

# MATHIEU HUOT

Computer Science Department  $\diamond$  Oxford, UK  
+33 (0) 7 70 68 58 92  $\diamond$  mathieu.huot@cs.ox.ac.uk

## RESEARCH INTERESTS

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My research interests are mainly semantics of programming languages, category theory, automatic differentiation and quantum computing.

I'm also very much interested in probabilistic programming, domain specific functional languages, computational effects, logical relations, universal algebra, variational inference and non-parametric inference.

## EDUCATION

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<b>University of Oxford</b> P.h.D in Computer Science Supervised by Sam Staton	<i>October 2018-now</i>
<b>École Normale Supérieure Paris-Saclay</b> Master in Computer Science (MPRI) with honours	<i>September 2015-September 2017</i>
<b>École Normale Supérieure Paris-Saclay</b> B.S in Computer Science B.S in Mathematics	<i>September 2014-September 2015</i>
<b>Classes Préparatoires at Henri Poincaré</b> MPSI-MP* : two-year intensive program preparing for the national competitive exam for entry to business / engineering schools	<i>September 2012-September 2014</i>

## PUBLICATIONS AT INTERNATIONAL CONFERENCES

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5. Alexander K. Lew, Mathieu Huot, Sam Staton, Vikash K. Mansinghka. ADEV: Sound Automatic Differentiation of Expected Values of Probabilistic Programs. POPL 2023.  
Distinguished paper award.
4. Amir Shaikhha, Mathieu Huot, Jaclyn Smith, Dan Olteanu. Functional Collection Programming with Semi-Ring Dictionaries. OOPSLA 2022.
3. Mathieu Huot, Sam Staton, and Matthijs Vákár. Correctness of Automatic Differentiation via Diffeologies and Categorical Gluing. FoSSaCS 2020.  
Nominated for EATCS and EAPLS best paper awards.
2. Mathieu Huot, Sam Staton. Quantum Channels as a Categorical Completion. LICS 2019.
1. Mathieu Huot, Sam Staton. Universal Properties in Quantum Theory. QPL 2018.

## PUBLICATIONS IN INTERNATIONAL JOURNAL

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1. Mathieu Huot, Sam Staton, and Matthijs Vákár. Higher Order Automatic Differentiation of Higher Order Functions. LMCS 2021.

## PUBLICATIONS IN WORKSHOPS

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3. Mathieu Huot, Alex K. Lew, Sam Staton, Vikash K. Mansinghka. What do posterior distributions of probabilistic programs look like? LAFI 2023
2. Alex K. Lew, Mathieu Huot, Vikash K. Mansinghka. Towards Denotational Semantics of AD for Higher-Order, Recursive, Probabilistic Languages. LAFI 2022
1. Alex K. Lew, Mathieu Huot, Vikash K. Mansinghka. Towards Denotational Semantics of AD for Higher-Order, Recursive, Probabilistic Languages. Differentiable Programming Workshop, NeurIPS 2021.

## WORK EXPERIENCE

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### Academic internships

#### Oxford University

*Oct. 2017 - Jul. 2018*

Universal properties in Quantum Mechanics

Supervised by Sam Staton

#### LORIA, Nancy

*Mar. 2017 - Jul. 2017*

Conservatives extensions of Montague semantics

Supervised by Philippe de Groote

#### Computer Laboratory, Cambridge

*Apr. 2016 - Aug. 2016*

Operads with algebraic structure

Supervised by Marcelo Fiore

#### Spécification et Vérification laboratory (LSV), Cachan

*Feb. 2015-July 2015*

Use of effective algebraic methods for the study of Polynomial Interrupt Timed Automata

supervised by Serge Haddad and Claudine Picaronny

### Industrial internships

#### RelationalAI

*Aug. 2021 - Feb. 2022*

In the Query Optimization Team. Coded advanced traversals/program-rewrites in Julia. I helped implement and prove correct an advanced AST rewriting to make queries evaluable by what their trie-interface for their bottom-up query evaluator. I implemented automatic-inlining of non-recursive queries. I reimplemented, generalised, and proved correct a demand-transform algorithm (based on magic sets), and automatic inference of demand patterns. Supervised by Hung Ngo.

### Other

#### Undergraduate admissions at University College

*Dec. 2020*

#### Boat renting

*Summer 2011 and 2012*

At Sillage, Cavalaire-sur-mer, France

#### Internship with the French navy (PMM)

*3 weeks in 2011-2012*

## TEACHING

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- Tutorials of Concurrency, Oxford CS Department *2021*
- Tutorials of Digital Systems, Oxford CS Department *2021*
- Tutorials of Models of Computation, Oxford CS Department *2020*
- Tutorials of Machine Learning, Oxford CS Department *2020*
- Classes of Principles of Programming Languages, Oxford CS Department *2019*
- Classes of Lambda calculus, Oxford CS Department *2018*

- Mathematics in High School, Fabert High School *1 week in 2017*
- Physics and English for a junior High School student *2011-2012*

## TALKS

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- 06/01/23, PPS, Paris
- 28/11/22, New Challenges in Programming Language Semantics, Lorentz Center, Leiden, NL.
- 30/03/2021, Fossacs, ETAPS, Online
- 27/02/2020, PIHOC workshop, IRIF, Paris
- 19/09/2019, Junior Semantics Seminar, Oxford
- 25/06/2019, LICS, Vancouver
- 30/04/2019, Loria, Nancy
- 24/01/2019, Junior Semantics Seminar, Oxford
- 17/12/2018, SYCO 2, Strathclyde University, Glasgow
- 03/06/2018, Quantum Physics and Logic, Dalhousie University, Halifax
- 30/01/2018, Quantum Lunch, organised by the Quantum Group, Oxford
- 2016, Logic and semantics for Dummies seminar, Cambridge

## SERVICE TO PROFESSION

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<b>Reviewing</b>	TCS 2021, ICALP 2019
<b>Organising seminars</b>	Junior Semantics Seminar (JSS) Oxford
<b>Student volunteering</b>	FLOC 2018

## COMMUNITY SERVICE

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- Class representative in the Board of student life for the CS department at ENS Paris-Saclay between 2014 and 2017.
- Vice-president of the Student Council at ENS Paris-Saclay in 2015-2016

## THESES AND REPORTS

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- 1st year DPhil Transfer report. Department of Computer Science, Oxford, March 2020
- Rapport projet ARPE. ENS Paris-Saclay, Département d'informatique, September 2018
- Extensions conservatives de la sémantique de Montague. Master thesis. ENS Paris-Saclay, Département d'informatique, September 2017
- Operads with algebraic structure. Master thesis. ENS Paris-Saclay, Département d'informatique, September 2016
- Application de méthodes d'algèbre effective pour l'étude d'automates temporisés. Bachelor thesis. ENS Paris-Saclay, Département d'informatique, September 2015

## LANGUAGES AND TOOLS

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### Languages

- French, native speaker
- English, fluent
- Spanish, German, working knowledge

### Programming Languages

OCaml, Julia, Haskell, C

### Tools

VSCode, Sublime, Github