

# 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.

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## Teaching

- 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.

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## Publications

### Journal papers

- [LPM] **A computable analysis of variable words theorems**  
Lu Liu, Ludovic Patey and Benoit Monin. —*Proceedings of the AMS*, to appear.
- [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]  **$\Pi^1_1$  encodability and omniscient reductions**  
Benoit Monin and Ludovic Patey —*Notre Dame Journal of Formal Logic*, to appear.
- [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

- [CIPST] **The Rado path decomposition theorem**  
Peter Cholak, Gregory Igusa, Ludovic Patey, Mariya Soskova and Dan Turetsky —Submitted.
- [DGHPP] **Ramsey’s theorem and products in the Weihrauch degrees**  
Damir Dzhafarov, Jun Le Goh, Denis Hirschfeldt, Ludovic Patey and Arno Pauly —Submitted.
- [CP] **Thin set theorems and cone avoidance**  
Peter Cholak and Ludovic Patey —Submitted.

### Drafts

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

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## 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

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## Invitations

### Invited talks

- Aug. 2018 **Plenary speaker**, *Computability and Complexity in Analysis*, Munich, Germany.
- Jul. 2018 **Plenary speaker**, *Logic Colloquium*, Udine, Italy.
- 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

- Sep. 2018 **Seminar**, *Measuring the Complexity of Computational Content*, Dagstuhl, Germany.
- Jul. 2018 **Seminar**, *Ramsey Theory in Logic, Combinatorics and Complexity*, Bertinoro, Italy.
- Jan. 2018 **Seminar**, *Computability Theory*, Oberwolfach, Germany.
- 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

- 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

- 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.
- Jan. 2018 **Computability Theory**, *Seminar*, Oberwolfach, Germany.

#### Past events

- 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*, Bucarest, 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.

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## Service

- Referee Archive for Mathematical Logic
- Referee Journal of Symbolic Logic
- Referee Mathematical Review (2015 – 2016)
- Referee Mathematical Structures in Computer Science
- Referee Computability in Europe 2014, 2017, 2018
- Referee Symposium on Theoretical Aspects of Computer Science 2017, 2018
- Referee Symposium on Logic in Computer Science 2017, 2018

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## Languages

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

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## Computer Skills

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| <ul style="list-style-type: none"> <li>Languages PHP, Java, Scala, C, C++, Ocaml, C#</li> <li>Platforms Ubuntu, Windows, Mac OS</li> <li>Tools LaTeX, Git, Subversion, Coq</li> </ul> | <ul style="list-style-type: none"> <li>Web HTML5, CSS, Javascript</li> <li>DB MySQL, Oracle, CouchDB</li> </ul> |
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## Interests and Hobbies

- Dance Waltz, tap dancing
- Sports Bicycling, Hiking, Running