Francesco Pio Ramunno

AI Research Scientist | PhD Candidate

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EDUCATION

PhD in Deep Learning and Astrophysics - supervised by Prof. Slava Voloshynovskiy and André Csillaghy,
University of Geneva (Switzerland) and Fachhochschule Nordwestschweiz FHNW | Zurich, Switzerland 2022-2026

Master of Science in Astrophysics and Space Science - supervised by Dario Del Moro, Juan-Luis Cano and Marco Micheli, *University of Rome Tor Vergata* | Rome, Italy Final Mark: 110 / 110 with honours 2020-2022

Bachelor in Mathematics - Thesis advisor: Prof. Ermenegildo Caccese, *Università degli studi della Basilicata* | Potenza, Italy Final Mark: 110 / 110 with honours 2017-2020

WORK EXPERIENCE

***AI Research Scientist* - Sony AI**
Zurich, Switzerland Starting 1st December 2026

- Working in the AI for Chip Design team on semicondutor devices.

***Research Scientist Intern in Machine Learning* - Sony AI**
Zurich, Switzerland - Research paper submitted to ICLR 2027 (first author) February 2026 – August 2026

- Designed and implemented a scalable dual-attention transformer architecture for PDE surrogate modeling on large-scale semiconductor meshes (500k+ nodes), combining global token attention with adaptive sparse local refinement.
- Improved the state of the art on open-source 2D/3D PDE benchmarks and Sony's in-house semiconductor simulation datasets by more than 30%.
- Integrated the proposed architecture into Sony AI's production semiconductor simulation framework.

***AI Foundation Models for Science Intern* - Polymathic AI (Simons Foundation)**
New York City (NY), USA - Supervisors: Rudy Morel, David Fouhey March 2025 – August 2025

- Built and scaled data pipelines for a 100+ TB multimodal spatiotemporal NASA solar dataset, synchronizing 14 modalities via temporal alignment, spatial reprojection, and preprocessing.
- Designed diffusion-based video models for long-horizon scientific forecasting, reducing exposure bias and improving temporal stability over autoregressive baselines. This work was published at NeurIPS 2025 (Main Track).
- Scaled high-resolution multi-channel diffusion models for distributed training on up to 32 NVIDIA H200 GPUs.

***Data Science and Machine Learning Intern* - European Space Agency (ESA)**
Frascati, Italy - Supervisors: Marco Micheli, Juan-Luis Cano March 2022 – August 2022

- Built end-to-end production pipelines integrating orbital, physical, and chemical properties of near-Earth objects across heterogeneous databases.
- Trained and benchmarked ML models (XGBoost, Random Forests) achieving a 2× reduction in RMSE over classical regression baselines for asteroid composition prediction.
- Shipped reproducible data workflows and technical documentation to the ESA Near-Earth Object Coordination Centre (NEOCC).

SELECTED PUBLICATIONS

"*Predicting Partially Observable Dynamical Systems via Diffusion Models with a Multiscale Inference Scheme*" — R. Morel, **F.P. Ramunno** et al., 2025 *NeurIPS 2025*

"*Enhancing Image Resolution of Solar Magnetograms: A Latent Diffusion Model Approach*" — **F.P. Ramunno** et al., 2025 *Astronomy and Astrophysics*

"*Magnetogram-to-Magnetogram: Generative Forecasting of Solar Evolution*" — **F.P. Ramunno** et al., 2024 *SPAICE 2024*

"*Solar Synthetic Imaging: Introducing DDPM on SDO/AIA Data*" — **F.P. Ramunno** et al., 2024 *Astronomy and Astrophysics*

SKILLS

Programming	Python, MATLAB, IDL, Bash
CS Fundamentals	Graphs, Trees, Heaps, Hash Maps, Dynamic Programming
ML Frameworks	PyTorch, JAX, Scikit-learn, Hugging Face, WandB
Research Areas	Scientific Machine Learning, Graph Neural Networks, Generative Modeling, Diffusion Models, Transformers, PDE Surrogates, Computer Vision, Video Generation, Uncertainty Quantification
Technical Skills	Distributed Training, HPC, SLURM, Linux, Docker, Git, Large-scale Data Pipelines, Experiment Tracking
Languages	Italian (Native), English (C2), German (A1)