Kumar Mausam

Physics Student

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Research Profile

Physics Student with a decent background in **Computational Physics**, **Geophysical Fluid Dynamics**, and **Scientific Machine Learning**. 4+ years of industry experience as a Data Scientist, specializing in **neural networks**, **generative modeling**, and **timeseries forecasting**. Passionate about applying ML to PDE–governed systems, ocean dynamics, and climate physics.

Research Interests

Geophysical Fluid Dynamics (GFD), Climate Dynamics, PDE Modeling, Scientific Machine Learning (SciML), PINNs, Generative ML, Turbulence

Education

2023–2025   **Master of Science in Physics**, *St. Joseph's University*, Bengaluru
Focus: Computational Physics, Fluid Dynamics, Fourier/Spectral Methods, Machine Learning.

2018–2021   **Bachelor of Science in Physics**, *Mithibai College (University of Mumbai)*, Mumbai

Publications & Preprints

2025   **J. Thomas and M. Kumar**, "Using neural network models to predict turbulent dynamics of low-energy high baroclinic modes." Submitted to an AMS Journal.

Research Experience

2024–2025   **Graduate Researcher**, *ICTS-TIFR*, Bengaluru
- Developed UNet, GAN, and Regularized cGAN frameworks to predict **high baroclinic mode dynamics** from barotropic vorticity.
- Achieved **90%+ accuracy** in predicting domain-integrated baroclinic kinetic energy and dissipation.
- Worked with **768×768 pseudospectral datasets**, Rossby-number-varying turbulent regimes, and multiscale feature prediction.

Professional Experience

Apr 2024 – Oct 2025   **Senior Associate – Market Pricing**, *London Stock Exchange Group (LSEG)*, Bengaluru
- Built a **hybrid forecasting ensemble** (RandomForest + DeepAR + Prophet) for financial volume prediction.
- Designed an LLM-powered **PDF diff-checker** with structured HTML visualization and auto-summary.

May 2021 – Apr 2024	**Associate Data Scientist**, *iQGateway*, Bengaluru

- ○ Implemented **Subspace Learning Machines** and **Random Rotation Ensembles** from theory.
- ○ Built internal **AutoML time-series module** and version-controlled DAG pipeline system.
- ○ Contributed to open-source libraries: **tf-tabnet**, **category_encoders**.
- ○ Improved OCR accuracy by tuning Tesseract with a handcrafted dataset.

Jan 2021 – Apr 2021	**R Developer and Analyst**, *myNalanda*, Pune,

- ○ Built dashboards in R/Shiny for education analytics.

Technical Skills

Physics & Maths	PDEs, Spectral Methods, GFD, Fourier Analysis
Programming	Python, C++, Rust, R, SQL, Git
ML/AI	PyTorch, TensorFlow, GANs, Diffusion Models, PINNs, CV models
Tools	Linux, Docker, HPC, GitLab CI/CD, LaTeX

Presentations

2025	**A GAN-based model to generate turbulent oceanic flows** – ICTS-TIFR In-house Seminar, ICTS-TIFR, Bengaluru
2025	**Machine Learning Models for Oceanic Turbulence** – Advanced ML for Earth System Modeling Workshop, ICTS-TIFR, Bengaluru
2025	**A machine learning-based model to generate turbulent oceanic flows** – National Conference in Mathematical Advances (NCMA 2025), St. Joseph's University, Bengaluru

References

Available upon request.