

# Andreas Tersenov

PHD STUDENT · UNIVERSITY OF CRETE PHYSICS DEPARTEMENT

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## Education

### University of Crete

#### PHD GRADUATE DEGREE IN PHYSICS

Heraklion, Greece

Aug. 2023 - expected Aug. 2026

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

### University of Crete

#### MSC GRADUATE DEGREE IN PHYSICS

Heraklion, Greece

Sept. 2022 - June 2023

- **Program:** "Advanced Physics", specialization: "Astrophysics and Space Physics"
- **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

#### BSC UNDERGRADUATE DEGREE IN PHYSICS

Heraklion, Greece

2018 - 2022

- **Grade:** 9.15/10 (Excellent)
- **Supervisor:** 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

#### Impact of mass mapping algorithms on cosmology inference

[A. Tersenov](#), L. Baumont, M. Kilbinger, J.L. Starck  
Published in *Astronomy & Astrophysics* 698 (2025): A25. doi, [arXiv:2501.06961v2](#)

#### A plug-and-play approach with fast uncertainty quantification for weak lensing mass mapping

H. Leterme, [A. Tersenov](#), J. Fadili & J.L. Starck  
submitted for publication to *Astronomy & Astrophysics*

#### Euclid preparation: Towards a DR1 application of higher-order weak lensing statistics

Euclid HOWLS Collaboration: S. Vinciguerra, ..., [A. Tersenov](#), et al.  
submitted for publication to *Astronomy & Astrophysics* [arXiv:2510.04953](#)

### IN PREPARATION

#### Validating Wavelet $\ell_1$ -Norm Theory Predictions Through Cosmological Parameter Inference

[A. Tersenov](#), V. Tinnaneri Sreekanth, M. Kilbinger & J.L. Starck

#### Assessing Baryonic Feedback in Weak Lensing cosmology: Simulation-Based Inference and BNT Transform Efficacy

[A. Tersenov](#), F. Lanusse, M. Kilbinger & 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).

## Research Experience

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### **Euclid collaboration - Lead Contributor & Working Group Member**

**GROUP: WEAK LENSING SCIENCE WORKING GROUP**

Nov. 2023 - Present

*Description:* Serving as an active member of the *Euclid* consortium with specific responsibilities in weak lensing data analysis, pipeline construction, and scientific leadership.

- Lead of the Euclid key paper on "Cosmic shear higher-order statistics analysis of DR1 data with theory", within the Higher-Order Weak Lensing Statistics (HOWLS) project.
- Active contributor to the HOWLS working group, developing and testing pipelines on cosmology inference with higher-order statistics. Co-lead of the "Mass Mapping and Tomography" brick.
- Active member of the Organization Unit for Level 3 data processing (OU-LE3), contributing to the mass mapping brick.

### **Institutes of Astrophysics & Computer Science at FORTH, CEA Paris-Saclay - 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.

### **CosmoStat Laboratory, CEA Paris-Saclay - Research Intern**

Paris, France

**SUPERVISORS: DR. J.L. STARCK, DR. M. KILBINGER**

Feb. 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**

Nov. 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**

Oct. 2021 - Oct. 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**

Moscow, Russia

**Superconducting Metamaterials - Research Intern**

**SUPERVISOR: DR. ANDREI MALISHEVSKII**

Jun. 2019 - Aug. 2019

*Description:* Investigated the spectral and temporal characteristics of fluxonium qubits coupled to coplanar resonators 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. Completed the program "Superconducting qubits, high pressure cells and metamaterials" of 80 hours.

## Talks & Posters

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### TALKS

Fall 2025. **Impact of mass-mapping and baryonic effects on cosmology inference.** Contributed talk: WL-SWG and OU-SHE

Meeting (Marseille, France)

Summer 2025. **Impact of Weak Lensing Mass Mapping Algorithms on Cosmology Inference**. Talk: **COLOURS Workshop** (Saclay, France)

Summer 2024. **Peak counts for UNIONS cosmology**. Contributed talk: UNIONS meeting (Paris, France)

## POSTERS

Fall 2025. **SBI for robust beyond-two-point cosmology**. **MINOAS Workshop** (Heraklion, Greece)

Fall 2025. **Impact of baryonic feedback on weak-lensing higher-order statistics**. **Beyond-two-point Statistics Meet Survey Systematics workshop** (Kashiwa, Japan)

Spring 2024. **Impact of mass mapping algorithms on cosmology inference**. **COSMO 21 Conference** (Chania, Greece)

Winter 2023. **Mass mapping and cosmology**. **Tonale Winter School on Cosmology** (Tonale, Italy)

## International Conferences & Schools Organised

### Winter School for AstroStatistics

Sharjah, UAE

SOC, LECTURER

Nov 2025

- Upcoming International winter school organized by SAASST, bringing together ~35 participants from Europe, the Middle East, and Asia.
- Responsibilities: program coordination, applicant selection, preparation and delivery of lectures and tutorials.

### Summer School for Astrostatistics in Crete (2025 & 2024 Editions)

Heraklion, Greece

ORGANISER, LECTURER

June 2025 & July 2024

- Co-organized two successive editions of an international school, each with ~35 participants (primarily graduate students and early-career researchers) selected from a highly competitive pool (~150 applicants in 2025; ~140 in 2024), from ~20 countries.
- **Local Organisation & Management** (both editions): Co-led all local logistics, including securing funding, website development, and coordination of venue, catering, merchandise, and social program.
- **Academic Responsibilities** (both editions): Program coordination, applicant selection, and preparation and delivery of lectures and tutorials. The tutorials can be found [here](#).

### Euclid-LE3 Meeting

Hersonissos, Greece

LOC

June 2025

- Supported coordination and logistics for the Euclid Consortium's Level-3 data processing meeting.

### COSMO 21 - Statistical Challenges in 21st Century Cosmology

Chania, Greece

LOC

May 2024

- Assisted in coordination and logistics for a major international cosmology conference with 100 participants.

## Teaching Experience

### Winter School for AstroStatistics

Sharjah, UAE

LECTURER (Prepared and will deliver the following lectures, and the corresponding hands-on sessions):

Nov 2025

- Introduction to Bayesian Inference
- Advanced Sampling
- Simulation-based Inference

### Summer School for Astrostatistics in Crete (2025 & 2024 Editions)

Heraklion, Greece

LECTURER (Prepared and delivered the following lectures, and the corresponding hands-on sessions):

June 2025 & July 2024

- Introduction to Bayesian Inference (2024)
- Bayesian Model Selection (2024)
- MCMC & Advanced Sampling (2025)
- Simulation-based Inference (2024 & 2025)

## Introduction to Data Science and Machine Learning (Undergraduate course)

Heraklion, Greece

### ASSISTANT LECTURER

Fall Semester 2024

- Delivered lectures on core machine learning concepts and offered supplementary sessions on advanced topics.
- Developed and graded weekly hands-on programming assignments to reinforce theoretical knowledge.
- Mentored students through practical coding
- Provided guidance on final project work.

## Undergraduate Physics Laboratories

University of Crete, Greece

### TEACHING ASSISTANT

Fall 2022, Spr. 2022, Spr. 2020

- Guided students through experiments and graded reports for three courses: *Advanced Physics Lab I*, *Physics Lab III – Optics*, and *Physics Lab II – Electricity*.

## Fellowships

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2023-2024 **PhD Fellowship** Foundation of Research & Technology - Hellas

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

## Refereeing

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Reviewer for the journal *Astronomy & Astrophysics*.

## Research Interests

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Computational cosmology; Weak gravitational lensing; higher-order statistics; simulation-based inference; probabilistic and generative modeling; deep learning for physical sciences; mass mapping; robust and interpretable cosmological inference; cosmological survey systematics.

## Skills

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**Programming:** Python, C++, MATLAB, JavaScript, HTML, Wolfram Mathematica

**Machine Learning & AI:** JAX, PyTorch, Pyro/NumPyro, TensorFlow, Scikit-learn, DeepInverse, Hugging Face, Weights & Biases

**High-Performance Computing:** Parallel computing (MPI, multiprocessing), GPU acceleration (CUDA), workflow optimization on HPC clusters; experience with multiple national/international HPC facilities

**Software Development:** Git & GitHub, Docker/Singularity, reproducible pipelines, documentation, continuous integration (CI), testing, and Python packaging

**Environments & Tools:** Linux/Unix systems, version control, containerized workflows, Jupyter

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