Nikolaos Triantafyllou

Physicist, PhD Candidate in Computational Astrophysics and Cosmology

Scuola Normale Superiore, Piazza dei Cavalieri 7, 56126 Pisa (PI), Italy

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Research Interests

Large-scale structure, 21cm cosmology, machine learning, bayesian statistics

Education

Scuola Normale Superiore *Pisa, Italy*

PhD in Computational Astrophysics and Cosmology *Nov. 2023 - Present*

- Advisor: Prof. A. Mesinger

University of Crete *Heraklion, Greece*

MSc Graduate Degree in Advanced Physics (specialization: Astrophysics) *Sept. 2022 - June 2023*

- Grade: 8.88/10 (”Excellent”)
- Advisor: Prof. V. Pavlidou

University of Crete *Heraklion, Greece*

BSc Undergraduate Degree in Physics *Sept. 2018 - Sept. 2022*

- Grade: 7.95/10 (”Very Good”)
- Advisor: Prof. V. Pavlidou

Research Experience

Scuola Normale Superiore *Pisa, Italy*

Supervisor: Prof. Andrei Mesinger *2023 - Present*

- Description: Research on Large-scale structure and Cosmology for the EoR. Using **bayesian** techniques (Posterior Density Estimation, Neural Ratio Estimation, Denoising Diffusion Probabilistic Models) to constrain the amplitudes and phases of large scale modes of the **primordial density field** and astrophysical parameters.

University of Crete and IA FORTH *Heraklion, Greece*

Supervisor: Prof. Vasiliki Pavlidou *2021 - 2023*

- Description: Research on Large-scale structure and Cosmology. Used deep (NNs, **CNNs**) and shallow learning to probe the **turnaround radius** on the plane of the sky based on mass and line-of-sight velocity simulated data in order to constrain cosmological parameters.

Publications

In Preparation

Bayesian Inference for Constraining the Cosmological Initial Density Field with 21-cm Observations from the Epoch of Reionisation
N. Triantafyllou, A. Mesinger, D. Prelogovic, S. Gagnon-Hartman

Last Stages of Preparation

Searching for a Signature of Turnaround in Galaxy Clusters with Convolutional Neural Networks
N. Triantafyllou, G. Korkidis, V. Pavlidou, P. Bonfini

Teaching Experience

Fall 2022	**Advanced Physics Lab I**, Teaching Assistant	*Heraklion, Greece*
Spring 2022	**Physics Lab III - Optics**, Teaching Assistant	*Heraklion, Greece*
Spring 2020	**Physics Lab II- Electromagnetism**, Teaching Assistant	*Heraklion, Greece*

Fellowships

2018-2019 **"Chrysanthos and Anastasia Karidis" Bequest Scholarship**,

International Conferences

17th Tonale Winter School in Cosmology 2024 — *Passo del Tonale, Italy*
Participant — *December 2024*

Physics in the AI era — *Pisa, Italy*
Participant — *September 2024*

CosmoVerse Training school @Corfu 2024 — *Corfu, Greece*
Participant — *May 2024*

RAS Specialist Discussion Meeting on Simulation Based Inference — *Online / London, UK*
Participant — *January 2024*

Onassis Lectures on Gravitational Waves 2022 — *Heraklion, Greece*
Participant — *July 2022*

Skills

Programming & Software
Proficient in: Python, LaTeX
Familiar with: C, C++, MATLAB

Languages
Greek (native), English (fluent, B2-ECCE, working proficiency), Italian (A1)

Academic
Scientific research, academic writing, LaTeX typesetting, problem-solving abilities, data analysis, teaching, report writing, presentation & communication skills, collaboration, time management, work ethic

Other Interests

Music (guitar playing, singing, lyric writing), philosophy, art, movies, road trips, swimming, basketball, wine/beer tastings, bars/pubs, board games