

Pierre Cagne

Curriculum Vitæ

 www.normalesup.org/~cagne
 [pierrecagne](https://github.com/pierrecagne)

Summary of key skills

- Good communication skills
- Extensive experience in teaching computer science and mathematics
- Expertise in Category Theory, Logic, Type Theory
- Languages: French (native), English (full proficiency), Norwegian (B1)
- Double education in mathematics (master of research) and computer science (PhD).
- Power-user of $\text{T}_{\text{E}}\text{X}/\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$
- Proficient in various programming languages: C, Python, C++, OCaml.
- Daily user of GNU/Linux and many open-source software (bash, git, emacs, ssh, etc.). Open-source enthusiast.

Research interests

I am a researcher in categorical logic, homotopical algebra, and their links with homotopy type theory and the foundations of computer science.

Academic positions

- Oct. 2019– **Research Fellow**, *Universitetet i Bergen*, Bergen, Norway.
- Mar. 2020 Funded by the Research Council of Norway’s project “Computational Aspects of Univalence”.
- Fall 2019 **Teaching Assistant**, *Universitetet i Bergen*, Bergen, Norway.
Partial position as a teaching assistant in the Department of Informatics.
- 2018–2019 **Teaching and Research Assistant**, *Université Paris Diderot*, Paris, France.
ATER (Attaché Temporaire d’Enseignement et de Recherche).
- 2015–2018 **PhD candidate**, *Université Paris Diderot*, Paris, France.
- 2015–2018 **Teaching Assistant**, *Université Paris Diderot*, Paris, France.

Education

- 2015–2018 **PhD**, *Université Paris Diderot*, Paris.
 PhD in mathematics and computer science under the supervision of Clemens Berger (Université de Nice) and Paul-André Melliès (Université Paris Diderot).
 Title : Towards a homotopical algebra of dependent types
 Defended on December 7th 2018.
 Committee: André Joyal (Reviewer), Hugo Herbelin (president), Peter LeFanu Lumsdaine (Examiner), Simona Paoli (Examiner), Emily Riehl (Examiner), Thomas Streicher (Reviewer).
- 2011–2012, 2014–2015 **Master of Research**, *École Normale Supérieure*, Paris, *summa cum laude*.
 “Master Parisien de Recherche en Informatique”, competitive master degree in pure computer science, jointly organized by École Normale Supérieure, École Polytechnique and Université Paris Diderot – Paris 7. Under the supervision of Paul-André Melliès.
- 2012–2014 **Master of Research**, *Université Pierre et Marie Curie*, Paris, *summa cum laude*.
 Master degree in pure mathematics. Under the supervision of Georges Maltsiniotis.
- 2010–2011 **Licence (Bachelor degree)**, *École Normale Supérieure*, Paris, *cum laude*.
 Bachelor degree in computer science.
- 2007–2010 **Classe Préparatoire**, *Lycée Henri Poincaré*, Nancy.
 Excellence science program, math major and physics minor (equivalent to the first two years of a bachelor degree in both departments)
- 2007 **Baccalauréat (highschool degree)**, Nancy, *summa cum laude*.
 Highschool degree in science, math major, with “mention européenne allemand” (european-wide minor in german)

Preprints and publications

- January 2020 Pierre Cagne and Paul-André Melliès, “Identity types as equality predicates”, *in preparation*.
- January 2020 Pierre Cagne and Paul-André Melliès, “Homotopy categories of Quillen bifibrations”, *in preparation*.
- December 2018 Pierre Cagne, “Towards a homotopical algebra of dependent types”, thesis, [link to manuscript](#).
- October 2017 Pierre Cagne and Paul-André Melliès, “On bifibrations of model categories”, arXiv:1709.10484, resubmitted to *Advances in Mathematics* after minor revisions (acceptation recommended from both reviewers).

Conferences and Workshops

- 2019 **International Conference on Homotopy Type Theory**, *Carnegie Mellon University*, Pittsburgh.
I presented a talk entitled “Identity types as equality predicates (Reconciling hyperdoctrines with MLTT)”.
- 2019 **25th International Conference on Types for Proofs and Programs**, *Center for Advanced Study*, Oslo.
I presented a talk entitled “Quillen bifibrations and the Reedy construction”.
- 2018 **Homotopy harnessing higher structures**, *Isaac Newton Institute*, Cambridge.
Participation to the workshop *Higher structures in homotopy theory*.
- 2017 **International Category Theory Conference**, *UBC*, Vancouver.
I presented a talk entitled “When computational monads go clubbing” at CT2017.
- Spring 2017 **Kan Extension Seminar II**, *online*.
I participated in an online seminar, jointly organized by Emily Riehl, Alexander Campbell and Brendan Fong. It was a bi-monthly seminar from January to May 2017 about Lawvere theories and generalizations. I presented a paper by Kelly entitled “On clubs and data-type constructors”.
- 2016 **GdR Top’s annual meeting**, *Université de Picardie Jules Verne*, Amiens.
Updated talk on “Bifibrations of model categories and the Reedy construction”.
- 2016 **International Category Theory Conference**, *Dalhousie University*, Halifax.
I presented a talk entitled “Bifibrations of model categories and the Reedy construction” at CT2016.

Reviewing work

(To preserve the anonymous nature of the peer-review process, only the conferences/journals are given.)

- Jun. 2019 **Reviewer**, *LICS 2019*, Vancouver, Canada.
Apr. 2019 **Reviewer**, *Mathematical Structures in Computer Science*.

Other research activities

- 2019 **Second School and Workshop on Univalent Mathematics (1 week)**, *University of Birmingham*, Birmingham, UK.
Participation to the project UniMath. Under the supervision of Anders Mörtberg: implementation of a type modeling ZF(C) with h-level 0.
- 2016 **Summer School (1 month)**, *Dalhousie University*, Halifax.
AARMS Summer School on category theory: “Higher Category Theory and Categorical Logic” by M.Shulman and P.Lumsdaine, and “Categories, Quantum Computation and Topology” by J.Vicary.

- 2015 **Spring School (1 week)**, *EPIT*, Saint-Raphaël.
Introductory school on formal mathematics in Coq. Teachers included Matthieu Sozeau and Assia Mahboubi. I acquired basic skills to work with Coq and start implementing my own research.
- 2015 **Master of research in computer science, internship (5 month)**, *Université Paris Diderot*, Paris.
“Monade d’état quantique et ensembles nominaux” under the supervision of Paul-André Melliès. Keywords: monads with arities, Lawvere theory, quantum computation.
- 2014 **Master of research in mathematics, memoir (6 month)**, *Université Pierre et Marie Curie*, Paris.
“Le localisateur fondamental minimal” under the supervision of Georges Maltsiniotis. Keywords: homotopical algebra, category theory, pursuing stacks.
- 2013 **Master of research in mathematics, memoir (4 month)**, *Université Pierre et Marie Curie*, Paris.
“Topos et hypothèse du continu” under the supervision of Emmanuel Lepage. Keywords: topos theory, continuum hypothesis, categorical logic.
- 2012 **Master of research in computer science, internship (5 month)**, *Université du Québec À Montréal*, Montreal.
“Stabilité de condition de pavage sous morphismes homologues” in team LaCIM under the supervision of Srečko Brlek. I also participated to the SAGE project. Keywords: combinatorics on word, discrete geometry, SAGE.
- 2011 **Bachelor research internship (3 month)**, *LORIA*, Nancy.
“Énumération des configurations locales des plans discrets” in team ADAGIo under the supervision of Éric Domenjoud and Damien Jamet. Keywords: combinatorics on word, discrete geometry.

Teaching experience

- Fall 2019 **Algorithms (1st year MSc)**, *Universitetet i Bergen*, Bergen, Norway.
Tutoring sessions for the course INF234 at UiB.
- Fall 2018 **C programming (3rd year BSc)**, *Université Paris Diderot*, Paris, France.
C coding sessions for the 3rd year of Bachelor degree in computer science.
- Fall 2018 **UNIX systems (1st year BSc)**, *Université Paris Diderot*, Paris, France.
Lectures and practical sessions on UNIX systems and bash scripting for the 1st year of Bachelor degree in computer science.

- Fall 2018 **Introduction to programming (1st year BSc)**, *Université Paris Diderot*, Paris, France.
Lectures and coding sessions on Python programming for the 1st year of Bachelor degree in computer science.
- Fall 2017 **Mathematics for chemists (2nd year BSc)**, *Université Paris Diderot*, Paris, France.
Tutoring session in mathematics for the 2nd year of Bachelor degree in chemistry.
- Fall 2017 **Algorithms (2nd year BSc)**, *Université Paris Diderot*, Paris, France.
Algorithms and Python programming session for students in 2nd year of Bachelor degree in mathematics.
- Fall 2016 **Algorithms (2nd year BSc)**, *Université Paris Diderot*, Paris, France.
Algorithms and Python programming session for students in 2nd year of Bachelor degree in mathematics.
- Fall 2016 **Algorithms and C programming (1st year MSc)**, *Université Paris Diderot*, Paris, France.
C programming session and semester-long project for students in 1st year of Master degree in mathematics.
- Spring 2016 **Math examiner (2nd year BSc)**, *Université Paris Diderot*, Paris, France.
Weekly oral session in analysis and algebra for students in 2nd year of Bachelor degree in mathematics.
- Fall 2015 **Algorithms (2nd year BSc)**, *Université Paris Diderot*, Paris, France.
Algorithms and Python programming session for students in 2nd year of Bachelor degree in mathematics.
- 2014–2015 **Math Examiner (1nd year “Classe Préparatoire”)**, *Lycée Sainte-Marie*, Neuilly, France.
Weekly oral session in mathematics (so called “Khôlles”) for HKBL class.

Fellowships

- Sept. 2015 **3-year PhD fellowship**, *Université Paris Diderot*, Paris, France.
Awarded by the ministry of higher education and research.

Languages

- French Native language
- English Full professional proficiency
- Norwegian Level B1 ca., engaged in NOR-U3 at Universitetet i Bergen
- German Elementary proficiency

Computer skills

- GNU/Linux Daily user. Power user of the command line and shell-based programs.
- OS X Former user.
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- C Proficient. Used in the past for efficient algorithms and system programming.
- OCaml Proficient. Used in the past for projects with high-level of abstraction (compiler with type inference for example).
- C++ Good knowledge. Used in the past for OOP-based projects and/or library specific usage (CGAL for example).
- Python Proficient. Used in the past small OOP-based projects, scripting, and scientific computing.
- LaTeX, TeX Proficient. Daily user for the past 10 years. Power user of TikZ and Beamer also.
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- SAGEMATH Former user and contributor to the project. Mostly used in the field of combinatorics.
- Coq Good knowledge. Used mostly with the UniMath library.
- Git Daily user, mostly with Github or Gitlab as remote repository.