

Corentin Cadiou

Assistant professor
Chargé de recherche

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Science interests

galaxy formation
cosmic web
numerical simulations
cosmology

Languages

French (native)

English (C2)

German (B2)

Spanish & Swedish (A1)

Numerical skills

HPC

RAMSES MPI

OpenMP CUDA

Programming

Fortran C++ Linux

Research experience

2025–now **Chargé de recherche (Assistant Professor)**

IAP, France 

2022–25 **Post-doctoral research**

Lund, Sweden 

Working on the group of Prof. Agertz on the role of angular momentum in the formation of galactic disks. Start: 01/10/2022, end: 31/01/2025

2019–22 **Post-doctoral research**

UCL, London, UK 

With Profs. Pontzen and Peiris, on ERC grant.

2016–19 **Post-graduate research**

IAP, Paris, France 

Supervisors: C. Pichon and Y. Dubois.

Education

2019 **PhD in Astrophysics**

Sorbonne & IAP, Paris  

“The impact of the large-scale structures of the Universe on dark matter halo and galaxy formation”. Refereed by S. White and A. Dekel.

2016 **Master's degree (Master 2) in Astronomy and Astrophysics**

Univ. Paris Diderot, Paris Observatory, Paris, France  

2015 Diploma of the École Normale Supérieure (ENS)

ENS, Paris 

Major in physics, minor in Computer Sciences


2013 Bachelor's degree, Physics

Univ. Paris Diderot & ENS, Paris  

Time allocations

Over my career, I have been **PI or co-I of projects securing 90 MCPU hr** (700,000€, assuming a price of 0.01€/CPU hr). My developments also enabled additional projects for a total of more than 100 MCPU hr.

2024 **(co-I) Harkonnens simulations**


20 MCPU hr allocation (Spanish national call). Suite of high-resolution simulations to support ESA's ARRAKIS mission to investigate the nature of dark matter. 

2024 **(PI) The role of mergers in shaping Milky-Way galaxies**



6 MCPU hr allocation (Swedish national call). Suite of high-resolution simulations focused on the role played by mergers in the formation of our galaxy.

2024 **(PI) How the cosmological environment drives galaxy properties**

3.6 MCPU hr allocation (local call). Suite of simulations to unravel the role played by the cosmological environment in setting the properties of galaxies. 

2023–25 **(co-I) MEGATRON project**



Large 50 MCPU hr allocation (UK national call), 15th DiRAC call (PI: H. Katz). Extreme-resolution cosmological simulation focused on circum-galactic physics.

2021–22 **(PI) Angular momentum project**



9.7 MCPU hr allocation (UK national call), 13th DiRAC call. Demonstration of the feasibility of controlling the angular momentum of galaxies in a cosmological volume.

2021–24 **EDGE Project** (‘code builder’ status)



Automatically co-author of all publications that use my contributed code. 40 MCPU hr obtained (UK national call, PI: J. Read). Suite state-of-the-art simulations of dwarf galaxies.

2020–21 **Obelisk simulation**



Radiation-hydrodynamical cosmological simulation following the assembly of a proto-cluster. 50 MCPU hr obtained (Europe wide call, PI: M. Trebitsch).

2018–20 **CINES computational time allocation**



Co-I of a 2 MCPU hr subproject, 25 MCPU hr obtained (France national call, PI: M. Volonteri). Investigation on the role of cosmological accretion on angular momentum accretion.

Awards and recognitions

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| 2023-24 | eSSENCE grant (100 000 €) Research grant for the project: “Galaxy formation in the exascale era”. | Lund University, Sweden |
| 2023-24 | Fysiografen grant (12 000 €) Research grant for the project: “The role of environment in driving galaxy spin”. | Lund University, Sweden |
| 2018 | NumFOCUS New Contributor Award In recognition of my contributions to the Yt project, the most widely-used Python package for analysing simulations. | |
| 2016–19 | ILP fellowship (5000 € per annum) | |
| 2012–19 | ENS scholarship & ENS doctoral fellowship , prestigious full stipends awarded nationwide to 20 fellows. | |

Responsibilities

— International collaborations & code development for open-science

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| 2023–now | ARRAKIHS mission European Space Agency (ESA) space mission to shed light on the nature of dark matter, to be launched in 2030. Co-I of the Simulation Work Package to interpret the data. | |
| 2023–now | ‘Agora’ collaboration Code comparison project aimed at finding which galaxy properties are robust predictions from the different models. | |
| 2022–now | ‘Ginea’ collaboration Collaboration to develop the next-generation cosmological simulation code (DYABLO, to supersede RAMSES). Personal contributions include key insight into input/output formats and coupling with post-processing tools. | France |
| 2019–24 | Member of ERC GMGalaxies (2019–2022, PI: Pontzen). | |
| 2016–24 | Member of ANR Spine (2016–2017, PI: Pichon) and SEGAL (2019–2024, PI: Pichon). | |
| 2017–now | Yt team member , in charge of support of the RAMSES code. Yt is now the most widely used library to analyse astrophysical simulations. Personal contributions include support for the RAMSES code, significant I/O performance improvements ($\times 100$ faster for RAMSES), community support. | |

— Community service

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| 2022–now | Member of the EAS Advisory Committee on Sustainability The European Astronomical Society (EAS) Sustainability Advisory Committee aims to investigate, communicate, and make recommendations to the Council on sustainability matters related to astronomy and astrophysics. | |
| 2020–now | Reviewer for Astronomy and Astrophysics, Monthly Notices of the Royal Astronomical Society, Scipy’s conference proceedings | |
| 2016–21 | Organizer of IAP pre-seminar and the ‘Extragalactic Journal Club’ | IAP, Paris, France & UCL, London, UK |

— Teaching and supervision

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| 2020–24 | Master’s student supervisions Supervision of 8 Master’s students. The work of the students in bold led to a submitted paper: T. Chérel (Lund, Master 2, 25–26); E. Larsson (Lund, Master 2, 24–25); Z. Khurij (Lund, Master 2, 24–25); A. Storck (Lund, Master 2, 23–24); A.-M. Söderman (Lund, Master, 23–24); Z. Kocjan (UCL, MSc, 21–23); J. Warbrick (UCL, MSci, 20–21); E. Pharabod (Polytechnique, France, Master 2, 20–21). | |
| 2016–19 | Teaching Assistant Courses included: concept and methods of Physics at B.Sc. level (192 hours). Graded all written work, oral and final written exams and assisted with labs. | Sorbonne Université, Paris, France |

Outreach activities

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| 2019–now | Outreach presentations in high-schools, museums, for the general public, for open house days. | |
| 2020–22 | Host and co-founder of the “Astronomy on Tap” London satellite Fortnightly general public online presentations (online due to the pandemic, more than 4,600 views). Awarded £1,000 by UCL Astronomy department to carry our activities. | |
| 2020 | Scientific expertise to translate the general public book ‘A History of the Universe in 100 stars’. | |

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| 2019 | Speaker at the “Pint of Science” festival | Paris, France |
| 2017–19 | <i>Journée de la Science (Open House days)</i> | Sorbonne Université, France |
| | Presented activities of the IAP, set up and performed hand-based experiments. | |

Visiting programs, schools and conferences

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So far, I have given **10 invited talks at conferences and seminars**, listed below. Poster presentations are highlighted as “newspaper”.

— Invited talks

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| 03/2023 | ★ Connecting Galaxies to Cosmology visiting Program | KITP, Santa Barbara, USA |
| 10/2022 | ★ 10 th Workshop on Cosmology and Structure Formation | KIAS, Seoul, South Korea |
| 03/2022 | ★ Cosmic Cartography | <i>online</i> , Kavli IPMU, Kashiwa, Japan |
| 01/2021 | ★ LCDM: Dark Matter In Cosmology | <i>online</i> , Monthly meeting of London-based cosmologists |
| 11/2019 | ★ Yonsei-IAP Workshop | <i>online</i> |
| 03/2019 | ★ Y _T workshop | University of Illinois, Urbana, USA |

— Invited seminars

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| 04/2023 | ★ Kavli Institute for Theoretical Physics blackboard talk | KITP, Santa Barbara, USA |
| | Prestigious talks intended to explain the science of one program to the other KITP program participants, locals, and scientists outside of a specialized field. | |
| 02/2022 | ★ Berkeley Cosmology Seminar | <i>online</i> , Berkeley, USA |
| 11/2021 | ★ Oxford Cosmology Seminar | Oxford, UK |

— Contributed talks

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| 03/2024 | Building Galaxies from Scratch | University of Vienna, Austria |
| 01/2024 | newspaper D-LOCKS Meeting | Technical University of Denmark, Copenhagen, Denmark |
| 12/2023 | New Simulations for New Problems in Galaxy Formation | Institut d’Astrophysique de Paris, France |
| 08/2023 | Santa Cruz Galaxy Workshop | University of California Santa Cruz, USA |
| 07/2022 | newspaper National Astronomy Meeting (NAM) | Warwick, UK |
| 06/2022 | newspaper EAS Meeting | Valencia, Spain |
| 06/2022 | Journées du PNCG (cosmology & galaxies) | Observatoire Astronomique de Strasbourg, France |
| 09/2021 | RAMSES User Meeting | <i>online</i> , Strasbourg Observatory, France |
| 07/2021 | Scipy 21: data analysis and code development in Python (900 participants) | <i>online</i> |
| 12/2020 | RHyTHM: ResearchH using Y _T Highlights Meeting. | <i>online</i> |
| 11/2020 | KIAS Cosmology Workshop. | <i>online</i> |
| 10/2019 | KIAS Internal Workshop | KIAS, Seoul, South Korea |
| 09/2018 | West Coast Swings workshop | ICRAR, Perth, Australia |
| 05/2018 | SPIN(E) ANR Meeting | ROE, Edinburgh, UK |
| 09/2017 | SPIN(E) ANR Meeting | Agay, France |
| 09/2017 | RAMSES User Meeting | Nice Observatory, Nice, France |
| 09/2016 | RAMSES User Meeting | CRAL, Lyon, France |

— Contributed seminars and journal clubs

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| 12/2021 | ‘FLAT’ talk | Durham, UK |
| 11/2021 | Cosmology Journal Club | IAP, Paris, France |
| 11/2021 | Astrophysics Journal Club | Racah Institute of Physics, Jerusalem, Israel |
| 10/2021 | Galaxy Coffee | MPIA, Heidelberg, Germany |
| 09/2021 | Cambridge Cosmology Seminar | <i>online</i> , Institute of Astronomy, Cambridge, UK |
| 12/2018 | Journal club & visiting program | Astrophysics Department, Oxford, UK |

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| 04/2018 | CRAL journal club | CRAL, Lyon, France |
| 10/2017 | KIAS journal club | KIAS, Seoul, South Korea |
| 04/2017 | CITA Journal Club | CITA, Toronto, Canada |

Publication list

I have submitted **13** articles as lead or co-lead author (**11** already published in MNRAS and A&A). I also contributed to **14** other articles. My papers have been cited **658** times (*h*-index of 14 as of 28th January 2025), [source: NASA/ADS](#).

— Submitted articles

1. “**The Impact of Star Formation and Feedback Recipes on the Stellar Mass and Interstellar Medium of High-Redshift Galaxies**”, Katz, Rey, **Cadiou**, Kimm & Agertz, *submitted to Monthly Notices of the Royal Astronomical Society*, (2024).
2. “**The causal effect of cosmic filaments on dark matter halos**”, Storck, **Cadiou**, Agertz & Galárraga-Espinosa, *submitted to Monthly Notices of the Royal Astronomical Society*, (2024).
3. “**How complex are galaxies? A non-parametric estimation of the intrinsic dimensionality of wide-band photometric data**”, **Cadiou**, Laigle & Agertz, *submitted to Monthly Notices of the Royal Astronomical Society*, (2024).

— Published articles

1. “**RAMSES-yOMP: Performance Optimizations for the Astrophysical Hydrodynamic Simulation Code RAMSES**”, Han, Dubois, Lee, Kim, **Cadiou** & Yi, in *The Astrophysical Journal*, 978, 1, 96-106, (2025).
2. “**EDGE-INFERNO: Simulating Every Observable Star in Faint Dwarf Galaxies and Their Consequences for Resolved-star Photometric Surveys**”, Andersson, Rey, Pontzen, **Cadiou**, Agertz, Read & Martin, in *The Astrophysical Journal*, 978, 2, 129-139, (2025).
3. “**Running with the bulls: The frequency of star-disc encounters in the Taurus star-forming region**”, Winter, Benisty, Shuai, Dûchene, Cuello, Anania, **Cadiou** & Joncour, in *Astronomy and Astrophysics*, 691, A43, (2024).
4. “**The AGORA High-resolution Galaxy Simulations Comparison Project. IV. Halo and Galaxy Mass Assembly in a Cosmological Zoom-in Simulation at $z \leq 2$** ”, Roca-Fàbrega, Kim, Primack, Jung, Genina, Hausammann, Kim, Lupi, Nagamine, Powell, Revaz, Shimizu, Strawn, Velázquez, Abel, Ceverino, Dong, Quinn, Shin, Segovia-Otero, Agertz, Barrow, **Cadiou**, Dekel, Hummels, Oh, Teyssier & AGORA Collaboration, in *The Astrophysical Journal*, 968, 2, 125-154, (2024).
5. “**Probing cosmology via the clustering of critical points**”, Shim, Pichon, Pogosyan, Appleby, **Cadiou**, Kim, Kraljic & Park, in *Monthly Notices of the Royal Astronomical Society*, 528, 2, 1604-1615, (2024).
6. “**Hot gas accretion fuels star formation faster than cold accretion in high-redshift galaxies**”, Kocjan, **Cadiou**, Agertz & Pontzen, in *Monthly Notices of the Royal Astronomical Society*, 534, 1, 918-930, (2024).
7. “**Estimating major merger rates and spin parameters ab initio via the clustering of critical events**”, **Cadiou**, Pichon-Pharabod, Pichon & Pogosyan, in *Monthly Notices of the Royal Astronomical Society*, 531, 1, 1385-1398, (2024).
8. “**Evolution of cosmic filaments in the MTNG simulation**”, Galárraga-Espinosa, **Cadiou**, Gouin, White, Springel, Pakmor, Hadzhiyska, Bose, Ferlito, Hernquist, Kannan, Barrera, Maria Delgado & Hernández-Aguayo, in *Astronomy and Astrophysics*, 684, A63, (2024).
9. “**Hot gas accretion fuels star formation faster than cold accretion in high redshift galaxies**”, Kocjan, **Cadiou**, Agertz & Pontzen, in *American Astronomical Society Meeting Abstracts*, 243, 306.02, (2024).
10. “**Stellar angular momentum can be controlled from cosmological initial conditions**”, **Cadiou**, Pontzen & Peiris, in *Monthly Notices of the Royal Astronomical Society*, 517, 3, 3459-3469, (2022).
11. “**Forecasts for WEAVE-QSO: 3D clustering and connectivity of critical points with Lyman- α tomography**”, Kraljic, Laigle, Pichon, Peirani, Codis, Shim, **Cadiou**, Pogosyan, Arnouts, Pieri, Iršič, Morrison, Oñorbe, Pérez-Ràfols & Dalton, in *Monthly Notices of the Royal Astronomical Society*, 514, 1, 1359-1386, (2022).
12. “**Gravitational torques dominate the dynamics of accreted gas at $z > 2$** ”, **Cadiou**, Dubois & Pichon, in *Monthly Notices of the Royal Astronomical Society*, 514, 4, 5429-5443, (2022).
13. “**The causal effect of environment on halo mass and concentration**”, **Cadiou**, Pontzen, Peiris & Lucie-Smith, in *Monthly Notices of the Royal Astronomical Society*, 508, 1, 1189-1195, (2021).
14. “**Angular momentum evolution can be predicted from cosmological initial conditions**”, **Cadiou**, Pontzen & Peiris, in *Monthly Notices of the Royal Astronomical Society*, 502, 4, 5480-5487, (2021).
15. “**The clustering of critical points in the evolving cosmic web**”, Shim, Codis, Pichon, Pogosyan & **Cadiou**, in *Monthly Notices of the Royal Astronomical Society*, 502, 3, 3885-3911, (2021).
16. “**EDGE: a new approach to suppressing numerical diffusion in adaptive mesh simulations of galaxy formation**”, Pontzen, Rey, **Cadiou**, Agertz, Teyssier, Read & Orkney, in *Monthly Notices of the Royal Astronomical Society*, 501, 2, 1755-1766, (2021).

17. **“Tracing the simulated high-redshift circumgalactic medium with Lyman α emission”**, Mitchell, Blaizot, [Cadiou](#), Dubois, Garel & Rosdahl, in *Monthly Notices of the Royal Astronomical Society*, 501, 4, 5757-5776, (2021).
18. **“The OBELISK simulation: Galaxies contribute more than AGN to H I reionization of protoclusters”**, Trebitsch, Dubois, Volonteri, Pfister, [Cadiou](#), Katz, Rosdahl, Kimm, Pichon, Beckmann, Devriendt & Slyz, in *Astronomy and Astrophysics*, 653, A154, (2021).
19. **“When do cosmic peaks, filaments, or walls merge? A theory of critical events in a multiscale landscape”**, [Cadiou](#), Pichon, Codis, Musso, Pogosyan, Dubois, Cardoso & Prunet, in *Monthly Notices of the Royal Astronomical Society*, 496, 4, 4787-4822, (2020).
20. **“Dense gas formation and destruction in a simulated Perseus-like galaxy cluster with spin-driven black hole feedback”**, Beckmann, Dubois, Guillard, Salome, Olivares, Polles, [Cadiou](#), Combes, Hamer, Lehnert & Pineau des Forets, in *Astronomy and Astrophysics*, 631, A60, (2019).
21. **“Accurate tracer particles of baryon dynamics in the adaptive mesh refinement code RAMSES”**, [Cadiou](#), Dubois & Pichon, in *Astronomy and Astrophysics*, 621, A96, (2019).
22. **“Galaxies flowing in the oriented saddle frame of the cosmic web”**, Kraljic, Pichon, Dubois, Codis, [Cadiou](#), Devriendt, Musso, Welker, Arnouts, Hwang, Laigle, Peirani, Slyz, Treyer & Vibert, in *Monthly Notices of the Royal Astronomical Society*, 483, 3, 3227-3255, (2019).
23. **“Galaxy evolution in the metric of the cosmic web”**, Kraljic, Arnouts, Pichon, Laigle, de la Torre, Vibert, [Cadiou](#), Dubois, Treyer, Schimd, Codis, de Lapparent, Devriendt, Hwang, Le Borgne, Malavasi, Milliard, Musso, Pogosyan, Alpaslan, Bland-Hawthorn & Wright, in *Monthly Notices of the Royal Astronomical Society*, 474, 1, 547-572, (2018).
24. **“How does the cosmic web impact assembly bias?”**, Musso, [Cadiou](#), Pichon, Codis, Kraljic & Dubois, in *Monthly Notices of the Royal Astronomical Society*, 476, 4, 4877-4907, (2018).