Andreas Tersenov

PhD Student · University of Crete Physics Departement

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Education

University of Crete / CEA Paris-Saclay — *Heraklion, Greece*

PhD Graduate Degree in Physics — *Aug. 2023 - expected Jul. 2027*

- **Project**: "TITAN - Artificial Intelligence in Astrophysics", EU ERA Chair
- **Supervisors**: Dr. J.L. Starck, Dr. M. Kilbinger, Prof. V. Pavlidou
- **Topic**: "Advanced Inference in Weak Lensing: Mass Mapping and Higher-Order Statistics for Precision Cosmology"

University of Crete — *Heraklion, Greece*

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

- **Program**: "Advanced Physics", specialization: "Astrophysics and Space Physics"
- **Grade**: 8.75/10 (Excellent)
- **Supervisors**: Dr. J.L. Starck, Prof. V. Pavlidou
- **Thesis**: "Comparison of mass-mapping techniques using weak gravitational lensing. Application to the UNIONS galaxy survey."

University of Crete — *Heraklion, Greece*

BSc Undergraduate Degree in Physics — *2018 - 2022*

- **Grade**: 9.15/10 (Excellent)
- **Supervisors**: Prof. V. Pavlidou, Prof. E. Kiritsis
- **Thesis**: "Cosmic-ray air-shower simulations across the ankle: combining mixed galactic composition with new physics above 50 TeV"

Publications

Submitted Papers

Impact of mass mapping algorithms on cosmology inference
A. Tersenov, L. Baumont, M. Kilbinger, J.L. Starck
accepted for publication in Astronomy & Astrophysics (acceptance date 31/03/2025). doi: arXiv:2501.06961

Papers In Preparation

Validating Wavelet ℓ_1-Norm Predictions Through Cosmological Parameter Inference
A. Tersenov, V. Tinnaneri Sreekanth & J.L. Starck

A plug-and-play approach with conformal predictions for weak lensing mass mapping
H. Leterme, A. Tersenov, J. Fadili & J.L. Starck

Assessing Baryonic Feedback in Weak Lensing cosmology with Higher-Order Statistics
A. Tersenov, F. Lanusse, J.L. Starck

Conference Proceedings

Cosmic-ray air-shower simulations across the ankle: Combining mixed Galactic composition with New Physics above 50 TeV
S. Romanopoulos, A. Tersenov, V. Pavlidou
published in 38th International Cosmic Ray Conference, 2024 (p. 495).

Work in Progress

Euclid: DR1 Analysis with Theory-Based Higher Order Statistics
A. Tersenov, A. Barthelemy, Euclid collaboration

Research Experience

Institute of Computer Science & Institute of Astrophysics at FORTH, CEA Paris-Saclay (CosmoStat Laboratory) - *PhD Fellow* *Heraklion, Greece*
SUPERVISORS: DR. J.L. STARCK, DR. M. KILBINGER, PROF. V. PAVLIDOU *Aug. 2023 - Present*
Description: Developing data-driven approaches for the reconstruction of weak-lensing mass maps and the analysis of large-scale datasets, including ones acquired by Euclid and UNIONS. Working on higher-order weak-lensing statistics for Bayesian cosmology inference. Also working on forward modelling of weak lensing observations combining physical models with Deep Learning components accounting for unknowns factors, and simulation-based inference (SBI) for Stage IV cosmological surveys. Member of the Euclid and UNIONS international collaborations.

CEA Paris-Saclay (CosmoStat Laboratory) - *Research Intern* *Paris, France*
SUPERVISORS: DR. J.L. STARCK, DR. M. KILBINGER *Jan. 2023 - June 2023*
Description: Worked on analysing and comparing convergence map making methods, conducting comparisons to evaluate their strengths and weaknesses, refining the `shear-pipe-peaks` inference pipeline, and assessing the impact of mass maps on cosmological parameter estimation. Applied these techniques to a preliminary version of the UNIONS survey data.

Institute of Astrophysics at FORTH - *Undergraduate/Graduate Research Assistant* *Heraklion, Greece*
SUPERVISOR: PROF. V. PAVLIDOU *2020 - June 2023*
Description: Ultra high energy cosmic ray research, as part of the CIRCE project. Worked on modeling mixed-composition ultra-high-energy cosmic-ray air showers in the Earth's atmosphere and the transition from Galactic to extragalactic cosmic rays. Conducted Monte Carlo simulations across the ankle in the cosmic ray spectrum to provide the constraints for a phenomenological new physics model above 50TeV, which solves the composition problem of ultra-high-energy cosmic rays.

Crete Center for Theoretical Physics - *Undergraduate/Graduate Research Assistant* *Heraklion, Greece*
SUPERVISOR: PROF. E. KIRITSIS *2021 - 2022*
Description: Investigated Holographic RG flows dual to QFTs on deformed S^3 geometry in the framework of Einstein-Maxwell-dilaton gravity in $3+1$ dimensions. A general dilaton potential was used and flows were driven by a scalar relevant operator. Worked on solving the respective Einstein equations, exploring the general properties of such flows, computing UV and IR asymptotics and analyzing exotic solutions.

National University of Science and Technology "MISIS" - Laboratory of Superconducting Metamaterials - *Research Intern* *Moscow, Russia*
SUPERVISOR: DR. ANDREI MALISHEVSKII *Jun. 2019 - Aug. 2019*
Description: Studied the spectral and temporal characteristics of a fluxonium qubit coupled to a coplanar resonator on a chip. Used cryogenic equipment to measure superconducting qubits. Studied electromagnetic waves in polaritonous metamaterials at values of dielectric permeability close to zero, as well as the numerical solution of dynamic equations for finding localized states in quantum metasurfaces. Also, completed the program "Superconducting qubits, high pressure cells and metamaterials" of 80 hours.

International Conferences & Schools

Summer School for Astrostatistics in Crete 2025 *Heraklion, Greece*
ORGANISER, LECTURER *June 2025*

Euclid-LE3 Meeting *Hersonissos, Greece*
ORGANISER (LOC), PARTICIPANT *June 2025*

Summer School for Astrostatistics in Crete 2024 — *Heraklion, Greece*
Organiser, Lecturer — *July 2024*

COSMO 21 - Statistical Challenges in 21st Century Cosmology — *Chania, Greece*
Organiser (LOC), Poster presenter — *May 2024*

Tonale Winter School on Cosmology 2023 — *Tonale, Italy*
Participant, Poster presenter — *December 2023*

Astronomical Data Analysis X (ADA X) — *Hersonissos, Greece*
Participant — *September 2023*

The 2022 Onassis Lectures in Physics: Gravitational Waves — *Heraklion, Greece*
Participant — *July 2022*

SynCRETism 2022 - Particle physicists dining with Astrophysicists — *Chania, Greece*
Participant — *June 2022*

5th International Conference on Quantum Technologies — *Moscow, Russia*
Participant — *July 2019*

Teaching Experience

Fall 2024	**Introduction to Data Science and Machine Learning:** Teaching Assistant *(Prepared hands-on sessions and weekly assignments on various topics in fundamental ML, from linear regression to CNNs, presented a summary of the theory in class, guided students)*	*University of Crete*
Jul. 2024	**Summer School for Astrostatistics in Crete 2024:** Lecturer *(Taught Bayesian Statistics, MCMC, Deep Learning & SBI. Prepared lectures, and hands-on Jupyter notebook tutorials)*	*University of Crete*
Fall 2022	**Advanced Physics Lab I:** Teaching Assistant	*University of Crete*
Spr. 2022	**Physics Lab III - Optics:** Teaching Assistant	*University of Crete*
Spr. 2020	**Physics Lab II - Electricity:** Teaching Assistant	*University of Crete*

Fellowships

2023-2024 **PhD Fellowship** Foundation of Research & Technology - Hellas
2018-2019 **"Chrysanthos and Anastasia Karidis" Bequest Scholarship**

Research Interests

Computational cosmology; statistical inference; probabilistic modeling; simulation-based inference; deep learning; generative models; mass mapping; higher-order statistics.

Skills

Programming & Software
Proficient in: Python, JAX, PyTorch, Pyro/NumPyro, HTML, LaTeX, Git and GitHub, Docker, Linux/Slurm
Familiar with: TensorFlow, C, C++, MATLAB, JavaScript, Wolfram Mathematica

Languages
Greek (native), English (fluent, C2-ECPE), Russian (B2-Saint Petersburg State University)