Nikolaos Triantafyllou

Physicist, PhD Candidate in Cosmology | ML

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Education

Scuola Normale Superiore *Pisa, Italy*

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

- Advisor: Prof. A. Mesinger
- Ongoing project: Bayesian Inference for Constraining the Cosmological Initial Density Field with 21-cm Observations from the Epoch of Reionisation (EoR)

University of Crete *Heraklion, Greece*

MSc Graduate Degree in Physics *Sept. 2022 - June 2023*

- Grade: 8.88/10 (”Excellent”)
- Program: ”Anvanced Physics”
- Specialization: ”Astrophysics and Space Physics”
- Advisor: Prof. V. Pavlidou
- Thesis: ”Searching for a signature of turnaround in velocity profiles of galaxy clusters with machine learning”

University of Crete *Heraklion, Greece*

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

- Grade: 7.95/10 (”Very Good”)
- Advisor: Prof. V. Pavlidou
- Thesis: ”Machine learning methods to detect the turnaround radius of galaxy clusters”

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.

Institute of Astrophysics at 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

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

International Conferences

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*

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**,

Research Interests

Cosmology, Computational Astrophysics, Machine learning, Bayesian Methods

Skills

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

Languages
Greek (native), English (fluent, B2-ECCE), 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