Dr. Argyrios Koumtzis

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Skills

Programming:

- **Advanced:** C, Fortran, **Python** (NumPy, SciPy, Matplotlib, MayaVi, PyTorch, Scikit-Learn)
- **Intermediate:** Julia, Version Control (Git), Emacs Lisp, bash, high performance computing clusters
- **Beginner:** Parallel computing: OpenMP (used with Fortran and C), GPU computing using CUDA C, SQL
- **Computational modeling:** PDEs, finite differences, spectral methods
- **Machine learning:** Physics-informed neural networks optimization algorithms
- Data analysis, data visualization
- **Plasma physics:** Magnetohydrodynamics, kinetic simulations, anomalous transport phenomena
- **Office applications:** Microsoft Office, Libre Office, LaTeX, Emacs

Languages

- **Greek:** native
- **English:** professional
  - TOEFL: 115/120

Finance & Entrepreneurship

- Developed Python code for stock screening
- Completed courses in Introduction to Corporate Finance at Columbia University via EDX and reading relevant books
- Managing a personal stock portfolio
- Financial modeling, e.g. DCF
- Advisor for a robotics team that won **first place** in the **International Robot Olympiad 2020**
- Proactively researching the real estate market to identify attractive investment opportunities
- Managing two Airbnb units

Summary

Computational researcher and quantitative developer with 8 years experience in tools like partial differential equations, **optimization algorithms**, Monte Carlo simulations, **machine learning** and physics informed neural networks. A team player who is also ready to take leadership roles and enjoys mentoring junior team members. Being a self-starter in finance, I am excited to apply my quantitative skills to explore the field of quantitative finance within dynamic fast-paced environments.

Research Experience & Education

July 2023 - present

Postdoctoral Researcher | Max Planck Institute for Solar System Research

- Implementing **physics-informed neural networks** for solving partial differential equations that characterize the magnetic field structure within the solar corona
- Validating computational models of the coronal magnetic field through comparative analysis with spacecraft observations

October 2019 – June 2023

PhD Candidate | Max Planck Institute for Solar System Research

- Thesis topic: Computational modeling of the solar coronal magnetic field
  - Grade: **magna cum laude**
- **Key result:** Developed a **state-of-the-art numerical code** that reconstructs the 3D structure of the solar coronal magnetic field using observations from space telescopes
- The code is written in C language, parallelized with open MP, and implemented on a Yin-Yang computational grid
- Participating in a multi-institution international team formed to compare coronal magnetic field models
- **Teaching experience:** Supervision of junior team members

2014 – 2019

Bachelor's Degree in Physics | Aristotle University of Thessaloniki, Greece

- **GPA: 9.39/10** (ranking 1st among 280 students)
- **Undergraduate Research Assistant** in group Plasma Physics & High Energy Astrophysics | 01/2016 – 10/2019
- Thesis: Power law flare statistics driven by photospheric turbulence
- Developed a **spectral code** for linear force-free magnetic field extrapolation in the solar corona in Fortran and Julia
- Developed a Fortran **Monte Carlo code** driven by observed probability distributions to study solar flare statistics
- Teaching assistant in Astronomy course

Summer research intern | Oxford University, UK | Summer 2017
- Estimating intergalactic magnetic fields
- Conducted 4D high performance computing Monte Carlo simulations
- Used **machine learning** to analyze multidimensional simulation data output

Conferences

- **Speaker in**
  - EGU (European Geological Union) | 2022, 2023
  - DPG (Deutsche Physikalische Gesellschaft) Meeting | 2022
  - Workshop "Nonlinear Dynamical Systems" | 2019
- **Invited participant:** Interdisciplinary international workshop "The audible universe" 1 and 2 | 2021, 2022

Scholarships & Awards

- Scholarship for academic excellence from National Bank of Greece | 2018
- Scholarship for an Educational Trip to **Massachusetts Institute of Technology** | 2016
- Award by the Greek Rotary Club for achieving a societal change: contribution to free access for the disabled to higher education | 2015
- 5th Position in International Youth Chess Championship for the blind | 2015

Publications

- Superdiffusive Stochastic Fermi Acceleration in Space and Energy, 2019, N. Siulas, H. Isliker, L. Vlahos, A. Koumtzis.
- A New Global Nonlinear Force-Free Coronal Magnetic-Field Extrapolation Code Implemented on a Yin-Yang Grid, 2023, A. Koumtzis, T. Wiegelmann.
- Global full sphere coronal field extrapolation during solar minimum and maximum, A. Koumtzis, T. Wiegelmann, M. Madjarska, to be submitted in November 2023.