

Research experience

- September 2023 –: Postdoc at DAMTP (University of Cambridge)

Supervisor: Enrico Pajer, DAMTP (University of Cambridge)

- *Field:* QFT and theoretical cosmology
- *Topic:* [Open Effective Field Theories](#), [Quantum information theory](#)
- *Skills:* EFTs and cosmological bootstrap; Mathematica

- September 2020 – August 2023: Ph.D. Student at IAS (Université Paris Saclay)

Supervisors: Julien Grain, IAS (Université Paris Saclay) and Vincent Vennin, APC (Université de Paris)

- *Field:* Primordial cosmology
- *Topic:* [Cosmological Open Quantum Systems](#), [Quantum aspects of the early universe](#)
- *Skills:* QFT on curved spacetime and non-equilibrium QFT; Mathematica

Thesis: “[Open Effective Field Theories for primordial cosmology](#): dissipation, decoherence and late-time resummation of cosmological inhomogeneities” | *Jury:* K. Noui, Y. Urakawa, N. Bartolo, C.P. Burgess, C. de Rham, M. Walschaers

- February – July 2019: Short-Term Scholar at KIPAC (SLAC) and SITP (Stanford University)

Supervisor: Leonardo Senatore, KIPAC (SLAC) and SITP (Stanford University)

- *Field:* Theoretical and observational cosmology
- *Topic:* [Effective Field Theory of Large Scale Structures](#)
- *Skills:* cosmological parameters inference from LSS (SDSS/BOSS), multiprocessing for Python

- June 2018: Intern at the LPNHE – CNRS/IN2P3

Supervisor: Jean-Philippe Lenain, LPNHE (Sorbonne Université)

- *Field:* Astroparticle physics
- *Topic:* Gamma-Ray Blazar Spectra using H.E.S.S. II and Fermi
- *Skills:* work with data (H.E.S.S. II/Fermi), C++ programming and CCIN2P3 computing center

- November – December 2016: Employee at the Sociology Department of University of Tasmania

Supervisor: Adrian Franklin, University of South Australia

- *Field:* Science and Technology Studies
- *Topic:* [Australian nationalism and the perception of feral species](#)
- *Skills:* Controversy Mapping and Digital Humanities

List of publications – My complete list of publications in physics can be found in [my INSPIRE profile](#).

- Physics:

- S. A. Salcedo, **T. Colas**, E. Pajer, “ An Open Effective Field Theory for light in a medium” – [arxiv:2412.12299](#)
- C. P. Burgess, **T. Colas**, R. Holman, G. Kaplanek, “Does decoherence violate decoupling?” – [arxiv:2411.09000](#)

- **T. Colas**, J. Grain, G. Kaplanek, V. Vennin, "In-in formalism for the entropy of quantum fields in curved spacetimes" – [JCAP 08 \(2024\) 047](#)
- **T. Colas**, "Open Effective Field Theories for cosmology" – *Proceedings Moriond Cosmology 2024* – [arxiv:2405.09639](#)
- S. A. Salcedo, **T. Colas**, E. Pajer, "The Open Effective Field Theory of Inflation" – [JHEP 10 \(2024\) 248](#)
- C. P. Burgess, **T. Colas**, R. Holman, G. Kaplanek, V. Vennin, "Cosmic Purity Lost: Perturbative and Resummed Late-Time Inflationary Decoherence" – [JCAP 08 \(2024\) 042](#)
- **T. Colas**, C. de Rham, G. Kaplanek, "Decoherence out of fire: Purity loss in expanding and contracting universes" – [JCAP 05 \(2024\) 025](#)
- **T. Colas**, J. Grain, V. Vennin, "Quantum recoherence in the early universe" – [EPL 142 \(2023\) 6, 69002](#)
- **T. Colas**, J. Grain, V. Vennin, "Benchmarking the cosmological master equations" – [Eur.Phys.J.C 82 \(2022\) 12, 1085](#)
- **T. Colas**, J. Grain, V. Vennin, "Four-mode squeezed states: two-field quantum systems and the symplectic group $Sp(4, \mathbb{R})$ " – [Eur.Phys.J.C 82 \(2022\) 1, 6](#)
- **T. Colas**, G. D'Amico, L. Senatore, P. Zhang, F. Beutler, "Efficient Cosmological Analysis of the SDSS/BOSS data from the Effective Field Theory of Large-Scale Structure" – [JCAP 06 \(2020\) 001](#)

- Science and technology studies:

- A. Franklin, **T. Colas**, Chapter "Feral Tourism" in [New Moral Natures in Tourism](#), Grimwood et al., Routledge Research, 2018

Academic references

- Vincent Vennin (LPENS): vincent.vennin@phys.ens.fr
- Enrico Pajer (DAMTP): enrico.pajer@gmail.com
- Clifford P. Burgess (Perimeter Institute): cburgess@perimeterinstitute.ca
- Claudia de Rham (Imperial College): c.de-rham@imperial.ac.uk

Education

- September 2017 – July 2020: Graduate Program in Theoretical Physics at the International Center for Fundamental Physics, Ecole Normale Supérieure, Paris, France
 - Master of Fundamental Physics obtained with *High Distinctions*
- September 2016 – July 2017: University of Tasmania, Hobart, Australia
 - One-Year Exchange passed with *High Distinctions*
- September 2014 – July 2017: Dual degree in Sciences and Social Sciences at Sciences Po Paris and Université Pierre et Marie Curie (Sorbonne University), Paris, France
 - Bachelor of Physics obtained with *High Distinctions*
 - Bachelor of Social Sciences obtained with *High Distinctions*

Teaching & Supervision

- September 2020 – July 2022: undergraduate **lectures** and **tutorials** in physics and mathematics, 72h/year
 - Complex analysis, Linear Algebra, Vectorial Analysis
 - Thermodynamics

- 2024: **supervision of Part III essays** (library-based projects) at DAMTP, University of Cambridge – 5 students
- 2023 – 2024: **Ph.D. co-supervision** in the context of 5 research projects involving 1st to 4th year Ph.D. students
- Spring 2021: third year **undergraduate supervision** for interns in physics and mathematics, 8 weeks

Academic commitment

- 2021 – 2023 : **PhD representative** at the Physics Graduate School Council, Université Paris Saclay, France

Local Organising Committee

- 2024 – : Cosmology Lunch **Seminar** series – Weekly event gathering more than 50 people from 3 institutions – DAMTP, University of Cambridge, United Kingdom
- January 2024: International Emerging Action **Workshop**: “Open Quantum Systems for Cosmology” – 30-people 3-day workshop with visitors from France and UK – DAMTP, University of Cambridge, United Kingdom
- July 2023: Soirée Jeunes des 150 ans de la Société Française de Physique – **outreach** event featuring 4 content creators and more than a hundred participants – Sorbonne Université, Paris, France
- May 2023: Seed **Meeting**: “Cosmological Open Quantum Systems” – 15-people 2-day workshop with visitors from France and UK – French Embassy, London, United Kingdom

Conferences and workshops

- December 2024: *Cosmological Correlators in Taiwan*, Taipei, Taiwan
- October 2024: COSMO'24, Kyoto, Japan
- October 2024: DAMTP-LMU Meeting, Cambridge, United Kingdom
- April 2024: *Moriond Cosmology 2024*, La Thuile, Italy
- November 2023: *UK Cosmo*, London, United Kingdom
- September 2023: *Correlators in Cortona*, Cortona, Italy
- May 2023: *Seed Meeting*, London, United Kingdom
- January 2023: *GdR CoPhy*, Paris, France
- October 2022: *Théorie, Univers et Gravitation* workshop, Montpellier, France
- July 2022: *Cargese Summer School Rethinking Beyond Standard Model*, Cargese, France
- June 2022: *Analogue models of gravity and fluctuation-induced phenomena*, Edinburgh, United-Kingdom
- June 2022: *GdR Ondes gravitationnelles*, Université Paris-Saclay, France
- May 2022: QUERCY2022 workshop, Le Bastit, France
- May 2022: *Spontaneous Workshop XIV, Hot Topics in Modern Cosmology*, Cargese, France
- May 2022: *Quantum Field Theory in Curved Space* workshop, online
- November 2021: *Physics Graduate School* workshop, Université Paris-Saclay, France

- November 2021: Paris-Portsmouth workshop, Paris, France
- February 2021: Elbereth Conference, Paris, France

Invited talks

- October 2024: RIKEN, Tokyo, Japan
- October 2024: IPMU, Tokyo, Japan
- September 2024: QASTM series, Bangalore, India
- September 2024: Leiden Institute of Physics, Leiden, Netherlands
- August 2024: IITK, Kanpur, India
- June 2024: LPENS, Paris, France
- February 2024: Nottingham University, Nottingham, United-Kingdom
- February 2024: Queen Mary, London, United-Kingdom
- January 2024: King's College London, London, United-Kingdom
- January 2024: University College London, London, United-Kingdom
- April 2023: ICAP, Paris, France
- March 2023: DAMTP, Cambridge, United-Kingdom
- February 2023: Centre de Physique Théorique, Marseille, France
- November 2022: Imperial College, London, United-Kingdom
- November 2022: Collège de France, Paris, France
- November 2022: Syracuse University, USA (online)
- April 2022: IPhT, CEA, Université Paris-Saclay, France
- November 2021: Higgs Center for Theoretical Physics, Edinburgh, United-Kingdom
- November 2020: LPSC, Grenoble, France (online)

Languages

- **English:** Professional skills (Live in the UK, IELTS: 7,5 - C1; one year in Australia; six months in the USA)
- **French:** Mother tongue
- **Spanish:** Conversational skills