

Curriculum Vitæ

Florent Leclercq

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- Personal Information** Born on January 17th, 1988 in Neuilly-sur-Seine (Hauts-de-Seine, France).
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ORCID ID [0000-0002-9339-1404](https://orcid.org/0000-0002-9339-1404) | [ARXIV](#) | [NASA ADS](#) | [Inspire HEP](#) | [RESEARCHGATE](#)
- Academic Employment** 02/2022–. **Research Scientist (Chargé de recherche CNRS)** – Institut d’Astrophysique de Paris (IAP, UMR 7095 CNRS–Sorbonne Université), Paris, France.
10/2021–01/2022. **STFC Ernest Rutherford Fellow** – Imperial Centre for Inference and Cosmology (ICIC), Imperial College, London, UK.
10/2017–09/2021. **Imperial College Research Fellow** – Imperial Centre for Inference and Cosmology, Imperial College, London, UK.
10/2015–09/2017. **Senior Research Associate** – Institute of Cosmology and Gravitation, University of Portsmouth, Portsmouth, UK.
10/2012–09/2015. **PhD Student** – Institut d’Astrophysique de Paris (IAP, UMR 7095 CNRS–Sorbonne Université), Paris, France.
Postgraduate education from [École Doctorale d’Astronomie et d’Astrophysique d’Île-de-France \(ED 127\)](#), Paris, France, and [Université Pierre et Marie Curie](#), Paris, France.
Thesis: *Bayesian large-scale structure inference and cosmic web analysis*.
Advisor: [Benjamin Wandelt](#), professor and international chair of theoretical cosmology at the UPMC/Sorbonne Université
Graduation date: 24 September 2015.
Defence committee: [Bertrand Laforge](#) (*président*), [Benjamin Wandelt](#) (*directeur de thèse*), [Oliver Hahn](#) (*rapporteur*), [Alan Heavens](#) (*rapporteur*), [Ofar Lahav](#) (*examineur*), [Will Percival](#) (*examineur*), [Rien van de Weijgaert](#) (*invité*), [Matías Zaldarriaga](#) (*invité*).
Post-master courses: complementary education in various specialised topics including astrophysics, theoretical cosmology, numerical simulations and high-performance computing.
- Education** 2011–2012. [École polytechnique](#), Palaiseau, France and [ETH](#), Zürich, Switzerland
Postgraduate degree (Master 2): *High Energy Physics* joint master program (Ranked first, GPA: 4.29)
Theoretical and experimental education in high energy physics: theoretical and observational cosmology, particle and astroparticle physics, the standard model of electroweak interactions and its supersymmetric extensions, strong interactions and quantum chromodynamics, general relativity and quantum gravity (string theory), tools and methods of experimental physics.
2008–2011. [École polytechnique](#), Palaiseau, France
“*Ingénieur Polytechnicien*” program: high-level multidisciplinary scientific education, with specialisation in particle physics and astrophysics. A human, military and sportive training forms an integral part of the curriculum.
 - 2010-2011, Third year: “From particles to stars” master program (GPA: 3.93)
 - 2009-2010, Second year (GPA: 3.54)
 - 2008-2009, First year (GPA: 4.03)

2005–2008. [Lycée Henri IV](#), Paris, France

Classes préparatoires aux Grandes Écoles, voie MP: preparatory years for nationwide competitive examination to the elite French *Grandes Écoles* for scientific studies.

2005. [Baccalauréat Scientifique](#). French secondary school diploma in sciences.

Diploma awarded with very high honours.

Research Internship Projects

02/2012–08/2012. [Institut d’Astrophysique de Paris](#), Paris, France

Project: *Approaching Non-Linear Cosmic Structure Formation*, under the supervision of [Benjamin Wandelt](#).

04/2011–07/2011. [Institut d’Astrophysique de Paris](#), Paris, France

Project: *Dark Matter and Stars*, under the supervision of [Fabio Iocco](#).

Grants & Fellowships

2023. [Agence Nationale de la Recherche, Programme JCJC](#). Total value: **304 k€**.

Principal investigator of the ANR project *INFOCW: High-performance information extraction from cosmic web probes* (ANR-23-CE46-0006, [October 2023–March 2028](#)).

2021. [Ernest Rutherford Fellowship \(2021–2026\)](#). Total value: **£ 765k** (80% [UKRI STFC](#), 20% [Imperial College](#)).

Individual senior UK research fellowship awarded among 10 in 2021. Project : *Joint analysis of galaxy clustering and weak lensing via simulation-based inference* (ST/V004239/1).

2019. [UK Research and Innovation – Science and Technology Facilities Council](#).

Primary supervisor for PhD studentship #2275522 (James Prideaux-Ghee), approx. **£ 60k**.

Associate investigator of the STFC *Imperial College Astrophysics Consolidated Grant* (ST/S000372/1, [April 2019–March 2022](#), PI: [Andrew Jaffe](#), £ 1.5M).

2017. [Imperial College Research Fellowship](#). Total value: approx. **£ 210k**, including a research and travel grant of **£ 28k**.

Individual fellowship awarded among 21 in all disciplines in 2017, including 2 in physics. Project: *The information content of the large-scale structure of the Universe*.

2016. [Agence Nationale de la Recherche](#).

Co-investigator of the ANR project *BIG4* (ANR-16-CE23-0002, [January 2017–December 2020](#), PI: [Guilhem Lavaux](#), 316 k€).

2015. [CITA National Fellowship](#) (declined).

2012. [Lagrange PhD Thesis Fellowship \(2012–2015\)](#). Value: approx. **10 k€**.

Title and research grant (travel, equipment) awarded by the Institut Lagrange de Paris.

2012. [AMX PhD Student Fellowship \(2012–2015\)](#). Value: approx. **100 k€**.

Grant specifically aimed at former École polytechnique “*Ingénieur*” alumni. 40 fellowships awarded among all disciplines in 2012.

Awards & Honours

2015. Very honourable mention for my PhD thesis and defence. Unanimous congratulations from the jury for the “exceptionally strong scientific content of this PhD, which pushes forward the state of the art”.

2010. Second prize for the scientific project (*Projet Scientifique Collectif*) of the École polytechnique, out of 80 projects.

Research Supervision Experience

Formally recognised as an [Assistant Supervisor](#) by Imperial College in [October 2018](#). Currently co-supervising 1 PhD student and 1 master student.

03/2024–. Supervisor (70%), Marco Chiarenza, master student in physics (LM-17) at the University of Milan. Co-supervision with Deaglan Bartlett (30%), postdoc in the group.

Project : *Cosmological simulations in an emulated frame of reference* (duration: 7 months).

10/2023–. Supervisor (60%), Tristan Hoellinger, PhD student co-supervised by Guilhem Lavaux (40%) at the Institut d’Astrophysique de Paris (IAP), Paris, France.

PhD project: *Constraints on cosmological physics from cosmic web probes using Euclid data*.

03/2023–07/2023. Supervisor, Tristan Hoellinger, research intern, third-year student at INSA Toulouse; currently a PhD student at the Institut d’Astrophysique de Paris (IAP), Paris, France.

Project: *A new machine learning technique to extract cosmological information from galaxy surveys* (duration: 5 months).

10/2019–11/2023. Primary Supervisor (75%), James Prideaux-Ghee, PhD student co-supervised by Alan Heavens (25%) at Imperial College.

PhD project: *Bayesian large-scale structure inference with cosmological velocities and fast radio bursts*.

Resulting publications: [J. Prideaux-Ghee](#), [F. Leclercq](#), G. Lavaux, A. Heavens, J. Jache, *Field-Based Physical Inference From Peculiar Velocity Tracers*, *MNRAS* **518**, 4191 (2023), [arXiv:2204.00023](#) [astro-ph.CO].

06/2018–06/2019. Supervisor, Mariem Magdy Ali Mohamed, master student in the MSc Physics with Extended Research at Imperial College; went on as a PhD student at the School of Mathematical Sciences, Queen Mary University of London (QMUL), London.

Project: *A predictive numerical implementation of the galaxy perturbative bias expansion* (duration: 1 year).

05/2018–07/2022. Assistant Supervisor (25%), George Kyriacou, PhD student co-supervised by Alan Heavens (35%) & Andrew Jaffe (40%) at Imperial College; went on as a UK civil servant.

PhD project: *A Bayesian application of redshift distributions to weak lensing surveys*.

02/2018–10/2021. Assistant Supervisor (25%), Arrykrishna Mootoovaloo, PhD student co-supervised by Alan Heavens (40%) & Andrew Jaffe (35%) at Imperial College; went on as a postdoctoral researcher at the University of Oxford, UK.

PhD project: *Emulation and compression for weak lensing cosmology*.

Resulting publications: [A. Mootoovaloo](#), A. F. Heavens, A. H. Jaffe, [F. Leclercq](#), *Parameter Inference for Weak Lensing using Gaussian Processes and MOPED*, *MNRAS* **497**, 2213 (2020), [arXiv:2005.06551](#) [astro-ph.CO]; [A. Mootoovaloo](#), A. H. Jaffe, A. F. Heavens, [F. Leclercq](#), *Kernel-Based Emulator for the 3D Matter Power Spectrum from CLASS*, *A&C* **38**, 100508 (2022), [arXiv:2105.02256](#) [astro-ph.CO].

06/2017–05/2018. Mentor (20%), Wolfgang Enzi, master student supervised by Jens Jasche (80%) at the Excellence Cluster Universe, Garching; went on as a PhD student at the Max-Planck Institute for Astrophysics (MPA), Garching, Germany.

Project: *The Approximate Bayesian Computation of power spectrum reconstruction with galaxy surveys* (duration: 1 year).

Resulting publication: [F. Leclercq](#), [W. Enzi](#), J. Jasche, A. Heavens, *Primordial power spectrum and cosmology from black-box galaxy surveys*, *MNRAS* **490**, 4237 (2019), [arXiv:1902.10149](#) [astro-ph.CO]

03/2017–07/2017. Supervisor, Baptiste Faure, research intern, third-year student at the École polytechnique (equivalent to French master level M1); went on as a PhD student at the département d’astrophysique (DAP) of CEA, Saclay, France.

Project: *Cosmological simulations: toward a massively parallel algorithm* (duration: 4 months).

Resulting publication: [F. Leclercq](#), [B. Faure](#), G. Lavaux, B. D. Wandelt, A. H. Jaffe, A. F.

Heavens, W. J. Percival, C. Noûs, *Perfectly parallel cosmological simulations using spatial comoving Lagrangian acceleration*, *A&A* **639**, A91 (2020), arXiv:2003.04925 [astro-ph.CO]

Teaching Experience 09/2021. STFC Summer School on Data Intensive Science 2021, organised by Durham University.

Lecturer: *Bayesian statistics, and some other aspects of probability theory* (3 hours).

09/2021. ICIC Data Analysis Workshop 2021, organised by Imperial College.

Member of the Scientific Organising Committee and demonstrator (15 hours).

05/2019. Astrophysics Group, Imperial College, London, UK.

Bayesian statistics and information theory (GitHub:florent-leclercq/Bayes_InfoTheory): advanced lectures for PhD students (9 hours).

03/2017. Institute of Cosmology and Gravitation, University of Portsmouth, Portsmouth, UK.

Cosmology with Bayesian statistics and information theory: advanced lectures for PhD students (6 hours).

2012–2013. Université Pierre et Marie Curie, Paris, France

Teaching assistant in the department of physics (72 hours):

- Experimental wave optics
- Physics lectures (thermodynamics and wave physics) for biologists

2011–2012. École polytechnique, Palaiseau, France

Teaching assistant in the department of physics (60 hours). In charge of tutoring undergraduate students in Quantum Mechanics.

10/2008–04/2009. Inspection académique des Pyrénées-Orientales, Perpignan, France

Eight-month pedagogy and leadership training, a part of the École polytechnique curriculum. In charge of the development and coordination of the scientific training of primary school teachers. In charge of helping teachers to develop good practice examples for teaching science.

Memberships International collaborations

2022– LSST Dark Energy Science Collaboration (DESC): involved in the modeling & combined probes and Bayesian pipelines topical teams.

2018–. Euclid Consortium (1.4 year FTE as of April 2024):

- Galaxy Clustering science working group (GC SWG): co-lead of the work package “Additional probes” (01/2021–) · lead of the standard project (SP) “galaxy clustering with likelihood-free inference” (GC-LFI) · involved in the work package “Likelihood fitting”,
- Weak Lensing science working group (WL SWG): involved in work package “Forward modelling”,
- Cosmological Theory science working group (TH SWG): involved in work package “Initial conditions”.

2016–. Aquila Consortium for Bayesian large-scale structure inference: founding member, lead responsible for the “cosmic web” and “implicit inference” programmes.

Scientific societies

Société Française d’Astronomie et d’Astrophysique (SF2A)

European Astronomical Society (EAS)

International Astrostatistics Association (IAA)

Royal Astronomical Society (RAS, 2018–2022)

Academic Service Peer reviewing

Referee for *A&A* (2016–), *Galaxies* (2016–), *JCAP* (2017–), *ApJ* (2017–) & *MNRAS* (2019–). Grant reviewer for the German Academic Exchange Service (DAAD, 2019), the DiRAC Resource Allocation Committee (UK national high-performance computing facility) (DiRAC

RAC, 2020, 2023).

Committees

2022. Member of the Scientific Organising Committee for the [XVth Cargèse School of Cosmology](#) (23–29 April 2023, Institut d’Études Scientifiques de Cargèse, Corsica, France)
2022. Member of the Scientific Organising Committee of the [Euclid France meeting 2022](#) (30 October–2 December 2022, Institut d’Astrophysique de Paris, France)
2019. Member of the Organising Committee of the [Euclid UK meeting 2019](#) (16–17 December 2019, Royal Astronomical Society, London, UK).
- 2018–2020. Member of the Scientific Organising Committee (SOC) of the conference [The Cosmic Web in the Local Universe](#) (27–31 January 2020, Lorentz Center, Leiden, the Netherlands).
- 2017–2018. Member of the Scientific Organising Committee (SOC) of [COSMO21: Statistical Challenges in 21st Century Cosmology](#) (23–25 May 2018, Valencia, Spain).

Institutional activities

- 2023–. Elected member of the Conseil de l’Observatoire des Sciences de l’Univers (OSU) IAP.
- 2017–2021. Representative of Imperial College Astrophysics at the [London Institute of Cosmology](#). Organiser of the monthly [London Cosmology Discussion Meeting \(LCDM\)](#).
- 2012–2015. Representative of PhD students at the IAP Laboratory Council (2014–2015). Organiser of the weekly student seminar at the Institut d’Astrophysique de Paris ([YMCA@IAP](#)) (2012–2013) and of the weekly meeting between students and the IAP seminar speaker (2014).

Public Engagement

Press releases and media coverages

2020. Media coverage of [Leclercq et al. 2020](#):
- Author of an article in The Conversation France (“[Vers une simulation de l’Univers sur un téléphone portable](#)”).
 - Main contact for the press release from Imperial College London (“[Misfolded proteins and simulating the Universe: News from the College](#)”).
2017. Media coverage of [Leclercq et al. 2017](#):
- Main contact for the press release from the University of Portsmouth (“[Cosmologists produce new maps of dark matter dynamics](#)”), covered by [phys.org](#) among others.
 - Author of the announcement on the website of INSU (“[De nouvelles cartes des flots de matière noire dans notre voisinage cosmique](#)”, in French).
 - Featured in Discover magazine (“[Charting the unseen sky](#)”), Pan European Networks (“[A light in the dark](#)”), and Science & Vie (“[5 télescopes à l’assaut de la toile cosmique](#)”, “[La Voie lactée se trouverait au milieu du plus grand vide de l’Univers](#)”).
 - Main contact for the science highlight of the Institut d’Astrophysique de Paris (“[The origin of the large-scale structure of the Universe and dark matter flows in our cosmic neighborhood](#)”).
2012. Media coverage of [Iocco et al. 2012](#):
- Involved in a press article featured by PhysOrg.com (“[Stars containing dark matter should look different from other stars](#)”).

Diffusion of scientific knowledge and scientific communication

- 2012–. Regular participant in outreach events and science festivals (Fête de la science, Stargazing Live, etc.).
- 02/04/2024. Invited speaker at the Institut d’Astrophysique de Paris (monthly conference): “[Énergie noire et intelligence artificielle](#)”.
- 04–12/08/2023. Invited speaker at the 33ème Festival d’Astronomie de Fleurance (Gers, France) for a conference (“[Le satellite Euclid et l’analyse de ses données : énergie noire, information et incertitude](#)”) and an advanced lecture (“[La théorie des probabilités](#)”).
- 22/01/2020. Invited speaker at the conference “[Cosmology and Exoplanets: Both Sides of the Nobel Prize](#)” organised by the student’s Physics Societies of ICL, UCL & QMUL.
- 2017–2018. Contributor to [Entropy](#), a collaboration of artists and scientists organising outreach demonstrations telling the cosmic story of creation: in charge of the translation of

the script into French.

Languages French: native

English: fluent (C2)

Spanish, Japanese: basic notions (A1)

Computer Operating systems: Linux (Ubuntu), Windows

Skills

Software: most common office software products, image processing

Programming: C, C++, Python, Java, HTML, PHP, SQL

Parallel and GPU programming: OpenMP, MPI, CUDA, Kokkos

Scientific tools: \LaTeX , Beamer, Matplotlib, GNUPlot, Mathematica, TensorFlow

Cloud computing (Amazon Web Services EC2, S3, Lightsail, Google Colab)

Astrophysical and cosmological simulations

Statistical methods for inference in high dimensional parameter spaces, Markov Chain Monte Carlo techniques for sampling, likelihood-free inference, processing of large data sets, modelling and inference in low signal-to-noise regimes