

Ludovic Patey

Doctor in Computer Science

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Academic Curriculum

- 2017 – now **CNRS Researcher (“Chargé de Recherche”)**, France
- 2016 – 2017 **Postdoc (“Morrey Visiting Assistant Professor”)**,
University of California, Berkeley
- 2013 – 2016 **PhD on “The reverse mathematics of Ramsey-type theorems”**,
Université Paris Diderot (Paris VII)
Advised by Laurent Bienvenu and Hugo Herbelin
- 2012 – 2013 **Mathematical Logic and Foundations of Computer Science**,
Université Paris Diderot (Paris VII), Master degree, Summa cum laude
- 2010 – 2012 **Parisian Master of Research in Computer Science**,
École normale supérieure, Paris, Master degree. Summa cum laude
- 2009 – 2010 **Licence in Computer Science**,
École normale supérieure, Paris, Magna cum laude
- 2007 – 2009 **DEUG in Mathematics**,
Université Pierre et Marie Curie (Paris VI)
- 2006 – 2009 **Computer engineering studies**,
SUPINFO - The International Institute of Information Technology, Paris

Research Interests

I am interested in the constructive content of mathematical reasoning. I mainly work within the framework of reverse mathematics under a computational perspective. My research primarily focuses on the reverse mathematics of combinatorial theorems, and in particular on Ramsey’s theorem and its consequences.

Experiences

- May 2012 – **Intern**, *Laboratoire Preuves, Programmes et Systèmes*, Paris, France
Aug. 2013 Type theory and reverse mathematics.
- Mar. 2012 – **Intern**, *Laboratoire d’Informatique Algorithmique: Fondements et Applications*, Paris, France
Aug. 2012 Definability of the Turing jump.
- Oct. 2011 – **Intern**, *ROSAEC Center*, Seoul, South Korea
Feb. 2012 Verification framework of multi-staged programs. Also between Mar. 2011 and Aug. 2011
- Jun. 2010 – **Intern**, *Institut Fourier*, Grenoble, France
Aug. 2010 Extensive study of the computational complexity of Eternity II and its variants.
- Aug. 2009 – **Casual labor**, *Institut National de Recherche en Agronomie*, Jouy-en-Josas, France
Oct. 2009 Development of a web interface favouring search in semantic databases.
- Dec. 2009 – **Intern**, *TIMC-IMAG laboratory*, Grenoble, France
Jun. 2009 Research and implementation of algorithms to search for partial subgraphs isomorphisms.
- Nov. 2007 – **Computer engineer**, *CLASIS SARL*, Paris, France, Permanent contract
Jun. 2008 Development of a web application of direct marketing.

Teaching

- Spring 2021 **Teaching**, *Computability theory and applications*, École Normale Supérieure de Lyon
This M2 course covers a good part of classical computability theory (Church-Turing thesis, Turing degrees, Π_1^0 classes, arithmetical hierarchy, priority methods, forcing...)
- Spring 2019 **Lab sessions**, *Algorithms and Competitive Programming*, École Polytechnique, Saclay
Course taught by Adrian Kosowski. The aim of this class is to train students to programming contests.
- Spring 2017 **Teaching**, *Incompleteness and Undecidability*, University of California, Berkeley
This class covers Gödel's incompleteness theorems, Turing machines, Rice theorem, recursively enumerable sets, among others.
- Fall 2016 **Teaching**, *Introduction to Abstract Algebra*, University of California, Berkeley
This class covers group theory, commutative rings, ideals, fields, fields extensions, among others.
- Fall 2016 **Teaching**, *Introduction to Analysis*, University of California, Berkeley
This class covers sequences, limits, continuous functions, uniform convergence, infinite series and the Riemann integral, among others.
- 2014 – 2015 **Lab sessions**, *Internet et Outils IO2*, Université Paris Diderot (Paris VII)
Course taught by Christophe Prieur. This class covers HTML, CSS, PHP and Javascript.
- 2013 – 2014 **Lab sessions**, *Language C*, Université Paris Diderot (Paris VII)
Course taught by Jean-Marie Rifflet. This class covers basic structures, pointers, libraries and related tools.
- 2013 – 2014 **Lab sessions**, *Initiation à la programmation IF1*, Université Paris Diderot (Paris VII)
Course taught by Matthieu Picantin. The aim of this class is to introduce the basics of procedural programming using Java.

Publications

Books

- [BP21] **Calculabilité : Aléatoire, Mathématiques à rebours et Hypercalculabilité**
Benoit Monin et Ludovic Patey — *Calvage et Mounet*, to appear.

Journal papers

- [MP22] **Partition genericity and pigeonhole basis theorems**
Benoit Monin and Ludovic Patey — submitted.
- [LP21] **The reverse mathematics of the Thin Set and Erdos-Moser theorems**
Lu Liu and Ludovic Patey — *Journal of Symbolic Logic*, to appear.
- [MP21b] **SRT22 does not imply RT22 in omega-models**
Benoit Monin and Ludovic Patey — *Advances in Mathematics*, to appear.
- [ACDMP] **Milliken's tree theorem and its applications: a computability-theoretic perspective**
Paul-Elliot Anglès d'Auriac, Peter Cholak, Damir Dzhafarov, Benoit Monin and Ludovic Patey — *Memoirs of the AMS*, to appear.
- [GTPT] **Computing sets from all infinite subsets**
Noam Greenberg, Matthew Harrison-Trainor, Ludovic Patey and Dan Turetsky — *Transactions of the AMS*, 374 (2021), no.11, pp. 8131–8160.
- [Pat21] **Ramsey-like theorems and moduli of computation**
Ludovic Patey — *Journal of Symbolic Logic*, à paraître.
- [DGHPT] **Relationships between computability-theoretic properties of problems**
Rod Downey, Noam Greenberg, Matthew Harrison-Trainor, Ludovic Patey et Daniel Turetsky — *Journal of Symbolic Logic*, to appear.
- [MP21a] **The weakness of the pigeonhole principle under hyperarithmetical reductions**
Benoit Monin and Ludovic Patey — *Journal of Mathematical Logic*, 21 (2021), no.3, pp. 2150013, 41.
- [DP21] **COH, SRT22, and multiple functionals**
Damir Dzhafarov and Ludovic Patey — *Computability*, 10 (2021), no. 2, 111–121.

- [CDHP20] **Some results concerning the SRT22 vs COH problem**
Peter Cholak, Damir Dzhafarov, Denis Hirschfeldt and Ludovic Patey — *Computability*, 9 (2020), no. 3-4, 193–217.
- [CP20] **Thin set theorems and cone avoidance**
Peter Cholak and Ludovic Patey — *Transactions of the American Mathematical Society*, 373 (2020), no. 4, 2743–2773.
- [DGHPP] **Ramsey’s theorem and products in the Weihrauch degrees**
Damir Dzhafarov, Jun Le Goh, Denis Hirschfeldt, Ludovic Patey and Arno Pauly — *Computability*, 9 (2020), no. 2, 85–110.
- [MP19] **Pigeons do not jump high**
Benoit Monin and Ludovic Patey — *Advances in Mathematics*, 352, (2019), 1066–1095.
- [CIPST] **The Rado path decomposition theorem**
Peter Cholak, Gregory Igusa, Ludovic Patey, Mariya Soskova and Dan Turetsky — *Israel Journal of Mathematics*, Israel J. Math. 234 (2019), no. 1, 179–208.
- [LPM] **A computable analysis of variable words theorems**
Lu Liu, Ludovic Patey and Benoit Monin. — *Proceedings of the AMS*, 147 (2019), no. 2, 823–834.
- [PY] **The proof-theoretic strength of Ramsey’s theorem for pairs and two colors**
Ludovic Patey and Keita Yokoyama. — *Advances in Mathematics*, 330 (2018), 1034–1070.
- [DP16] **Coloring trees in reverse mathematics**
Damir Dzhafarov and Ludovic Patey — *Advances in Mathematics*, 318 (2017), 497–514.
- [Pat16a] **Dominating the Erdős-Moser theorem in reverse mathematics**
Ludovic Patey. — *Annals of Pure and Applied Logic*, 168 (2017), no. 6, 1172–1209.
- [BPS15] **On the logical strengths of partial solutions to mathematical problems**
Laurent Bienvenu, Ludovic Patey and Paul Shafer.
— *Transactions of the London Mathematical Society*, 4 (2017), no. 1, 30–71.
- [Pat16b] **The reverse mathematics of non-decreasing subsequences**
Ludovic Patey — *Archive for Mathematical Logic*, 56 (2017), no. 5-6, 491–506.
- [Pat16c] **Partial orders and immunity in reverse mathematics**
Ludovic Patey — *Computability*, 7 (2018) no. 4, 323–339.
- [FP15] **Coloring the rationals in reverse mathematics**
Emanuele Frittaion and Ludovic Patey — *Computability*, 6 (2017), no. 4, 319–331.
- [MP16] **Pi01 encodability and omniscient reductions**
Benoit Monin and Ludovic Patey — *Notre Dame Journal of Formal Logic*, 60 (2019), no. 1, 1–12.
- [DLSW] **Ramsey’s theorem for singletons and strong computable reducibility**
Damir Dzhafarov, Ludovic Patey, Reed Solomon and Linda Brown Westrick
— *Proceedings of the American Mathematical Society*, 145 (2017), no. 3, 1343–1355.
- [Pat15j] **The weakness of being cohesive, thin or free in reverse mathematics**
Ludovic Patey. — *Israel Journal of Mathematics*, 216 (2016), no. 2, 905–955.
- [BP] **Diagonally non-computable functions and fireworks**
Laurent Bienvenu and Ludovic Patey. — *Information and Computation*, 253 (2017), part 1, 64–77.
- [Pat15b] **Controlling iterated jumps of solutions to combinatorial problems**
Ludovic Patey. — *Computability*, 6 (2017), no. 1, 47–78.
- [Pat15i] **The strength of the tree theorem for pairs in reverse mathematics**
Ludovic Patey. — *Journal of Symbolic Logic*, 81 (2016), no. 4, 1481–1499.
- [Pat15k] **Iterative forcing and hyperimmunity in reverse mathematics**
Ludovic Patey. — *Computability*, 6 (2017), no. 3, 209–221.
- [Pat15e] **Open questions about Ramsey-type statements in reverse mathematics**
Ludovic Patey. — *Bulletin of Symbolic Logic*, 22 (2016), no. 2, 151–169.
- [Pat15c] **Degrees bounding principles and universal instances in reverse mathematics**
Ludovic Patey. — *Annals of Pure and Applied Logic*, 166 (2015), no. 11, 1165–1185.

[Pat15f] **Ramsey-type graph coloring and diagonal non-computability**
Ludovic Patey. —*Archive for Mathematical Logic*, 54 (2015), no. 7-8, 899–914.

[Pat15h] **The complexity of satisfaction problems in reverse mathematics**
Ludovic Patey. —*Computability*, 4 (2015), no. 1, 69–84.

Conference papers

[Pat16] **Partial Orders and Immunity in Reverse Mathematics**
Ludovic Patey. —*Lecture Notes in Computer Science, Computability in Europe*, 353–363 (2016)

[Pat15d] **Iterative Forcing and Hyperimmunity in Reverse Mathematics**
Ludovic Patey. —*Lecture Notes in Computer Science, Computability in Europe*, 291–301 (2015)

[Pat14] **The Complexity of Satisfaction Problems in Reverse Mathematics**
Ludovic Patey. —*Lecture Notes in Computer Science, Computability in Europe*, 333–342 (2014)

Submitted papers

[LP21] **The reverse mathematics of the Thin Set and the Erdos-Moser theorems**
Lu Liu and Ludovic Patey. —Submitted

Drafts

[Pat15a] **Combinatorial weaknesses of ramseyan principles**
Ludovic Patey. —In preparation.

Awards

2017 **Thiessé de Rosemont/Demassieux prize**, *Chancellerie des Universités de Paris*

2016 **Sacks prize**, *Association for Symbolic Logic*

2016 **Accessit to the Gilles Kahn thesis prize**, *Société Informatique de France*

2015 **Best student paper award**, *Computability in Europe*, Bucharest, Romania
Paper: Iterative forcing and hyperimmunity in reverse mathematics

2014 **Best student paper award**, *Computability in Europe*, Budapest, Hungary
Paper: The complexity of satisfaction problems in reverse mathematics

Invitations

Invited talks

Feb. 2021 **Special session**, *SouthEastern Logic Symposium*, En ligne
Talk: Classifications of Ramsey-like theorems.

Feb. 2021 **Seminar**, *Online Logic Seminar*, Online
Talk: Canonical notions of forcing in computability theory.

May 2020 **Plenary speaker**, *NSF-FRG meeting on Reverse Mathematics of combinatorial principles [Cancelled]*, Penn State University, PA, USA

Avr. 2020 **Tutorial**, *Workshop on Computability, Algebraic structures, and Randomness [Cancelled]*, Kyoto, Japan

Jun. 2020 **Plenary speaker**, *Leeds Computability Days [Cancelled]*, Leeds, UK

Dec. 2019 **Special session**, *Canadian Mathematical Society Winter Meeting*, Toronto, Canada
Talk: SRT₂₂ does not imply RT₂₂ in omega-models

May 2019 **Special session**, *ASL Annual North American Meeting*, New York, NY, USA
Talk: Ramsey-like theorems and moduli of computation

Mar. 2019 **Plenary speaker**, *Third Workshop on Mathematical Logic and its Applications*, Nancy, France
Talk: Ramsey-like theorems and moduli of computation

Aug. 2018 **Plenary speaker**, *Computability and Complexity in Analysis*, Munich, Germany
Talk: Never underestimate pigeons

Jul. 2018 **Plenary speaker**, *Logic Colloquium*, Udine, Italy
Talk: Ramsey's theorem under a computable perspective

- Sep. 2017 **Plenary speaker**, *Computability Theory and Foundations of Mathematics*, Singapore
Talk: Can we fish with Mathias forcing?
- Jul. 2017 **Plenary speaker**, *Computability, Complexity and Randomness*, Mysore, India
Talk: The weakness of Ramsey's theorem under omniscient reductions
- Jun. 2017 **Plenary speaker**, *Computability in Europe*, Turku, Finland
Talk: Ramsey's theorem under a computable perspective
- Mar. 2017 **Special session**, *Southeastern Logic Symposium*, Gainesville, FL, USA
Talk: The strength of the thin set theorems
- Jan. 2017 **Plenary speaker**, *Computability and Complexity Symposium*, Wellington, New-Zealand
Talk: The reverse mathematics of non-decreasing sequences
- Oct. 2016 **Plenary speaker**, *Midwest Computability Seminar, Special Meeting in Honor of Carl Jockusch's 75th Birthday*, Chicago, IL, USA
Talk: Coloring trees and rationals in reverse mathematics
- Jul. 2016 **Plenary speaker**, *Workshop on Computability Theory*, Ghent, Belgium
Talk: How randomly rainbows appear!
- May. 2016 **Plenary speaker**, *The Foundational Impact of Recursion Theory, in honor of Steve Simpson's 70th birthday*, Storrs, Connecticut
Talk: The weakness of Ramsey's theorem under omniscient reductions
- Jun. 2015 **Special session**, *Computability in Europe*, Bucharest, Romania
Talk: How colorings reduce when colors increase
- Jul. 2014 **Plenary speaker**, *Workshop on Computability Theory*, Prague, Czech Republic
Talk: On universal instances of principles in reverse mathematics

Invited participations

- Apr. 2021 **Seminar**, *Computability Theory*, Oberwolfach, Germany
- Sep. 2019 **Workshop**, *Reverse Mathematics of Combinatorial Principles*, Oaxaca, Mexico
Talk: SRT22 does not imply COH in omega-models
- Sep. 2018 **Seminar**, *Measuring the Complexity of Computational Content*, Dagstuhl, Germany
Talk: RT22 compared to the product of SRT22 and COH
- Jul. 2018 **Seminar**, *Ramsey Theory in Logic, Combinatorics and Complexity*, Bertinoro, Italy
- Jan. 2018 **Seminar**, *Computability Theory*, Oberwolfach, Germany
Talk: Pigeons do not jump high
- Sep. 2017 **Conference**, *Aspects of Computation*, Singapore
- Jan. 2016 **Conference**, *New Challenges in Reverse Mathematics*, Singapore, Singapore
Talk: Ramsey's theorem and compactness
- Sep. 2015 **Seminar**, *Measuring the Complexity of Computational Content*, Dagstuhl, Germany
Talk: Controlling iterated jumps of Ramsey-type theorems

Popular science press

- May 2016 **Quanta Magazine**, *Mathematicians Bridge Finite-Infinite Divide*, by Natalie Wolchover
<https://www.quantamagazine.org/20160524-mathematicians-bridge-finite-infinite-divide/>

Grants

- Feb. 2020 **Grant**, *Research in Paris*, with Peter Cholak at the Institut Henri-Poincaré, Paris, France
Project: Computability-theoretic aspects of thin set theorem
- Jan. 2020 – **Grant**, *International Emerging Action*, France-Japan project with Keita Yokoyama
- Dec. 2022 Project: Frontier topics in computability theory
- Oct. 2019 – **Grant**, *ANR Jeunes Chercheurs*
- Sept. 2022 Project: Computational Aspects of Combinatorial Theorems

- Jan. 2018 **Grant**, *Research in pairs*, with Peter Cholak, Damir Dzhafarov and Denis Hirschfeldt, Oberwolfach, Germany
Project: The computational strength of versions of Ramsey's Theorem
- Oct. 2016 **Grant**, *Research in pairs*, with Damir Dzhafarov and Denis Hirschfeldt, Oberwolfach, Germany
Project: The computational strength of versions of Ramsey's Theorem

International conferences and seminars

Future events

- Mar. 2022 **New directions in computability theory**, *Conference*, Luminy, France

Past events

- Apr. 2021 **Computability Theory**, *Conférence*, Oberwolfach, Germany
- Feb. 2021 **SouthEastern Logic Symposium**, *Conference*, Online
- May 2020 **NSF-FRG meeting on Reverse Mathematics of combinatorial principles [Cancelled]**, *Conference*, Penn State University, PA, USA
- Mar. 2020 **ASL North American Annual Meeting [Cancelled]**, *Conference*, Irvine, CA, USA
- Jun. 2020 **Leeds Computability Days**, *Workshop [Cancelled]*, Leeds, UK
- Dec. 2019 **Canadian Mathematical Society Winter Meeting**, *Conference*, Toronto, Canada
- Sep. 2019 **Reverse Mathematics of Combinatorial Principles**, *Workshop*, Oaxaca, Mexico
- May 2019 **ASL Annual North American Meeting**, *Conference*, New York, NY, USA
- Mar. 2019 **Third Workshop on Mathematical Logic and its Applications**, *Workshop*, Nancy, France
- Sep. 2018 **Measuring the Complexity of Computational Content**, *Seminar*, Dagstuhl, Germany
- Aug. 2018 **Computability and Complexity in Analysis**, *Conference*, Munich, Germany
- Jul. 2018 **Logic Colloquium**, *Conference*, Udine, Italy
- Jul. 2018 **Ramsey Theory in Logic, Combinatorics and Complexity**, *Seminar*, Bertinoro, Italy
- Jul. 2018 **Workshop on Ramsey Theory and Computability**, *Workshop*, Rome, Italy
- Jan. 2018 **Computability Theory**, *Seminar*, Oberwolfach, Germany
- Sep. 2017 **Computability Theory and Foundations of Mathematics**, *Workshop*, Singapore
- Jul. 2017 **Computability, Complexity and Randomness**, *Conference*, Mysore, India
- Jun. 2017 **Computability in Europe**, *Conference*, Turku, Finland
- Mar. 2017 **Southeastern Logic Symposium**, *Conference*, Gainesville, FL, USA
- Jan. 2017 **Computability and Complexity Symposium**, *Conference*, Wellington, New-Zealand
- Oct. 2016 **Midwest Computability Seminar, Special Meeting in Honor of Carl Jockusch's 75th Birthday**, *Seminar*, Chicago, IL, USA
- Jul. 2016 **Workshop on Computability Theory**, *Workshop*, Gand, Belgium
- Jun. 2016 **Computability in Europe**, *Conference*, Paris, France
- Jun. 2016 **Computability, Randomness and Applications**, *Conference*, Marseille, France
- May. 2016 **Annual North American Meeting**, *Conference*, Storrs, Connecticut
- May. 2016 **The Foundational Impact of Recursion Theory, in honor of Steve Simpson's 70th birthday**, *Workshop*, Storrs, Connecticut
- Jan. 2016 **New Challenges in Reverse Mathematics**, *Conference*, Singapore, Singapore
- Sep. 2015 **Measuring the Complexity of Computational Content**, *Seminar*, Dagstuhl, Germany
- Jun. 2015 **Computability in Europe**, *Conference*, Bucharest, Romania
- Jun. 2015 **Computability, Complexity and Randomness**, *Conference*, Heidelberg, Germany
- Jun. 2015 **Varieties of Algorithmic Information**, *Conference*, Heidelberg, Germany
- Jul. 2014 **Workshop on Computability Theory**, *Workshop*, Prague, Czech Republic
- Jul. 2014 **Computability in Europe**, *Conference*, Budapest, Hungary

- May. 2014 **Types**, *Conference*, Paris, France
- Sep. 2013 **Computability, Complexity and Randomness**, *Conference*, Moscow, Russia
- Jul. 2013 **Logic Colloquium**, *Conference*, Evora, Portugal
- Jul. 2013 **Computability in Europe**, *Conference*, Milan, Italy
- Mar. 2013 **Reverse Mathematics and Type Theory**, *Workshop*, Seoul, South Korea
- Jun. 2012 **Computability in Europe**, *Conference*, Cambridge, United Kingdom

Committees and services

- Referee **Journals:** Archive for Mathematical Logic, Computability, Journal of Symbolic Logic, Mathematical Structures in Computer Science, Selecta Mathematica.
Conferences: Computability in Europe 2014, 2017, 2018, 2019, Symposium on Theoretical Aspects of Computer Science 2017, 2018, Symposium on Logic in Computer Science 2017, 2018.
Databases: Mathematical Reviews 2015 – 2016
- March 2022 **Organizer**, *New directions in computability theory*, CIRM, Luminy, France
- June 2020 **Organizer**, *GT Calculabilités days from the GDR-IM [Cancelled]*, Lyon, France
- May 2020 **Recruitment committee**, *Job of Maître de conférences at the LACL and a the MMI department of the IUT of Sénart Fontainebleau*, Créteil, France
- Jul. 2018 **Program committee**, *Workshop on Ramsey Theory and Computability*, Rome, Italy

Languages

- French Mother tongue
- English Fluent (110/120 at TOEFL)
- German Advanced

Computer Skills

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|-----------|-------------------------------------|-----|------------------------|
| Languages | PHP, Java, Scala, C, C++, Ocaml, C# | Web | HTML5, CSS, Javascript |
| Platforms | Ubuntu, Windows, Mac OS | DB | MySQL, Oracle, CouchDB |
| Tools | LaTeX, Git, Subversion, Coq | | |