Guillaume Falmagne

Postdoctoral researcher in complex systems (Princeton University)

Education and research experience

2022 – now **Postdoctoral research associate**, High Meadows Environmental Institute (Princeton University), *Critical transitions in socio-ecological systems*, Supervisor: Simon Levin

Spring 2022 **Postdoctoral researcher**, Subatech (IMT Atlantique, CNRS), Nantes, *Continuing research on partonic energy loss in the quark-gluon plasma*, Supervisor: François Arleo

2018 – Dec 2021 **PhD in particle physics**, Laboratoire Leprince-Ringuet, École Polytechnique (Institut Polytechnique de Paris).

Courses Advanced Quantum Field Theory, CERN-Fermilab Hadron Collider Physics school (2019), International School of QCD (LPT Orsay, 2018). Models for the energy transition, plant seeds, ethics of research.

Research *Observation of the B_c^+ meson in heavy ion collisions with the **CMS** detector; Partonic **energy loss** in the quark-gluon plasma*, supervisors: Raphaël Granier de Cassagnac, François Arleo.

2017–2018 **2nd year of Master in High Energy Physics**, École Polytechnique (Université Paris-Saclay), *summa cum laude*

Research **5-month internship**, same context as PhD (feasibility study)

end 2016 – jun 2017 Volunteering and cultural experience in South America and Eastern Europe.

2015 – end 2016 **12-month research internship**, CERN (Geneva, Switzerland), *Λ_b^0 production **asymmetry** measurements at 7 and 8 TeV with the **LHCb** detector at the LHC*, supervisor: Sascha Stahl.

2013–2015 **Bachelors degree and first year of Master in Fundamental Physics**, École Normale Supérieure de Cachan (Paris-Saclay) and Université Pierre et Marie Curie (Paris 6), *magna cum laude*

Research (2015) **4-month internship**, SLAC National Accelerator Laboratory (Stanford University), *Matching NNLO and parton showers for Z/W-Higgs production in the SHERPA generator. Multi-scale improved NLO jet clustering (MINLO)*, supervisors: Lance Dixon, Stefan Hoeche.

Research (2014) **2-month internship**, Laboratoire Leprince-Ringuet, École Polytechnique, *Resolution unfolding of the CMS detector for measuring bottomonium suppression in the quark-gluon plasma*, supervisor: Raphaël Granier de Cassagnac.

2011–2013 Classes préparatoires in Mathematics and Physics, Lycée Henri Poincaré (Nancy, France)

2011 Baccalauréat in Sciences, *summa cum laude*

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Awards and fellowships

2023 **Best poster (2nd place) of the Collective Intelligence Symposium**, *Santa Fe Institute*

2022 **PhD thesis award of *Institut Polytechnique de Paris***

2022 **PhD thesis award of *Groupement de Recherche QCD***

2022 **Accessit** to the Daniel Guinier **PhD thesis award of *Société Française de Physique***

2022 **CERN Senior Research Fellowship**, *declined for HMEI Research Associate position, Princeton U.*

2013 **Admission at ENS Cachan after national competitive exams**, *'normalien', full 4-year funding*

Main published works

2022 **Observation of the B_c^+ Meson in Pb-Pb and pp Collisions at $\sqrt{s_{\mathrm{NN}}} = 5.02$ TeV and Measurement of its Nuclear Modification Factor**, *CMS collaboration*, Phys. Rev. Lett. 128, 252301

Role (2018-21) ☞ Contact author and main analyser

2022 **Probing the path-length dependence of parton energy loss via scaling properties in heavy ion collisions**, *François Arleo, Guillaume Falmagne*, arXiv:2212.01324 (under review with PRDL)

2019 **Quenching of hadron spectra in XeXe and PbPb collisions at the LHC**, *François Arleo, Guillaume Falmagne*, Proc. of Hard Probes 2018, PoS 075

Role (2018-23) ☞ Extending the model and its comparison to measurements, and set forth three additional scaling laws

2021 **Observation of a $\Lambda_b^0 - \bar{\Lambda}_b^0$ production asymmetry in proton–proton collisions at $\sqrt{s} = 7$ and 8 TeV**, *LHCb collaboration*, JHEP10 (2021) 060

Role (2015-17) ☞ Major analyser

2019–2021 **Author of all papers from the CMS Collaboration submitted in this period (> 200)**

☞ Direct contributions to: Muon reconstruction in heavy ion collisions (CMS internal: MUO-21-001), Fragmentation of jets containing a J/ψ (PLB(2021) 136842)

2015 **Les Houches 2015: Physics at TeV Colliders Standard Model Working Group Report**, *J.R. Andersen et al.*, arXiv:1605.04692

Role (2015) ☞ Contribution to matching NNLO and parton showers in V-Higgs + MINLO procedure in SHERPA

Scientific talks

2024 **International School and Conference on Network Science (NetSciX),** Venice (Italy),
Tipping cascades in the Amazon rainforest due to the moisture recycling network

2023 ERSI Critical Transitions Workshop, flashtalk, PIK, Berlin (Germany),
Trees, networks and games for large-scale cooperation

2023 Seminar at Theoretical Ecology Tea, EEB, Princeton,
Structural aspects of large-scale cooperation

2023 GdR QCD General Assembly, talk for 2022 PhD award, *online*,
Collective phenomena and critical transitions: from plasma to complex socio-ecological systems

2023 **Collective Behaviour Workshop**, Isaac Newton Institute, Cambridge (UK),
Early warning signals and the structure and emergence of collaborations with a large-scale experiment

2023 Seminar at Max Planck Institute for Human Development, Berlin (Germany),
Early warning signals and the structure of collaborations using a large-scale experiment on Reddit

2023 Seminar at PIK (Potsdam Institute for Climate Impact Research, Germany),
Investigating early warning signals with a large-scale collaborative experiment on Reddit

2023 **Collective Intelligence Symposium,** poster, Santa Fe Institute (NM, USA),
Surveying early warning signals of transitions using a large-scale collaborative experiment

2021 **CERN-LHC Seminar**, online (recording available),
First observation of the B_c^+ meson in PbPb and pp collisions at 5.02 TeV at CMS

2021 Rencontres QGP France, Étretat (France),
First observation of B_c^+ meson production in PbPb and pp collisions with CMS

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2021 **9th Edition of Large Hadron Collider Physics Conference (LHCP)**, online (recording available),
Exotic quarkonia production in heavy ion collisions: X(3872) and B_c^+

2021 **19th International Conference on Strangeness in Quark Matter (SQM)**, online,
First measurement of the B_c^+ meson nuclear modification factor in PbPb collisions with CMS
☞ **Published proceedings**: EPJ Web of Conferences 259, 12011 (2022)

2021 **14th International Workshop on Heavy Quarkonium (QWG)**, online,
Quarkonium production studies in nuclear collisions at CMS

2020 Journées CMS-France, online, *B_c production: Towards a first observation in heavy ions collisions*

2019 Journées de Rencontre des Jeunes Chercheurs, Moulin-Mer (France),
Probing the quark-gluon plasma with the B_c meson in CMS
☞ **Published proceedings**: C. Armand et al., JRJC 2019 Book of Proceedings, p.88

2019 **GdR Intensity Frontier Workshop**, Sommières (France),
B_c meson production in pp and PbPb collisions with CMS, and plenary talk *(B_c session summary)*

2019 QGP France, Étretat (France),
Modification of B_u^+, B_s^0 and B_c^+ mesons in PbPb collisions with the CMS detector

2018 **Int. Conf. on Hard & EM Probes of High-Energy Nuclear Collisions**, Aix-les-Bains (France),
B_s^0 and B^+ meson nuclear modification factors in PbPb collisions at 5.02 TeV with CMS detector
☞ **Published proceedings**: G. Falmagne for the CMS Collaboration, Proc. of Hard Probes 2018, PoS 143

Teaching experience

2023 Private research mentor, *CCIR*

2018 – 2021 **Teaching assistant**, *École Polytechnique (Institut Polytechnique de Paris)*
Optics, Waves, and Radiation (Bachelor 2$^{\text{nd}}$ year). Advanced Particle Physics (Master 1$^{\text{st}}$ year).

2020 **Research supervisor**, *École Polytechnique*
Noémie Pilleux: Master 1st year, 2 months. Natalie Blot: Bachelor, 2 months.

2014 – 2016 Private tutoring, *LiveMentor*
Mathematics and physics for students in classes préparatoires.

nov-dec 2014 Teaching internship in physics in high school, *Lycée Frédéric Mistral, Fresnes (France)*

Skills

IT

Proficiency: C++, Python, LaTex, ROOT (CERN), Linux, Git
Basic knowledge: Bash, Excel, Fortran, CamL, Igor, Scilab

Languages

French, English: native/fluent
German: Reading, writing, conversation
Spanish, Italian: Reading, basic conversation

Non-professional activities

Scientific outreach

oct 2019 Volunteer at **CERN Open Days**, *CMS site*, Geneva
Outreach on CMS activities, 80,000 visitors in total in a week-end

apr 2019 Animation of the CERN stand at ***Geek Touch Convention***, Lyon (France)
Demonstrating CERN activities to a broad public

Associations

2023 Member of the **Climate Committee** of the EEB department, *D&I and general climate*

2019–2022 **Representative** of students and postdocs and sustainable development leader at **LLR Lab Council**

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2014–2015	Member of the **student association** of the ENS Cachan In charge of communication and partnerships
nov 2013	Humanitarian association of ENS Cachan: social microcredit event (*The Rise*, Babyloan)

Hobbies

Rugby	10+ years in clubs and a university team
Scuba-diving	CMAS two star diver
Running	Typical performance: 10km in 40min
Music	Flute (9 years of classical formation, university bands), classical singing (8 years in choirs)

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