Pierre Cagne

Curriculum Vitæ

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pierrecagne

Education

2015–2018 **PhD**, *Université Paris Diderot*, Paris, summa cum laude.
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)

Academic positions

Mar. 2022 – current **Postdoctoral Researcher**, *Appalachian State University*, Boone, NC, USA.
Postdoctoral position at the Department of Computer Science. Funded by the NSF.

Aug. 2021 – Jan. 2022 **Postdoctoral Researcher**, *Aarhus Universitet*, Århus, Denmark.
Postdoctoral position in the Logic and Semantics group at the Department of Computer Science

Fall 2020 **Teaching Assistant**, *Universitetet i Bergen*, Bergen, Norway.
Partial position as a teaching assistant in the Department of Informatics.

2019–2020 **Research Fellow**, *Universitetet i Bergen*, Bergen, Norway.
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.

Fellowships

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

Research interests

I am a researcher in theoretical computer science. My main areas of research are type theory, categorical logic, and homotopical algebra.

Publications

Published

Dec. 2022 Pierre Cagne and Patricia Johann, "Characterizing Functions Mappable over GADTs", Programming Languages and Systems, APLAS 2022, *Lecture Notes in Computer Sciences*, Volume 13658, Springer.

Aug. 2020 Pierre Cagne and Paul-André Melliès, "On bifibrations of model categories", *Advances in Mathematics*, Volume 370, 26 August 2020, 107205

Dec. 2018 Pierre Cagne, "Towards a homotopical algebra of dependent types", thesis, link to manuscript.

In preparation

Feb. 2023 Pierre Cagne and Patricia Johann, "Are GADTs data structures?", soo to be sumitted to MFPS2023.

Pierre Cagne, Nicolai Kraus and Marc Bezem, "On the symmetries of spheres in univalent fondations", *in preparation.*

Pierre Cagne and Paul-André Melliès, "Identity types as equality predicates", *in preparation*.

Pierre Cagne and Paul-André Melliès, "Homotopy categories of Quillen bifibrations", *in preparation*.

Artifact

Dec. 2022 Pierre Cagne and Patricia Johann, Proof-of-concept supporting "Characterizing Functions Mappable over GADTs". DOI:10.5281/zenodo.7004589. Link to literate Agda code.

Books

2019– Symmetry , *in preparation* , /UniMath/SymmetryBook .
Collaborative writing with Marc Bezem, Bjørn Dundas, Ulrik Buchholtz, Dan Grayson. The book aims at giving a synthetic introduction to group theory through homotopy type theory.

Talks at Conferences and Workshops

Dec. 2022 **APLAS**, *University of Auckland*, Auckland, New Zealand.
Presentation of the accepted paper "Characterizing Functions Mappable over GADTs".

Aug. 2022 **HoTTEST Summer School**, *Western University*, Online.
Colloqium given at the HoTTEST Summer School 2022 on univalent type theory: "Group theory without goups".

Nov. 2020 **Homotopy Type Theory Electronic Seminar Talks**, *Western University*, Online.
Online talk: "On the symmetries of the spheres in univalent foundations".

2020 **26th International Conference on Types for Proofs and Programs**, *Univeristy of Torino*, Torino, Italy.
Plenary talk: "On the symmetries of the spheres in univalent foundations". Cancelled because of COVID-19 oubreak.

2019 **International Conference on Homotopy Type Theory**, *Carnegie Mellon University*, Pittsburgh, USA.
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.)

Feb. 2023 **Reviewer**, *Journal of Homotopy and Related Structures*.

Jul. 2022 **Reviewer**, *Mathematical Structures in Computer Science*.

Nov. 2021 **Reviewer**, *FoSSaCS 2022*, Munich, Germany.

Jul. 2021 **Reviewer**, *MFPS 2021*, Salzburg, Austria.

Jun. 2019 **Reviewer**, *LICS 2019*, Vancouver, Canada.

Apr. 2019 **Reviewer**, *Mathematical Structures in Computer Science*.

Teaching experience

Fall 2020 **Automata theory (1st year MSc)**, *Universitetet i Bergen*, Bergen, Norway.
Tutoring sessions for the course INF210 at UiB.

Fall 2020 **Algorithms (1st year MSc)**, *Universitetet i Bergen*, Bergen, Norway.
Tutoring sessions for the course INF234 at UiB.

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 (1st year "Classe Préparatoire")**, *Lycée Sainte-Marie*, Neuilly, France.
Weekly oral session in mathematics (so called "Khôlles") for HKBL class.

Other research activities

2021 **Category Theory Seminar**, *Aarhus Universitet*, Aarhus, Denmark.
Organizing an entry-level seminar on Category Theory at Aarhus University in Fall/Winter 2021.

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.

Languages

French	Native language
English	Full professional proficiency
Norwegian	Level B2 ca.
German	Elementary proficiency

Computer skills

C	Proficient. Efficient algorithms and system programming.

OCaml	Proficient. Projects with high-level of abstraction (compiler with type inference for example).
C++	Good knowledge. 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.
Javascript	Proficient. Web front-end development.
LaTeX, TeX	Proficient. Daily user for the past 15 years. Power user of TikZ and Beamer also.

Agda	Proficient. Formalization of univalent mathematics and type systems implementation.
Coq	Good knowledge. Used mostly with the UniMath library.
SageMath	Former user and contributor to the project. Mostly used in the field of combinatorics.

Git	Daily user, mostly with Github or Gitlab as remote repository.
GNU/Linux	Daily user. Power user of the command line and shell-based programs.
OS X	Former user.

References

Paul-André Melliès, *IRIF, Université Paris Cité*, PhD advisor.
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Marc Bezem, *Institut for Informatikk, Universitetet i Bergen*, Postdoc advisor.
email: Marc.Bezem@uib.no,
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Patricia Johann, *Department of Computer Science, Appalachian State University*, Postdoc advisor.
email: johannp@appstate.edu,
phone: +1 (828) 262-7008

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