

Miguel A. S. Pinto

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📅 14/01/1999 (26 years old)

📍 Lisbon, Portugal

EDUCATION

Bologna Ph.D. Programme in Physics and Astrophysics 2/2023 - PRESENT

Faculty of Sciences of the University of Lisbon

Dissertation: **Cosmology, Compact Objects and Gravitational Waves in Modified Gravity**

Average Grade (currently): 20/20

Supervisors: Prof. Dr. Francisco S. N. Lobo, Prof. Dr. Nuno Barros e Sá, and Dr. João Luís Rosa

Bologna Master's Degree in Physics, Nuclear and Particle Physics Specialization 9/2020 - 5/2023

Faculty of Sciences of the University of Lisbon

Dissertation: **Gravitational induced particle production in modified gravity**

Final Grade: 19/20 (Excellent); Thesis Grade: 20/20 (Excellent)

Supervisor: Prof. Dr. Francisco S. N. Lobo

Bologna Bachelor's Degree in Physics 9/2017 - 7/2020

Faculty of Sciences of the University of Lisbon

Final Grade: 16/20 (Very Good)

PROFESSIONAL EXPERIENCE

Invited Teaching Assistant 2/2025 - PRESENT

Faculty of Sciences of the University of Lisbon: Department of Physics

An invited teaching position to conduct classes for undergraduate students. In particular:

> **1st Semester 2025/2026**

Exercise classes on “**Numerical Methods**” for 40 third-year undergraduate students in Biomedical Engineering and Biophysics, and second-year undergraduate students in Engineering Physics.

> **2nd Semester 2024/2025**

Exercise classes on “**Classical Electrodynamics**” for over 30 second-year undergraduate students in Physics, and Engineering Physics. Received **excellent** evaluations.

Ph.D. Research Fellow 3/2023 - PRESENT

Fundação para a Ciência e Tecnologia, I.P. (FCT)

Recipient of an FCT Ph.D. Studentship ([UI/BD/154479/2022](#)). Research focus: Applications of modified gravity theories.

Complementary International Training:

> **Babes-Bolyai University (Romania)**

Visiting Ph.D. Student, Nov 9–17, 2024

Collaboration with Prof. Dr. Tiberiu Harko's cosmology and astrophysics group, establishing long-term research collaborations in modified gravity.

> **University of Gdansk (Poland)**

Visiting PhD Student, Sept 16–Oct 16, 2024

Worked with co-supervisor Dr. João Luís Rosa on the cosmological and astrophysical implications of Einstein-scalar-Gauss-Bonnet gravity; contributed to ongoing collaborative research.

> **University of the Azores (Portugal)**

Visiting Ph.D. Student, July 14–26, 2024

Advanced theoretical foundations with co-supervisor Prof. Dr. Nuno Barros e Sá, focusing on theories with a non-minimal coupling between geometry and matter, and establishing future collaborations.

Researcher

10/2021 - PRESENT

Institute of Astrophysics and Space Sciences (IA) ([UIDB/04434/2020](#) and [UIDP/04434/2020](#))

A research position to investigate topics within the scope of cosmology.

- › Member of the Cosmology Research Group since October 2021.
- › Member of the “BEYond Lambda” FCT-funded Research Project ([PTDC/FIS-AST/0054/2021](#)) since March 2022.

Teaching Assistant

2/2022 - 2/2023

Faculty of Sciences of the University of Lisbon: Department of Physics

Secured position through a public selection process. Taught classes to over 90 undergraduate students. Courses included:

- › **Mechanics and Waves:** Laboratory classes for over 50 Earth Sciences students. Received **excellent** evaluations.
- › **Elements of Physics:** Laboratory classes for 15 Geology students. Received **very good** evaluations.
- › **Quantum Mechanics:** Exercise classes for over 30 Physics students (*pro bono*). Received **excellent** evaluations.

Private Tutor

8/2021 - 2/2023

Superprof and Explica Online

A tutoring position in which I taught private lectures to over 10 undergraduate students from 4 different Portuguese universities. The topics covered included Optics, Electromagnetism, Quantum Mechanics, Nuclear and Particle Physics, General Relativity, Cosmology, Linear Algebra, and Calculus.

JOURNAL ARTICLES AND PREPRINTS

1. Francisco S. N. Lobo, Tiberiu Harko, **Miguel A. S. Pinto**, *Modified Gravity with Nonminimal Curvature-Matter Couplings: A Framework for Gravitationally Induced Particle Creation*, [Universe 11 \(2025\), 356](#). No citations.
2. Gonzalo J. Olmo, **Miguel A. S. Pinto**, *On energy-momentum conservation in non-minimal geometry-matter coupling theories*, [arXiv:2509.24890](#). No citations.
3. Nuno Barros e Sá, **Miguel A. S. Pinto**, Tomás Trindade, *Clarifying the relation between covariantly conserved currents and Noether's second theorem*, [arXiv:2506.14454](#). No citations.
4. Cláudio Gomes, João Luís Rosa, **Miguel A. S. Pinto**, *Gravitational wave propagation in hybrid metric-Palatini gravity*, [arXiv:2506.12870](#). Cited by 1.
5. **Miguel A. S. Pinto**, Roberto V. Maluf, Gonzalo J. Olmo, *Regular black hole solutions in (2+1)-dimensional $f(\mathbf{R}, T)$ gravity coupled to nonlinear electrodynamics*, [Eur.Phys. J.C 85 \(2025\) no.8, 835](#). Cited by 3.
6. CosmoVerse Collaboration (including **Miguel A. S. Pinto**), *The CosmoVerse White Paper: Addressing observational tensions in cosmology with systematics and fundamental physics*, [Phys.Dark Univ. 49 \(2025\) 101965](#). Cited by 228.
7. **Miguel A. S. Pinto**, João Luís Rosa, *Λ CDM-like evolution in Einstein-scalar-Gauss-Bonnet gravity*, [Eur. Phys. J. C 85 \(2025\) no.9, 1041](#). Cited by 6.
8. Tiberiu Harko, **Miguel A. S. Pinto**, Shahab Shahidi, *Matter really does matter, or Why $f(\mathbf{R}, \text{Matter})$ type theories are significant for gravitational physics and cosmology*, [Phys.Dark Univ. \(2025\) 101863](#). Cited by 5.
9. Ricardo A. C. Cipriano, Nailya Ganiyeva, Tiberiu Harko, Francisco S.N. Lobo, **Miguel A. S. Pinto**, João Luís Rosa, *Energy-Momentum Squared Gravity: A Brief Overview*, [Universe 10 \(2024\) 9, 339](#). Cited by 9.
10. Ricardo A. C. Cipriano, Tiberiu Harko, Francisco S.N. Lobo, **Miguel A. S. Pinto**, João Luís Rosa, *Gravitationally induced matter creation in $f(\mathbf{R}, T_{\mu\nu}, T^{\mu\nu})$ gravity*, [Phys.Dark Univ. 44 \(2024\) 101463](#). Cited by 20.
11. Amine Bouali, Himanshu Chaudhary, Tiberiu Harko, Francisco S.N. Lobo, Taoufik Ouali, **Miguel A. S. Pinto**, *Observational Constraints and Cosmological Implications of Scalar-Tensor $f(\mathbf{R}, T)$ Gravity*, [MNRAS 526 \(2023\) 3, 4192–4208](#). Cited by 27.
12. **Miguel A. S. Pinto**, Tiberiu Harko, Francisco S. N. Lobo, *Irreversible Geometrothermodynamics of Open Systems in Modified Gravity*, [Entropy 25 \(2023\) 6, 944](#). Cited by 10.
13. **Miguel A. S. Pinto**, Tiberiu Harko, Francisco S. N. Lobo, *Challenging Λ CDM with Scalar-tensor $f(\mathbf{R}, T)$ Gravity and Thermodynamics of Irreversible Matter Creation*, [Acta Phys.Polon.Supp. 16 \(2023\) 6, 28](#). Cited by 2.
14. **Miguel A. S. Pinto**, Tiberiu Harko, Francisco S. N. Lobo, *Gravitationally induced particle production in scalar-tensor $f(\mathbf{R}, T)$ gravity*, [Phys.Rev.D 106 \(2022\) 4, 044043](#). Cited by 30.

CONFERENCE AND SEMINAR PRESENTATIONS

1. Λ CDM-like evolution in Einstein-scalar-Gauss-Bonnet gravity, May 26, 2025, 13th Bolyai-Gauss-Lobachevsky Conference on Non-Euclidean Geometry in Modern Physics and Mathematics, Saïdia, Morocco.
2. Λ CDM-like evolution in Einstein-scalar-Gauss-Bonnet gravity, April 15, 2025, My Favourite Dark Matter Model, University of Azores, Ponta Delgada, Portugal.
3. Λ CDM-like evolution in Einstein-scalar-Gauss-Bonnet gravity, January 23, 2025, Ph.D. Student Seminars, Institute of Astrophysics and Space Sciences, Portugal.
4. Λ CDM-like evolution in Einstein-scalar-Gauss-Bonnet gravity, November 11, 2024, Babes-Bolyai University, Cluj-Napoca, Romania (**Invited**).
5. Cosmology and gravitational physics in $f(\mathbf{R}, \text{Matter})$ type theories, October 15, 2024, Instytut Fizyki Teoretycznej i Astrofizyki, Uniwersytet Gdański, Gdańsk, Poland.
6. Cosmology, matter creation, and regular black holes in non-minimal geometry-matter coupling theories, CosmoVerse Journal Club, May 7, 2024, online.
7. Physical and cosmological implications of non-minimal geometry-matter couplings, 12th Bolyai-Gauss-Lobachevsky Conference on Non-Euclidean Geometry in Modern Physics and Mathematics, May 2, 2024, Domus Collegium Hungaricum of Hungarian Academy of Sciences, Budapest, Hungary (**Invited**).
8. Non-minimal geometry-matter couplings and their implications, 7th Winter Workshop @Valencia, December 13, 2023, Faculty of Physics of the University of Valencia, Valencia, Spain.
9. Gravitationally induced particle production in modified gravity, 17th Iberian Cosmology Meeting, April 4, 2023, Ponte de Lima, Portugal.
10. Particle production processes in scalar-tensor $f(\mathbf{R}, \mathbf{T})$ gravity, 32nd Midwest Relativity Meeting, October 7, 2022, Oakland University, Rochester, United States of America (on-site)/online.
11. Challenging Λ CDM with scalar-tensor $f(\mathbf{R}, \mathbf{T})$ gravity and thermodynamics of irreversible matter creation, The 8th Conference of the Polish Society on Relativity, September 23, 2022, Mathematical Institute of the Polish Academy of Sciences, Warsaw, Poland.
12. Particle production processes in $f(\mathbf{R}, \mathbf{T})$ gravity, XXXII Encontro Nacional de Astronomia e Astrofísica, September 5, 2022, Faculty of Sciences of the University of Lisbon, Lisbon, Portugal.
13. Open thermodynamic systems and particle production processes in scalar-tensor $f(\mathbf{R}, \mathbf{T})$ gravity, 23rd International Conference on General Relativity and Gravitation, July 6, 2022, Institute of Theoretical Physics, Chinese Academy of Sciences, Lijiang, China (on-site)/online.

GRANTS AND AWARDS

- Fulbright Grant for Research with the support of FCT** **06/2025**
Fulbright Portugal
Fulbright Grant for Research with the support of FCT, awarded by the Fulbright Portugal Commission for the research project “Spontaneous scalarization of a relativistic fluid star in Einstein-scalar-Gauss-Bonnet gravity”, which will be developed under the supervision of Prof. Dr. Emanuele Berti at Johns Hopkins University, Baltimore, United States, from March to July 2026.
- Short-Term Scientific Mission Grant** **10/2024**
COST Action CA21136 (CosmoVerse)
Short-Term Scientific Mission Grant (2000€) awarded by the European Cooperation in Science and Technology (COST) Action: CA21136, for the research project “The role of non-minimally coupled scalar fields in $f(\mathbf{R}, \mathbf{T})$ gravity to address cosmic tensions” developed in collaboration with Dr. Tiziano Schiavone at the Galileo Galilei Institute, Florence, Italy.
- Short-Term Scientific Mission Grant** **9/2023**
COST Action CA21136 (CosmoVerse)
Short-Term Scientific Mission Grant (2000€) awarded by the European Cooperation in Science and Technology (COST) Action: CA21136, for the research project “Addressing cosmological tensions with Palatini formulation of modified theories of gravity”, developed in collaboration with Prof. Dr. Gonzalo Olmo at the University of Valencia, Spain.
- Academic Merit Certificate** **2020**
Faculty of Sciences of the University of Lisbon
Certificate awarded for positive academic results in the 2nd year of the Bologna Bachelor’s Degree in Physics: 16.25/20.

HIGHLIGHTED ACTIVITIES

Refereeing

6/2025 - PRESENT

Referee for two major Q1 journals: European Physical Journal C and Monthly Notices of the Royal Astronomical Society.

Cogito Podcast

4/2023 - PRESENT

 [Cogito Podcast](#)  [Cogito](#)  [cogito.podcast](#)

Driven by curiosity and to promulgate a food-for-thought culture to the general audience in Portugal, Emanuel Martins and I created Cogito, a podcast about science and philosophy, as well as any other topic that arouses our attention, such as technology, religion, politics, and personal finances.

IA Summer Program 2025

7/2025

 [Web Page](#)

The "IA Summer Program" is an activity promoted by IA to engage undergraduate students in real-life research programs. In this regard, I was one of the supervisors of a project entitled "Beyond Four Dimensions: Exploring the Fabric of Spacetime", in which the students explored various higher-dimensional models. In particular, I supervised a student who researched the Einstein-Gauss-Bonnet gravity theory in $(4 + d)$ dimensions, and I gave a lecture on the basics of Kaluza-Klein (KK) Theory, such as its historical context, theoretical framework (Cylinder Condition, General Relativity in 5D, KK Parametrization), and Klein Compactification Mechanism (K-K reduction).

CosmoVerse School @Corfu

5/2024

 [Certificate](#)

I participated in this advanced programme, which introduced young researchers to the theoretical foundations of modern cosmology. The curriculum covered a range of topics, including inflation, general relativity, modified gravity, neutrino physics, and dark energy models. Additionally, the programme featured practical classes where we learned to apply numerical methods and use softwares commonly utilized in the field, such as neural networks, CLASS, CAMB, and their modifications.

Same Home Town ("Cientista Regressa à Escola") Programme

4/2024

 [Certificate](#)  [Short Video](#)  [News Article](#)

The "Cientista Regressa à Escola" Programme, promoted by the non-governmental organization Native Scientists, is a programme that challenges scientists to return to their primary school to hold workshops with 4th-grade children. The aim is to broaden their horizons, promote scientific literacy and higher education, and combat stereotypes related to science and scientists. During my activities, the children learned about the planets that constitute our solar system and their relative sizes using different objects. They also learned about the concept of gravitational force according to Newton and how Einstein's General Relativity works by using oranges, marbles, and a flexible sheet.

Science Communication Article for CosmoVerse website

3/2024

 [Article](#)

In the context of CosmoVerse's outreach activities, I wrote a science communication article for the website regarding the history of General Relativity and modified gravity theories entitled "What if Einstein was wrong?". Due to the simple terms I used for explaining certain delicate concepts, such as the vacuum energy and the cosmological constant, the article was considered for "all levels", which means anyone can understand it.

First EuCAPT School: Cosmology

9/2023

 [Certificate](#)

An advanced school organized by The European Consortium for Astroparticle Theory (EuCAPT) that was designed for Master's and Ph.D. Students working in the areas of cosmology and astroparticle physics, and combined a scientific with a soft skills training program. What I primarily took away from this school was a basic understanding of effective field theory techniques in the context of cosmology.

MEMBERSHIP IN WORKING GROUPS AND ASSOCIATIONS

Team Member <i>Research Project with Ref. PID2023-149560NB-C21 funded by MICINU (Spain)</i>	9/2024 - PRESENT
Core Member <i>LISA Consortium</i>	6/2025 - PRESENT
Member of Working Group 3 (Fundamental Physics) <i>COST Action CA21136 (CosmoVerse)</i>	1/2024 - PRESENT
Member <i>Fisicamente Falando</i>	2/2021 - 9/2022
Board Member <i>Núcleo de Física e Engenharia Física da FCUL (NFEF-FCUL)</i>	5/2018 - 10/2021

</> DIGITAL SKILLS

- > **Coding:** Python, C++
- > **Software:** Wolfram Mathematica, xAct Package for Wolfram Mathematica, CLASS
- > **Production Tools:** LaTeX, Microsoft PowerPoint, Microsoft Excel, Microsoft Word

LANGUAGE SKILLS

	Writing	Reading	Listening	Spoken Production	Spoken Interaction
Portuguese	<i>Native</i>	<i>Native</i>	<i>Native</i>	<i>Native</i>	<i>Native</i>
English¹	<i>C2</i>	<i>C2</i>	<i>C2</i>	<i>C2</i>	<i>C2</i>
Spanish	<i>B2</i>	<i>C1</i>	<i>B2</i>	<i>B2</i>	<i>B2</i>
Italian²	<i>B1</i>	<i>B1</i>	<i>B1</i>	<i>B1</i>	<i>B1</i>
Czech³	<i>A1</i>	<i>A1</i>	<i>A1</i>	<i>A1</i>	<i>A1</i>
Polish⁴	<i>A1</i>	<i>A1</i>	<i>A1</i>	<i>A1</i>	<i>A1</i>

¹  [EF Standard English Test](#)

²  [Currently enrolled in the B1.1 M30 online course at the Istituto Italiano di Cultura di Lisbona](#)

³  [Approvement Certificate on Czech Language and Culture A1.2](#)

⁴  [Certificate of Participation in an Intensive Polish Language Course](#)

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