

Vasileios Kalaitzidis

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EDUCATION AND TRAINING

01/09/2020 – 01/07/2025 St. Andrews, United Kingdom

INTEGRATED MASTER'S IN THEORETICAL PHYSICS University of St. Andrews

Website <https://www.st-andrews.ac.uk/> | **Field of study** Physics | **Final grade** First Class, Dean's List, 16.8/20 (3.85-3.9 GPA) |

Level in EQF EQF level 7 | **National classification** 7 | **Type of credits** ECTS | **Number of credits** 300 |

Thesis Non-Parametric Stellar Brightness Profiles from Microlensing Fold Caustics

05/01/2024 – 17/05/2024 West Lafayette, United States

SEMESTER EXCHANGE Purdue University

Website <https://www.purdue.edu/> | **Field of study** Physics | **Final grade** Honors, 4.0 GPA, Dean's List | **Level in EQF** EQF level 6

01/09/2008 – 01/05/2020 Athens, Greece

INTERNATIONAL BACCALAUREATE DIPLOMA / GREEK HIGH SCHOOL DIPLOMA (APOLYTIRIO) Athens College

Website <https://www.athenscollege.edu.gr/> | **Level in EQF** EQF level 4

01/05/2019 – 01/09/2020 Online

ANUX ASTROPHYSICS XSERIES - SERIES OF ONLINE COURSES Australian National University

Website <https://www.anu.edu.au/> | **Field of study** Physics

COSMIC RAYS, DARK MATTER, AND THE MYSTERIES OF THE UNIVERSE WASEDAX-ONLINE COURSE Waseda University

Website <https://www.waseda.jp/top/en/> | **Field of study** Physics

WORK EXPERIENCE

 **TSUNG-DAO LEE INSTITUTE (TDLI) AT SHANGHAI JIAO TONG UNIVERSITY (SJTU) – SHANGHAI , CHINA**

VISITING RESEARCHER – 10/01/2026 – 30/07/2026

- Enhance unresolved cosmic ray diffuse background sources models.
- Perform analysis on how much of the excess observed LHAASO diffuse background can be attributed to unresolved sources, supervised by Dr. Gwenael Giacinti and Dr. Hao Zhou.

 **ESO- EUROPEAN SOUTHERN OBSERVATORY – GARCHING, GERMANY**

RESEARCH INTERN – 01/06/2025 – 15/07/2025

- Conducted research on the effect of physical structure of early protostellar systems on observed ice column density ratios using RADMC-3D, under the supervision of Dr. Pooneh Nazari, funded by the Gruber Foundation.
- Performed analysis of synthetic spectra in Python to assess implications for observational ice abundance measurements in the JWST era.

 **RAS- ROYAL ASTRONOMICAL SOCIETY – ST. ANDREWS, UNITED KINGDOM**

Link <https://doi.org/10.1093/mnras/staf781>

SUMMER RESEARCH STUDENT – 01/05/2024 – 15/07/2024

- Developed mathematical models for local void profiles under the guidance of Dr. Indranil Banik, funded by the RAS.
- Used Fortran light-cone analysis to extract BAO values, later processed in MATLAB.
- Applied quadratic interpolation in a Newton-Raphson algorithm for statistical evaluation. Published findings in MNRAS

 **ST. ANDREWS UNIVERSITY – ST. ANDREWS, UNITED KINGDOM**

RESEARCH SUMMER STUDENT – 01/05/2023 – 15/07/2023

- Characterized Roche lobe shapes in MOND through mathematical modeling

- Developed a Python-based simulation tool for undergraduate astronomy students to explore gravitational computational problems in astronomy.

NCSR DEMOKRITOS – ATHENS, GREECE

SHADOWSHIP STUDENT – 01/07/2022 – 30/07/2022

- Studied 2D dark matter direct detection techniques with Dr. Georgios Anagnostou (CMS group).
- Analyzed real experimental data, employing above techniques using ROOT.

SOLMEYEA – ATHENS, GREECE

PART TIME INTERN – 01/07/2021 – 30/07/2024

- Shuffled roles, reflecting the startups growth
- Market research on potential clients/suppliers
- Performed statistical analysis on CO₂-to-algae bioreactor efficiency.

NCSR DEMOKRITOS – ATHENS, GREECE

RESEARCH INTERN – 15/06/2019 – 15/07/2019

- Conducted KM3NET sensor testing and assisted with CERN MicroMega detector calibrations.
- Participated in TANDEM particle accelerator experiments and XFR lab research.

PUBLICATIONS

2025

["Testing the Local Void Hypothesis Using Baryon Acoustic Oscillation Measurements over the Last 20 Years"](#)

The paper investigates how local inhomogeneities, particularly the potential presence of a Local Void, can bias baryon acoustic oscillation distance measurements and thus affect inferred cosmological parameters.

Indranil Banik, Vasileios Kalaitzidis, Testing the local void hypothesis using baryon acoustic oscillation measurements over the last 20 yr, MNRAS, Volume 540, Issue 1, June 2025, Pages 545–561, <https://doi.org/10.1093/mnras/staf781>

Authors: Indranil Banik, Vasileios Kalaitzidis | **Journal Name:** MNRAS | **Volume, Issue and Pages:** Volume 540, Issue 1, June 2025, Pages 545–561 | **Publisher:** Oxford Academic- RAS

2025

["The CosmoVerse White Paper: Addressing Observational Tensions in Cosmology with Systematics and Fundamental Physics"](#)

The paper reviews the growing observational discrepancies (such as the Hubble-constant tension) within the standard cosmological model, and assesses how much they can be explained by measurement systematics versus the need for new physics.

Eleonora Di Valentino et al., The CosmoVerse White Paper: Addressing observational tensions in cosmology with systematics and fundamental physics, Physics of the Dark Universe, Volume 49, 2025, 101965, ISSN 2212-6864

Authors: Eleonora Di Valentino et al | **Journal Name:** Physics of the Dark Universe | **Volume, Issue and Pages:** Volume 49, 2025, 101965, ISSN 2212-6864 | **Publisher:** Science Direct

2025

["Background solutions to the Hubble tension in f \(Q\) gravity and consistency with BAO measurements"](#)

We test several f(Q) symmetric teleparallel gravity models-including logarithmic, exponential, and hyperbolic tangent forms-to assess their ability to resolve the Hubble tension while remaining consistent with DESI DR2 BAO data.
In print, received: 23 Oct 2025

Authors: José Antonio Nájera , Harry Desmond , Indranil Banik , and Vasileios Kalaitzidis | **Journal Name:** Galaxies

2025

["Ice column densities and source structure II. Can observed ice column densities be affected by structure in young protostellar disks?"-In preparation](#)

We use a grid of RADMC-3D radiative transfer models to test whether variations in protostellar envelope mass, disk size, and dust grain properties can explain observed discrepancies between ice and gas column densities without invoking new chemistry.
Manuscript in preparation; planned submission in late 2025.

Authors: Vasileios Kalaitzidis, Pooneh Nazari

2025

["Non-Parametric Stellar Brightness Profiles from Microlensing Fold Caustics Using Machine Learning and Numerical Inversion Techniques"-In preparation](#)

We develop and compare three inversion techniques-Product Integral Method, Finite Element Method, and Ridge Regression Supervised Learning Model-to recover stellar limb-darkening profiles from microlensing fold caustic crossings. Manuscript in preparation; planned submission in late 2025.

Authors: Vasileios Kalaitzidis

2026

"Beyond FLRW: A Joint Inference of Cosmology and Tripp Parameters Using Type Ia Supernovae"-In preparation

We develop a hierarchical Bayesian framework that simultaneously fits cosmological parameters and the SN Ia Tripp standardization coefficients-allowing redshift- and environment-dependence- we test FLRW against mildly inhomogeneous alternatives. Manuscript in preparation; planned submission in 2026.

Authors: Indranil Banik, Vasileios Kalaitzidis

CONFERENCES AND SEMINARS

01/06/2025 – 30/06/2025 Garching, Germany

7 th ESO Summer RESEARCH Programme-Guest

Link <https://www.eso.org/sci/meetings/2025/SummerResearch2025.html>

10/05/2024 – 12/05/2024 West Lafayette, USA

Purdue University Undergraduate Research & Poster Symposium-Presenter

Link <https://www.purdue.edu/undergrad-research/conferences/spring/index.php>

08/06/2023 – 15/06/2023 St. Andrews, UK

MOND 40 Conference-Admin

Link <https://continentalhotspot.com/2025/02/01/the-mond-40-conference-talks/>

16/07/2023 – 30/07/2023 Annecy, France

GRASPA summer school at LAPP-Student

Link <https://indico.in2p3.fr/event/29484/>

01/07/2019 – 12/07/2019 Athens, Greece

NCSR Demokritos 54th Summer School-Student

Link <http://summerschool.demokritos.gr/>

LANGUAGE SKILLS

Mother tongue(s): **GREEK**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
FRENCH	A2	A2	A2	A2	A1
ENGLISH	C2	C2	C2	C2	C2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

SKILLS

astronomy | Python (computer programming) | NumPy, SciPy, Astropy, TensorFlow, scikit-learn | Machine Learning (AI, DL, CNN) | MATLAB | FORTRAN | ROOT (Cern) | authoring software | Astroparticle Simulations | use scripting programming | scientific computing | statistics