

ANDRÉS VICENTE ARÉVALO

Research Scientist ◊ Machine Learning ◊ Scientific Computing

Freiburg im Breisgau, Germany (Basel commutable, open to relocation) ◊ Spanish citizen (EU)

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SUMMARY

PhD astrophysicist and machine-learning researcher with a master's in artificial intelligence. Eight years turning large, noisy measurements into physical answers with inverse methods and deep learning: graph-neural-network surrogates that run expensive simulations $\sim 10^3 \times$ – $\sim 10^6 \times$ faster, and inversion codes that process 5 TB of telescope data on up to 3,500 CPU cores. Co-founder and CTO of an EBITDA-positive startup-valuation platform. Seeking research scientist, data science or machine learning roles.

SKILLS

Machine learning: deep learning in PyTorch and TensorFlow; graph neural networks (PyTorch Geometric), transformers, CNNs, surrogate modelling, reinforcement learning, NLP; Hugging Face, LoRA fine-tuning, Weights & Biases

LLMs: OpenAI, Anthropic, Gemini and xAI APIs; LLM-as-a-judge evaluation; AI coding agents

Scientific computing: inverse problems, nonlinear optimisation, uncertainty quantification, numerical simulation; C++, CUDA, MPI, Slurm, Fortran; runs on up to 3,500 cores and 4×H100 GPUs

Data & software: Python (NumPy, SciPy, pandas, Matplotlib, OpenCV), statistical data analysis and visualisation, SQL/PostgreSQL (working knowledge), Django, Celery/Redis, Git, Linux, nginx, AWS (EC2, S3, RDS)

Languages: Spanish and Catalan (native), English (fluent), German (basic, currently learning)

EXPERIENCE

[Leibniz Institute for Solar Physics \(KIS\)](#), Freiburg

Jan 2025 – present

Postdoctoral Researcher, [DFG project ACDC](#) on the solar chromosphere

- Scaled the graph-neural-network surrogate to full 3D atmospheres (millions of nodes): a model on one H100 GPU replaces a radiative-transfer simulation that costs 5–10M CPU-hours on an HPC cluster, a $\sim 10^6 \times$ speed-up (first-author paper, [A&A](#) 2026).
- Led a six-author, three-institute study that fits a physically constrained model to sunspot spectra and recovers temperature and magnetic-field maps in two coupled atmospheric layers (first-author paper, [A&A](#) 2026).
- Principal investigator of a 2M CPU-hour allocation at [HLRS Stuttgart](#) and of two [GREGOR telescope](#) campaigns (2025, 2026); five campaigns, 38 observing days and 5 TB of data as PI in total.

[UpValuations](#) – startup-valuation platform

2021 – 2023

Co-founder & CTO

- Co-founded with two financial analysts and owned the entire technical side: architecture, development and infrastructure.
- Implemented the valuation engine in Python (NumPy, pandas, SciPy): discounted cash flow, venture-capital, scorecard, risk-premium and market-multiple methods, with automated PDF reports.
- Built and operated the Django/PostgreSQL platform with Celery/Redis background jobs and online payments on AWS (EC2, S3, RDS), served by nginx and gunicorn; all written and run by hand, before AI coding agents existed.
- Worked directly with clients: 5–10 paying clients and positive EBITDA; [Deusto Business School Citizen Bootcamp](#) on startup foundation and growth (2022–2023).

[Instituto de Astrofísica de Canarias \(IAC\)](#), Tenerife

2020 – 2024

Doctoral Researcher, [FPI fellowship](#) (competitive national PhD fellowship)

- First application of graph neural networks to a radiative-transfer solver, treating the model atmosphere as a graph: $\sim 10^3 \times$ faster than the iterative solver (first-author paper, [ApJ](#) 2022; [code open-sourced on GitHub](#)).

- Co-developed POLARIS, a large collaborative C++ code for 3D inversions, leading its statistical-equilibrium module; enabled the first fully 3D inversion of a solar prominence (first-author paper in preparation, *ApJ Letters*).
- Ran inversions and ML training on the [Spanish Supercomputing Network](#) (12.5M CPU-hours: [MareNostrum](#), [La Palma](#)), with the largest runs on 3,500 cores.
- PI of three observing campaigns at the [SST](#) and [GREGOR](#) telescopes (22 days): proposal, observation, calibration and analysis.
- Taught two scientific-programming courses at the [University of La Laguna](#) (about 30 students a year, 2021–2024); research stay at the [Astronomical Institute of the Czech Academy of Sciences](#) (2023).

PROJECTS

Sentiment Prism (2026, prism.andreuva.com) – Web app that asks GPT, Claude, Gemini and Grok about a brand and its competitors, and scores the answers with an LLM judge for sentiment, consensus and cited sources, with cost-capped scheduled runs to track changes over time. Built end to end with AI coding agents to learn LLM tooling (FastAPI, PostgreSQL, React, Docker); public live demo.

graphnet_nlte (github.com/andreuva/graphnet_nlte) – Open-source PyTorch Geometric code behind the two graph-neural-network acceleration papers.

LEADERSHIP & SERVICE

Supervised one master’s thesis, one bachelor’s thesis and one internship.

Reviewer for the Machine Learning and the Physical Sciences workshop at NeurIPS (2022, 2023, 2026).

Invited talks: a [guest lecture at the ELLIS Unit Freiburg](#) (2026) and a [round table on AI](#) (2024).

Talks at international conferences (European Astronomical Society 2022 and 2026, Royal Astronomical Society 2026, Solar Polarization Workshop 2022 and 2025).

EDUCATION

Master in Artificial Intelligence – [Universitat de València](#) 2024 – 2025
Continuing-education master, 60 ECTS, online, completed alongside full-time research. Grade 9.11/10; thesis on graph neural networks (9.8/10). Deep learning, reinforcement learning, natural language processing, AI in the cloud, industrial AI.

PhD in Astrophysics – [IAC & Universidad de La Laguna](#) 2020 – 2024
Sobresaliente cum laude (highest grade), International Doctorate. Thesis: *3D inversions of chromospheric structures*.

Master in Computational Astrophysics – [Universidad de La Laguna](#) 2018 – 2020
Thesis on cosmological N-body simulations; co-author of a paper in *MNRAS* (2020).

BSc in Physics – [Universitat de València](#) 2014 – 2018

Training: [NVIDIA Deep Learning Institute](#) (computer vision; deep learning for multiple data types) and [PRACE Summer of HPC](#) (deep-learning object detection, from HPC to the edge), 2020.

SELECTED PUBLICATIONS

Seven refereed papers, four as first author; full list on [ORCID](#).

Vicente Arévalo, A., Asensio Ramos, A., Díaz Baso, C. J. (2026). [Accelerating 3D non-LTE synthesis with graph neural networks](#). *Astronomy & Astrophysics* 710, A256.

Vicente Arévalo, A., Borrero, J. M., et al. (2026). [Chromospheric and photospheric properties of sunspots as inferred from Stokes inversions under magnetohydrostatic and non-local thermodynamic equilibrium](#). *Astronomy & Astrophysics* 708, A351.

Vicente Arévalo, A., Asensio Ramos, A., Esteban Pozuelo, S. (2022). [Accelerating non-LTE synthesis and inversions with graph networks](#). *The Astrophysical Journal* 928, 101.