by Professors [Peter Haynes](#) & [Rich Kerswell](#) at DAMTP.

### Pembroke College, University of Cambridge

Oct 2020 – Sep 2021

*MRes Physical Natural Sciences - Environmental Data Science - Merit (70%+).*

- Thesis: 'Deep learning to predict dynamics on an inertial manifold of mid-latitude jet systems'
- Co-Supervised by Professors [Peter Haynes](#) & [Rich Kerswell](#) at DAMTP.

### University College, University of London

Sep 2017 – Jul 2020

*BSc Physical Natural Sciences - Theoretical Physics - First Class Honours in all 3 years (70%+).*

- Thesis: 'Classifier Robustness for Neutrino Event Detection using Domain Adversarial Neural Networks' - Supervised by Dr Chris Backhouse, at [UCL High Energy Physics](#).

**Tiffin School** - Secondary Education - A\*A\*AA grades at A-Level; 6A\*4A grades at GCSE.

## PUBLICATIONS

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(See [Google Scholar](#) for an up to date publications list - [here](#))

'Extending Deep Learning Emulation Across Parameter Regimes to Assess Stochastically Driven Spontaneous Transition Events', **I.J.S. Shokar**, P.H.Haynes & R.R. Kerswell, ICLR Workshop on AI4DifferentialEquations In Science, [openreview.net/forum?id=7a5gUX4e5q](https://openreview.net/forum?id=7a5gUX4e5q) (2024).

'Stochastic Latent Transformer: Efficient Modelling of Stochastically Forced Zonal Jets', **I.J.S. Shokar**, R.R. Kerswell & P.H. Haynes, Under Review at JAMES, [doi:10.48550/arXiv.2310.16741](https://doi.org/10.48550/arXiv.2310.16741) (2023).

## PRESENTATIONS AT CONFERENCES, WORKSHOPS AND SEMINARS

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(\*denotes invited, †denotes oral presentation)

†ERCOFTAC Workshop on Machine Learning for Fluid Dynamics, Sorbonne University, Paris, France, [ercoftac.org/events/machine-learning-for-fluid-dynamics](https://ercoftac.org/events/machine-learning-for-fluid-dynamics) (2024).

\*†Isaac Newton Institute Workshop on Anti-diffusive dynamics: from sub-cellular to astrophysical scales, Cambridge, UK, [newton.ac.uk/event/adi](https://newton.ac.uk/event/adi) (2024) - [recorded talk](#).

\*†Magri Lab Seminar, Imperial College London, London, UK (2023)

\*†Machine Learning Seminar, ECMWF, Reading, UK (2023).

†APS DFD 2023, Bulletin of the American Physical Society, Washington D.C., USA, [meetings.aps.org/Meeting/DFD23/Session/T28.7](https://meetings.aps.org/Meeting/DFD23/Session/T28.7) (2023).

†Institute of Computing for Climate Science Summer School, Cambridge, UK, [iccs.cam.ac.uk/events/iccs-summer-school-2023](https://iccs.cam.ac.uk/events/iccs-summer-school-2023) (2023) - [recorded talk](#).

†EGU General Assembly 2023, Vienna, Austria, [doi.org/10.5194/egusphere-egu23-9121](https://doi.org/10.5194/egusphere-egu23-9121) (2023).

†UK Fluids Network Workshop on Data-Driven Methods in Fluid Dynamics, Leeds, UK, [fluids.leeds.ac.uk/2023/workshop-data-driven-methods-in-fluid-dynamics](https://fluids.leeds.ac.uk/2023/workshop-data-driven-methods-in-fluid-dynamics) (2023) - [slides](#).

## GRANTS, AWARDS AND PRIZES

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**UK Fluids Network Workshop on Data-Driven Methods** - Best Presentation (2023) - [slides](#).

**Smith–Knight & Rayleigh–Knight Prizes** - Essay Prize (2023) - [essay](#).

- Annual prize for research by a graduate student in mathematics at the University of Cambridge.

**UKRI EPSRC Research Training Support Grant** (2020-)

- Travel, equipment and training award to enhance doctoral research (£15k).

**UKRI EPSRC Scholarship** - Master's & Doctoral Full Studentship (2020-)

- Full funding for postgraduate study at the [CDT in the Application of Artificial Intelligence for Environmental Risks](#) (~£115k).

**UCL Data Science Society Hackathon** - Winning Team (2019)

- Using datasets from American Express, we developed a product personalisation strategy using k-means clustering and a random forest model - trading off credit card growth and risk of defaults.

**Arm Holdings, Applied Machine Learning Insight Challenge** - Winning Team (2019)

- Applied an adaptive image filter to a webcam image using a CNN to produce portraits in the style of famous artists.

**University of Cambridge Sporting Half Blue** - [AFL Varsity Athlete](#) (2024)

- Awarded to exceptional athletes competing at the highest level of university sport.

## INDUSTRIAL RESEARCH EXPERIENCE

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**Data Science & Analytics Summer Intern**

Jul 2019 – Aug 2019

[FTI Consulting](#)

*London, UK*

- Analysed the Panama Papers dataset for a bank's fraud due diligence using a graph network.

- Used pattern identification, including fuzzy string matching, and anomaly detection models to assist a client in fraud detection.

## SERVICE, TEACHING AND POSITIONS OF RESPONSIBILITY

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**13th International Conference on Climate Informatics** (2024) - Reviewer.

**Deep Neural Networks** - Part II Computer Science, University of Cambridge

- Academic Supervisor - Example Classes (Lent Term 2022, 2023 & 2024).

**Applied Machine Learning** - AI4ER CDT, University of Cambridge

- Academic Supervisor and Co-organiser - [Introduction Classes](#) (Michaelmas Term 2022 & 2023).

**Institute of Computing for Climate Science** Summer School, Cambridge (2023)

- Organisation volunteer and speaker.

**Cambridge Centre for Climate Science** Workshop on Machine Learning for Climate Science (2022) - Co-organiser - [resources](#).

**Graduate Parlour, Pembroke College, Cambridge** - President (May 2021 – May 2022);

Housing Officer (May 2022 – Oct 2023); Events Officer (Nov 2020 – May 2022).

**University of London** - Lillian-Penson Hall, Resident Advisor (Aug 2019 – Aug 2020); Nutford House, Junior Common Room, Events Officer (Sep 2017 – Jun 2018).

## TECHNICAL SKILLS

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- *Languages*: Python, Julia, MATLAB, & C++ ; `slurm` & `bash`; HTML & CSS.

- *Deep Learning Frameworks*: PyTorch, TensorFlow & JAX.

- Git &  $\text{\LaTeX}$ .