

Research Interests

- AoS: Philosophy and Foundations of Physics; Philosophy of Astronomy and Cosmology; Philosophy and Foundations of Quantum (Field) Theory and Quantum Gravity; Quantum Field Theory in Curved Spacetime; Philosophy of Quantum Experiments.
- AoC: History of Physics; General Philosophy of Science; Epistemology of Science; Philosophy of Scientific Modelling.

Research Experience

- 2023– **Postdoctoral Researcher, Utrecht University (Netherlands).**
Postdoctoral research contract within the ERC Starting Grant COSMO-MASTER on the spacetime-matter dichotomy. PI: Prof. Niels Martens.
- 2022–2023 **Postdoctoral Fellow, Radboud University Nijmegen (Netherlands).**
Host: Prof. Frank Saueressig; Project: Quantum fields and gravity.
Postdoctoral research contract in the High Energy Physics Department and IMAPP.
- 2021–2022 **Postdoctoral Fellow, School of Mathematics & CfAR, Dublin City University (Ireland).**
Host: Prof. Peter Taylor; Project: Quantum field theory in the early universe.
Postdoctoral research contract with Dublin City University.
- 2017–2021 **Postgraduate Researcher, Instituto de Física Corpuscular (IFIC) & CSIC (Spain).**
Supervisor: Prof. José Navarro-Salas; Project: Renormalization in curved spacetime.

Education

- 2017–2021 **PhD in Physics, University of Valencia (Spain).**
Thesis: *Renormalization in curved space-time.*
Supervisor: Prof. José Navarro-Salas. Grade: *Summa Cum Laude.*
- 2018–2019 **Master in Philosophy of Science, UNED (Spain).**
Thesis: *Science and democracy.*
Supervisor: Prof. Jesús Zamora Bonilla. Grade: 9.5/10.
- 2015–2016 **Master in Advanced Physics, University of Valencia (Spain).**
Thesis: *Quantum field theory in the early universe.*
Supervisor: Prof. José Navarro-Salas. Grade: 9/10.
- 2011–2015 **Degree in Physics, University of Valencia (Spain).**

Fellowships, Grants and Awards

- 2024 **Julian Schwinger Foundation Grant.** Funding (\$10,000) to support PhD students attending QFTCSW III.
- 2023 **COST Action CA21136 Short-Term Scientific Mission.** Competitive funding (€1,844) for a research visit.
- Juan de la Cierva Postdoctoral Fellowship.** Competitive funding (€67,400) by the Ministry of Economy of Spain for postdoctoral research at a spanish university. *Declined.*
- CIAPOS Postdoctoral Fellowship.** Competitive funding (€92,470) by the Government of Valencia for postdoctoral research at a international university . *Declined.*
- 2022 **Margarita Salas Postdoctoral Fellowship.** Competitive funding (€80,300) by the Ministry of Science of Spain for postdoctoral research at a international university.
- COST Action CA18108 Short-Term Scientific Mission.** Competitive funding (€2,860) for a research visit.
- 2021 **Government of Ireland Postdoctoral Fellowship.** Highly competitive funding (€96,417) by the Irish Research Council for a research project in any irish university. .
- 2017 **Severo Ochoa PhD Fellowship.** Competitive funding (€92,750) by the Ministry of Economy of Spain for the development of a Phd. thesis in a highly excellent research institute..
- 2016 **University of Valencia Travel Grant.** €317.74.

Publications

Peer-reviewed published papers

- [P1] A. Ferreira, A. Fleuren, and N. Martens, *Deflating the Spacetime–Matter Dichotomy*. Submitted.
- [P2] A. Ferreira, J. Navarro-Salas, and S. Pla, *The Birth of Gravitational Particle Creation: the Enduring Legacy of Leonard Parker’s 1966 Thesis*, arXiv:2511.13518. Accepted with minor corrections.
- [P3] A. Ferreira, S. Monin, and F. Torrenti, *Physical scale adiabatic regularization in cosmological spacetimes*, *Physical Review D* **109**, 045015 (2024).
- [P4] A. Ferreira, J. Navarro-Salas, and S. Pla, *Comment on “Gravitational Pair Production and Black Hole Evaporation”*, *Physical Review Letters* **133** (2024) 229001.
- [P5] A. Ferreira and F. Torrenti, *Ultraviolet regularized power spectrum without infrared distortions in cosmological spacetimes*, *Physics Letters B* **840**, 137868 (2023).
- [P6] A. Ferreira and S. Pla, *Adiabatic regularization and preferred vacuum state for the $\lambda\phi^4$ field theory in cosmological spacetimes*, *Physical Review D* **106**, 065015 (2022).
- [P7] A. Ferreira, S. Nadal, and J. Navarro-Salas, *Renormalization, running couplings, and decoupling for the Yukawa model in a curved spacetime*, *Physical Review D* **104**, 025003 (2021).
- [P8] A. Ferreira and J. Navarro-Salas, *Running gravitational couplings, decoupling, and curved spacetime renormalization*, *Physical Review D* **102**, 045021 (2020).
- [P9] A. Ferreira, J. Navarro-Salas, and S. Pla, *R-summed form of adiabatic expansions in curved spacetime*, *Physical Review D* **101**, 105011 (2020).
- [P10] P. Beltrán-Palau, A. Ferreira, J. Navarro-Salas, and S. Pla, *Breaking of adiabatic invariance in the creation of particles by electromagnetic backgrounds*, *Physical Review D* **100**, 085014 (2019).
- [P11] A. Ferreira and J. Navarro-Salas, *Running couplings from adiabatic regularization*, *Physics Letters B* **792**, 81–85 (2019).
- [P12] A. Ferreira, J. Navarro-Salas, and S. Pla, *Role of gravity in the pair creation induced by electric fields*, *Physical Review D* **98**, 045015 (2018).
- [P13] J. Barbero, A. Ferreira, J. Navarro-Salas, and E. Villaseñor, *Adiabatic expansions for Dirac fields, renormalization, and anomalies*, *Physical Review D* **98**, 025016 (2018).
- [P14] A. Ferreira and J. Navarro-Salas, *Pair creation in electric fields, anomalies, and renormalization of the electric current*, *Physical Review D* **97**, 125012 (2018).
- [P15] A. Del Río, A. Ferreira, J. Navarro-Salas, and F. Torrenti, *Adiabatic regularization with a Yukawa interaction*, *Physical Review D* **95**, 105003 (2017).

Conference Proceedings

- [C1] A. Ferreira and S. Pla, *Instantaneous vacuum and states of low energy for a scalar field in cosmological backgrounds*, Proceedings of the AQFTCS (2022).
- [C2] A. Ferreira, *Renormalization, running couplings and the conformal anomaly in curved spacetime*, Proceedings of the MG16 Meeting on General Relativity (2021).
- [C3] S. Nadal, A. Ferreira, and J. Navarro-Salas, *Renormalization and decoupling for the Yukawa model in curved spacetime*, Proceedings of the MG16 Meeting on General Relativity (2021).
- [C4] A. Ferreira, J. Navarro-Salas, and S. Pla, *Pair creation in electric fields, renormalization, and backreaction*, Proceedings of the MG15 Meeting on General Relativity (2018).
- [C5] A. Ferreira, J. Navarro-Salas, A. Del Río, S. Pla, and F. Torrenti, *Adiabatic regularization with a Yukawa interaction*, Proceedings of the MG15 Meeting on General Relativity (2018).

In progress [Sufficiently Advanced to be Presentable at Colloquia]

- [O1] A. Ferreira and A. Fleuren, *Another critical look at inflationary cosmology*. We provide an account of the advances of the program of inflation and perform a critical analysis of its role within the Λ CDM model.
- [O2] N. C. Martens, S. H. Vergouwen & A. Ferreira (eds) *The Space Between: Crossing the Conceptual Boundary between Spacetime & Matter*, Cambridge University Press Collected volume on the conceptual distinction between spacetime and matter. (Under contract)
- [O3] A. Ferreira and A. Cavallaro, *Are Quantum fields matter?*. In: *The Space Between: Crossing the Conceptual Boundary between Spacetime & Matter* Martens, N.C.M., Vergouwen, S.H. & Ferreira, A. (eds), Cambridge University Press.

Talks and Conferences

Epistemology of Quantum Experiments

- 2025 *Unifying Quantum Theory and Gravity Through Experiments*
Analogies, external validity and the future of experimental modelling, Vienna (Austria). (Invited Talk)
- 2025 *Practice and Philosophy*
Workshop on Quantum Technology and the Philosophy of Quantum Mechanics, Delft (Netherlands). (Invited Commentator)

Epistemology of Inflation

- 2025 *Another Critical Look at Inflationary Cosmology.*
Terceras Jornadas de Epistemología e Historia de la Astronomía, Córdoba (Argentina). (Invited Talk)
COSMOS Network, Online. (Seminar)

Spacetime–Matter Dichotomy in Inflation

- 2025 *Deflating the spacetime-matter dichotomy.*
10th Biennial Meeting of the EPSA, Groningen (Netherlands). (Symposium)
BSPS Annual Conference, Glasgow (UK). (Talk)
22nd European Conference on Foundations of Physics, Gdańsk (Poland). (Talk)
Spacetime-matter dichotomy in scalar field theories.
Philosophy of Dark Energy Workshop, Utrecht (Netherlands). (Invited Talk)
- 2024 *Spacetime-matter dichotomy in scalar field theories.*
University of Bonn (Germany). (Seminar)
2nd History & Philosophy of Cosmology Conference, Milan (Italy). (Talk)

Quantum Field Theory in Curved Spacetime

- 2024 *Quantum fields in cosmological spacetime and the early Universe.*
14th Conference on Classical and Quantum Relativistic Dynamics, Helsinki (Finland). (Invited Talk)
Non-minimal coupled scalar field in cosmological spacetimes.
Iberian Cosmology Meeting (IBERICOS), Salamanca (Spain). (Talk)
- 2023 *Non-minimal coupled scalar field in cosmological spacetimes.*
CosmoVerse Conference, Lisbon (Portugal). (Poster)
Ultraviolet-regularized power spectrum in cosmological spacetime.
Spanish and Portuguese Relativity Meeting, Bilbao (Spain). (Talk)
- 2022 *Instantaneous vacuum state for theories in cosmological spacetimes.*
Avenues in Quantum Field Theory in Curved Spacetime, Italy. (Talk)
Instantaneous vacuum state for theories in cosmological spacetimes.
IAP Conference: When \hbar Meets G , Paris (France). (Poster)
Extended DeWitt–Schwinger renormalization.
Irish Theoretical Physics Conference, Dublin (Ireland). (Talk)
- 2021 *Extended DeWitt–Schwinger subtraction, heavy fields and decoupling.*
Sixteenth Marcel Grossmann Meeting (Online). (Talk)
- 2019 *Adiabatic regularization and running couplings.*
22nd International Conference on General Relativity and Gravitation, Valencia (Spain). (Talk)
- 2018 *Adiabatic regularization for Dirac fields with Yukawa interaction.*
Fifteenth Marcel Grossmann Meeting, Rome (Italy). (Talk)
- 2017 *Scalar and Dirac fields in an electromagnetic field.*
VI Postgraduate Meeting, Valencia (Spain). (Talk)
Adiabatic regularization for Dirac fields with Yukawa interaction.
12th Iberian Cosmology Meeting (IberICOS), Valencia (Spain). (Talk)
- Extra Seminars:** Universidad Complutense de Madrid, Universidad de Valencia, Radboud University Nijmegen, University of Basel, University of Pavia, Univercity College Dublin

Teaching Experience

- 2025–2026 *Philosophy of Space and Time*, Utrecht University. Co-instructor.
Philosophy of Quantum Field Theory, Utrecht University. Guest Lecturer.
Seminar in Philosophy of Science, Utrecht University. Instructor.
- 2024–2025 *Philosophy of Space and Time*, Utrecht University. Co-instructor.
Philosophy of Science I & II, Utrecht University. Teaching Assistant.
Philosophy of Relativity, Summer School, University of São Paulo. Instructor (6 hours).
- 2023–2024 *Philosophy of Space and Time*, Utrecht University. Teaching Assistant.
Quantum Worlds, Utrecht University. Teaching Assistant.
- 2022–2023 *Quantum Gravity*, Radboud University Nijmegen. Teaching Assistant.
- 2018–2021 *Mathematical Methods II*, University of Valencia. Teaching Assistant.
- 2017–2018 *General Physics*, University of Valencia. Teaching Assistant.
- 2013–2014 *General Physics*, University of Bonn. Teaching Assistant.

Supervision

Phd Thesis

- 2025–Present Miguel Miret (Utrecht University), *The matematization of matter*.

Master Thesis

- 2025–2026 Matteo Romano, Utrecht University.
- 2024–2025 Andrea Cavallaro, University of Trieste. Defense with honours (*cum laude*). Collaboration [O3].
- 2023–2024 Alex Fleuren, Utrecht University. Top-3 Hanneke Janssen Memorial Prize. Collaboration [P1] and [O1].
- 2022–2023 Samuel Monín, Universitat Autònoma de Barcelona. One joint publication [P3].
- 2021–2022 Lorenzo Pisani, Dublin City University. Best mark of the class; current IRC PhD Fellow.
- 2020–2021 Daniel Musson, University of Valencia.

Bachelor Thesis

- 2020–2021 Daniel Panadero, University of Valencia. Best thesis of the class.

Research Visits

- 2025 Lichtenberg Group in History and Philosophy of Physics, University of Bonn (Germany), 15–16/04/2025.
- 2023 Institute of Astrophysics, University of Granada (Spain), 22–26/05/2023.
 Dept. of Theoretical Physics, University of Valencia (Spain), 03–06/03/2023.
- 2022 Dept of Theoretical Physics, University of Valencia (Spain), 05–09/06/2022.
 Dept of Physics, University of Pavia (Italy), 06–20/06/2022.
- 2019 Dept of Physics, Universidad Complutense de Madrid (Spain), 13–17/10/2019.
- 2018 Dept of Physics, University of Basel (Switzerland). 01/11/2018–16/12/2018.

Organization of Conferences, Workshops and Meetings

- 2025- UPAC Weekly Colloquium, Utrecht (Netherlands). 01/09/2023–present.
- 2025 Utrecht Philosophy of Astronomy and Cosmology Conference, Utrecht (Netherlands). 03–05/09/2025.
 Spacetime Matters Conference, Utrecht (Netherlands). 01–02/09/2025.
- 2024 III QFTCS Workshop, Lisbon (Portugal). 18–21/06/2024.
 HPP-NL Workshop, Utrecht (Netherlands). 08/04/2024.
 UPAC Inflation Workshop, Utrecht (Netherlands). 24/05/2024.
- 2023 II QFTCS Workshop, Granada (Spain). 24–26/05/2023.
- 2022 I QFTCS Workshop, Online. 23–27/05/2022.
- 2017 VI Postgraduate Meeting, Valencia (Spain). 29/11–01/12/2017.

Extra Activities

Outreach, Public engagement and Diversity

- 2025 Retype and publication of Leonard Parker's thesis *The Creation of Particles in an Expanding Universe*, made it freely available as an open-access (arXiv) document. The reissued thesis is accompanied by a Foreword that places the work in its proper historical context. arXiv:2507.05372
- 2024 *Xornadas Filosofía+Ciencia (FICOU)*, Ourense (Spain), 15/12/2023. <https://fcou.uvigo.es/evento/267690/>
Outreach article: <https://cosmoversetensions.eu/learn-cosmology/antonio-ferreiro>
- 2021 Interview on LGBT in science: <https://qg-mm.unizar.es/interview-with-ca18108-action-participant-antonio-ferreiro-on-his-research-on-quantum-effects-in-curved-spacetimes-and-the-additional-challenges-faced-by-the-lgbt-community-in-fundamental-theoretical>
- 2019 Outreach talks for High-school students: From the Big Bang to the Higgs Boson, Ourense (Spain)
Progress in Science, talk dedicated to woman in physics, Valencia (Spain)
Founder and member of *Espectre Visible*, the first LGBT association in STEM at the U. of Valencia.
Escola d'Estiu Erasmus de Física (15-19/07/2019), *El vacío y el origen de estructuras en el Universo*.

Services

- Member of the COSMOS network.
- Member of the Scientific Committee. *Philosophical and Technological Reflections on Contemporary Cosmology*, Online Workshop (28-30/01/2026).
- Referee for *Physical Review D*, *Physics Letters A*, *Foundations of Physics*.
- Member of the Management Committee of COST Actions CA21136 (CosmoVerse) and CA23115 (Relativistic Quantum Information).
- Member of the Quality Commission of Doctoral Degrees, AQU Catalunya.

Others

- Languages: Spanish (native), English (advanced), German (advanced), Galician (advanced).
- Coding skills: C, C++, Matlab, Scientific Python, Mathematica, Visual Basic, CAMB, LatticeEasy.

References

- Prof. Jose Navarro Salas, University of Valencia (jnavarro@ific.uv.es)
- Dr. Frank Saueressig, Radboud University (f.saueressig@science.ru.nl)
- Dr. Niels Martens, Utrecht University (n.c.m.martens@uu.nl)