

# Pierre Vandenhove

Postdoctoral Researcher at LaBRI

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## Positions

- Oct 2023– Present **Postdoctoral Researcher**, LaBRI, Université de Bordeaux, France  
Work with Nathanaël Fijalkow funded by the ANR project *G4S – Games for Synthesis*.
- Oct 2019– Sept 2023 **PhD candidate**, UMONS – Université de Mons, Belgium; Laboratoire Méthodes Formelles (LMF), Université Paris-Saclay, CNRS, ENS Paris-Saclay, France  
Funded by the F.R.S.-FNRS Research Fellow project *FrontieRS: Frontiers of Many-sided Reactive Synthesis*. See “PhD Thesis” section below for more details.

## Education

- 2017–2019 **Master’s degree in Mathematics (Specialization in Computer Science)**, UMONS, Belgium, *Summa cum laude*  
Exchange year at *Durham University*, UK in 2017–2018. Passed with first-class honors.  
Thesis: *Reachability in Stochastic Hybrid Systems*, supervised by T. Brihaye and M. Randour.  
Average grade: 19.6/20, Award of the Mathematical Department.
- 2014–2017 **Bachelor’s degree in Mathematics**, UMONS, Belgium, *Summa cum laude*  
Academic minor in Computer Science.  
Average grade: 19.1/20, Award of the Mathematical Department.

## Publications

Links to the articles (including extended versions on arXiv) are available on [my website](#).

### Peer-reviewed journal articles

- [BORV23] **Arena-Independent Finite-Memory Determinacy in Stochastic Games**. Patricia Bouyer, Youssef Oualhadj, Mickael Randour, Pierre Vandenhove. *Logical Methods in Computer Science*, volume 19, issue 4, pages 18:1–18:51, 2023.
- [BRV23] **Characterizing Omega-Regularity through Finite-Memory Determinacy of Games on Infinite Graphs**. Patricia Bouyer, Mickael Randour, Pierre Vandenhove. *TheoretCS*, volume 2, pages 1–48, 2023.
- [ZVX+22] **Parallel and Memory-Efficient Distributed Edge Learning in B5G IoT Networks**. Jianxin Zhao, Pierre Vandenhove, Peng Xu, Hao Tao, Liang Wang, Chi Harold Liu, Jon Crowcroft. *IEEE Journal of Selected Topics in Signal Processing*, volume 17, issue 1, IEEE, pages 222–233, 2022.
- [BBR+22] **Decisiveness of Stochastic Systems and its Application to Hybrid Models**. Patricia Bouyer, Thomas Brihaye, Mickael Randour, Cédric Rivière, Pierre Vandenhove. *Information and Computation*, volume 289, part B, Elsevier, pages 1–25, 2022.
- [BLO+22] **Games Where You Can Play Optimally with Arena-Independent Finite Memory**. Patricia Bouyer, Stéphane Le Roux, Youssef Oualhadj, Mickael Randour, Pierre Vandenhove.

*Logical Methods in Computer Science*, volume 18, issue 1, pages 11:1–11:44, 2022.

#### Peer-reviewed conference proceedings

[BFRV23] **How to Play Optimally for Regular Objectives?** Patricia Bouyer, Nathanaël Fijalkow, Mickael Randour, Pierre Vandenhove. *50th EATCS International Colloquium on Automata, Languages and Programming (ICALP 2023)*, LIPIcs 261, Schloss Dagstuhl, pages 118:1–118:18, 2023.

[BCRV22] **Half-Positional Objectives Recognized by Deterministic Büchi Automata.** Patricia Bouyer, Antonio Casares, Mickael Randour, Pierre Vandenhove. *33rd International Conference on Concurrency Theory (CONCUR 2022)*, LIPIcs 243, Schloss Dagstuhl, pages 20:1–20:18, 2022.

[BRV22a] **Characterizing Omega-Regularity through Finite-Memory Determinacy of Games on Infinite Graphs.** Patricia Bouyer, Mickael Randour, Pierre Vandenhove. *39th International Symposium on Theoretical Aspects of Computer Science (STACS 2022)*, LIPIcs 219, Schloss Dagstuhl, pages 16:1–16:16, 2022.

[BORV21] **Arena-Independent Finite-Memory Determinacy in Stochastic Games.** Patricia Bouyer, Youssef Oualhadj, Mickael Randour, Pierre Vandenhove. *32nd International Conference on Concurrency Theory (CONCUR 2021)*, LIPIcs 203, Schloss Dagstuhl, pages 26:1–26:18, 2021.

[BBR+20] **Decisiveness of Stochastic Systems and its Application to Hybrid Models.** Patricia Bouyer, Thomas Brihaye, Mickael Randour, Cédric Rivière, Pierre Vandenhove. *Eleventh International Symposium on Games, Automata, Logics, and Formal Verification (GandALF 2020)*, EPTCS 326, pages 149–165, 2020.

[BLO+20] **Games Where You Can Play Optimally with Arena-Independent Finite Memory.** Patricia Bouyer, Stéphane Le Roux, Youssef Oualhadj, Mickael Randour, Pierre Vandenhove. *31st International Conference on Concurrency Theory (CONCUR 2020)*, LIPIcs 171, Schloss Dagstuhl, pages 24:1–24:22, 2020. *Nominated (among 4 papers) for the Best Paper Award of CONCUR 2020.*

#### Invited papers in international conferences

[BCRV23] **Half-Positional Objectives Recognized by Deterministic Büchi Automata (Extended Abstract).** Patricia Bouyer, Antonio Casares, Mickael Randour, Pierre Vandenhove. *32nd International Joint Conference on Artificial Intelligence (IJCAI 2023), Sister Conferences Best Papers*, pages 6420–6425, 2023.

[BRV22b] **The True Colors of Memory: A Tour of Chromatic-Memory Strategies in Zero-Sum Games on Graphs.** Patricia Bouyer, Mickael Randour, Pierre Vandenhove. *Keynote lecture at the 42nd IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2022)*, LIPIcs 250, Schloss Dagstuhl, pages 3:1–3:18, 2022.

## PhD Thesis

Title **Strategy Complexity of Zero-Sum Games on Graphs**  
268 pages, 2023.

Supervisors [Mickael Randour](#) (UMONS) and [Patricia Bouyer](#) (LMF)

Jury Christel Baier (Reviewer – Technische Universität Dresden), Patricia Bouyer (Cosupervisor), Véronique Bruyère (President – UMONS), Thomas Colcombet (Reviewer – CNRS, Institut de Recherche en Informatique Fondamentale), Laurent Doyen (Examiner – CNRS, Laboratoire Méthodes Formelles), Benjamin Monmege (Examiner – Aix-Marseille Université, Laboratoire d'Informatique & Systèmes), Mickael Randour (Cosupervisor)

Graduation April 26, 2023

## Honors

2022 Prix Doctorants STIC 2022 – *accessit*, Labex DigiCosme.

2020 Nominated for the Best Paper Award of CONCUR 2020.

2019 Award of the Mathematics Department of UMONS.

## Talks

You can find the corresponding slides and posters on [my website](#).

### 2024

- The Decisiveness Property for Decidable Classes of Stochastic Systems, *Liverpool Verification Seminar*, 29/02, Liverpool, UK.

### 2023

- Characterizing Omega-Regularity through Strategy Complexity of Zero-Sum Games, *Young Scholar Day of the Belgian Mathematical Society*, 20/12, Brussels, Belgium.
- Strategy Complexity of Zero-Sum Games on Graphs, *Links' Team Seminar*, 24/11, Lille, France.
- Strategy Complexity of Zero-Sum Games on Graphs, *MoVe Seminar*, 09/11, Marseille, France.
- How to Play Optimally for Regular Objectives?, *Highlights 2023 of Logic, Games and Automata*, 25/07, Kassel, Germany.
- How to Play Optimally for Regular Objectives?, *ICALP 2023: 50th EATCS International Colloquium on Automata, Languages and Programming*, 11/07, Paderborn, Germany.
- Strategy Complexity of Zero-Sum Games on Graphs, *Liverpool Verification Seminar*, 03/07, Liverpool, UK.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *STIC doctoral day on the Saclay plateau*, 20/06, Gif-sur-Yvette, France.
- Strategy Complexity of Zero-Sum Games on Graphs, *Seminar of IST Austria*, 09/05, Vienna, Austria.
- Strategy Complexity of Zero-Sum Games on Graphs, *public thesis defense*, 26/04, Mons, Belgium.
- Strategy Complexity of Zero-Sum Games on Graphs, *private thesis defense*, 20/04, Mons, Belgium.
- Strategy Complexity of Zero-Sum Games on Graphs (Thesis seminar), *LMF Seminar*, 14/03, Gif-sur-Yvette, France.

- Memory Requirements of Omega-Regular Objectives: the Regular Case, *LaBRI/MTV Seminar*, 02/03, Bordeaux, France.
- How to Play Optimally for Regular Objectives?, *GT Informel CDS/MCS of the Laboratoire Méthodes Formelles*, 17/02, Gif-sur-Yvette, France.

## 2022

- Memory Requirements of Omega-Regular Objectives: the Regular Case, *UMONS Formal Methods Reading Group*, 16/12, Mons, Belgium.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *IRIF Automata Seminar*, 28/10, Paris, France.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *ULB Verif Seminar*, 14/10, Brussels, Belgium.
- Half-Positional Objectives Recognized by Deterministic Büchi Automata, *CONCUR 2022: The 33rd International Conference on Concurrency Theory*, 14/09, Warsaw, Poland.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *LAMAS and SR 2022: Logical Aspects in Multi-Agent Systems and Strategic Reasoning*, 26/08, Rennes, France.
- Half-Positional Objectives Recognized by Deterministic Büchi Automata, *Highlights 2022 of Logic, Games and Automata*, 29/06, Paris, France.
- Existence of memoryless optimal strategies through universal graphs [based on a LICS'22 paper], *UMONS Formal Methods Reading Group*, 02/06, Mons, Belgique.
- Jeux pour l'informatique et complexité des stratégies, *Séminaire Jeunes de l'UMONS*, 21/04, Mons, Belgium.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *Current Trends in Graph and Stochastic Games (GAMENET Workshop)*, 06/04, Maas-tricht, The Netherlands.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *STACS 2022: 39th International Symposium on Theoretical Aspects of Computer Science*, 17/03, Online.
- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *LaBRI/LX seminar*, 03/03, Bordeaux, France.

## 2021

- Characterizing Omega-Regularity Through Finite-Memory Determinacy of Games on Infinite Graphs, *Journées du GT Vérif*, 17/11, ENS Paris-Saclay, Gif-sur-Yvette, France.
- Characterizing Omega-Regularity Through Strategy Complexity of Games on Infinite Graphs [Ongoing Work], *UMONS Formal Methods Reading Group*, 23/09, Mons, Belgique.
- Arena-Independent Finite-Memory Determinacy, *Highlights 2021 of Logic, Games and Automata*, 15/09, Online.
- Arena-Independent Finite-Memory Determinacy in Stochastic Games, *CONCUR 2021: The 32nd International Conference on Concurrency Theory*, 26/08, Online.
- Arena-Independent Finite-Memory Strategies, *GT ALGA - Journées annuelles 2021*, 17/06, Online.
- Arena-Independent Finite-Memory Strategies, *GT Model-Checking and Synthesis, LMF, Université Paris-Saclay*, 23/04, Online.

## 2020

- Understanding Finite-Memory Determinacy, *LMF Research Days*, 09/12, Online.
- Decisiveness of Stochastic Systems and its Application to Hybrid Models, *Eleventh International*

*Symposium on Games, Automata, Logics, and Formal Verification (GandALF 2020)*, 22/09, Online.

- Games Where You Can Play Optimally with Arena-Independent Finite Memory, *CONCUR 2020: The 31st International Conference on Concurrency Theory*, 02/09, Online.
- Games Where You Can Play Optimally with Arena-Independent Finite Memory, *MOVEP 2020: 14th Summer School on Modelling and Verification of Parallel Processes*, 22/06, Online.

## 2019

- Reachability in Stochastic Hybrid Systems, *Highlights 2019 of Logic, Games and Automata*, 19/09, Warsaw, Poland.
- Reachability in Stochastic Hybrid Systems, *13th International Conference on Reachability Problems (RP'19)*, 12/09, Brussels, Belgium.
- Reachability in Infinite Markov Chains, *Mardi des Chercheurs 2019*, 05/03, Université de Mons, Mons, Belgium.

## Research visits

- Visit to Dominik Wojtczak and Patrick Totzke at University of Liverpool, July 3–7, 2023 and February 26 to March 1, 2024.
- Visit to Nicolas Mazzocchi at IST Austria, Vienna, May 8–12, 2023.
- Visit to Hugo Gimbert at LaBRI, Bordeaux, from February 27 to March 3, 2023.
- Visit to Nathanaël Fijalkow at University of Warsaw, September 19–23, 2022.
- Visit to Nathanaël Fijalkow at LaBRI, Bordeaux, from February 28 to March 4, 2022.

## Teaching

- Jan 2024– Jun 2024 **Machine Learning and Deep Learning**, *Teaching Assistant*, Université de Bordeaux  
Theory courses and exercise sessions.
- Jan 2024– Jun 2024 **Computer Science**, *Teaching Assistant*, Lycée Montaigne (CPGE)  
Algorithms and programming exercises for first-year students.
- Sept 2019– Aug 2023 **Formal Methods for System Design**, *Teaching Assistant*, Université de Mons  
Teaching assistant for the course given by Mickael Randour for students in a Master in Mathematics or a Master in Computer Science.
- Aug 2015, 2016, 2017 **Tutoring**, *UMONS*  
Tutor for math and computer science students at UMONS retaking an exam.

## Student supervision

### Interns

- Cosupervision (with Nathanaël Fijalkow, Guillaume Lagarde, and Théo Matricon) of Sylvain Brisset on programmatic reinforcement learning.
- Cosupervision (with Nathanaël Fijalkow and Théo Matricon) of Gianni Padula on incremental reactive synthesis (November 2023 to February 2024).
- Cosupervision (with Mickael Randour) of Jean Abou Samra on automata minimization (June to August 2023).
- Supervision of Maximilien Vanhaverbeke (student intern, UMONS) on succinctness of good-for-games automata (August 2022).
- Supervision of Luca Lani (student intern, UMONS) on strategy complexity of zero-sum games

(August 2021).

#### ■ Jury member for master's theses

- Valentin Dusollier (2023, UMONS)
- James Main (2021, UMONS).

#### ■ Attended research events

##### ■ 2024

- *Journées du GT DAAL*, Rennes, France.

##### ■ 2023

- *Belgian Mathematical Society Young Scholar Day*, Brussels, Belgium.
- *Highlights 2023 of Logic, Games and Automata*, Kassel, Germany.
- *ICALP 2023: 50th EATCS International Colloquium on Automata, Languages and Programming*, Paderborn, Germany.
- *STIC doctoral day on the Saclay plateau*, Gif-sur-Yvette, France.

##### ■ 2022

- *CONCUR 2022: The 33rd International Conference on Concurrency Theory*, Warsaw, Poland.
- *LAMAS and SR 2022: Logical Aspects in Multi-Agent Systems and Strategic Reasoning*, Rennes, France.
- *Highlights 2022 of Logic, Games and Automata*, Paris, France.
- *Current Trends in Graph and Stochastic Games (GAMENET Workshop)*, Maastricht, The Netherlands.
- *39th International Symposium on Theoretical Aspects of Computer Science (STACS 2022)*, Online.

##### ■ 2021

- *Journées du GT Vérif*, ENS Paris-Saclay, Gif-sur-Yvette, France.
- *Highlights 2021 of Logic, Games and Automata*, Online.
- *CONCUR 2021: The 32nd International Conference on Concurrency Theory*, Online.
- *Reinforcement Learning - From Theory to Practice Summer School*, Alan Turing Institute.
- *GT ALGA - Journées annuelles 2021*, Online.

##### ■ 2020

- *Spotlight on Games*, Online.
- *GandALF 2020: Eleventh International Symposium on Games, Automata, Logics, and Formal Verification*, Online.
- *Highlights 2020 of Logic, Games and Automata*, Online.
- *CONCUR 2020: The 31st International Conference on Concurrency Theory*, Online.
- *MOVEP 2020: 14th Summer School on Modelling and Verification of Parallel Processes*, Online.

##### ■ 2019

- *Highlights 2019 of Logic, Games and Automata*, Warsaw, Poland.
- *13th International Conference on Reachability Problems (RP'19)*, Brussels, Belgium.
- *Theory and Algorithms in Graph and Stochastic Games*, Mons, Belgium.
- *Mardi des Chercheurs*, Mons, Belgium.

## 2018

- FoPSS Logic and Learning School, Oxford, UK.
- MOVEP 2018: 13th Summer School on Modelling and Verification of Parallel Processes, Cachan, France.
- International Conference on Functional Programming (ICFP'18), St. Louis, Missouri, United States.

## 2017

- Computers in Scientific Discoveries 8, Mons, Belgium.

## Internships

- Aug– **Student intern**, OCaml Labs, University of Cambridge, UK
- Nov 2018 Implementation of the Mask R-CNN architecture for image segmentation and classification using OCaml's numerical library Owl. Contributions to the *computation graph* module.
- Jul 2017 **Research intern**, Algorithms Lab, UMONS, Belgium  
Received a grant for a research internship in graph theory about coloration problems.

## Miscellaneous

- Reviewing I have written reviews for Logical Methods in Computer Science (x3), Dynamic Games and Applications, GandALF'20, LICS'21, CONCUR'21 (x2), FORMATS'21, SETTA'21, ATVA'22, CSL'23, FoSSaCS'23, CONCUR'23 (x2), MFCS'23, EUMAS'23, VMCAI'24, STACS'24, LATIN'24, FoSSaCS'24, LICS'24, ICALP'24 (x2), MathSciNet (x2).
- Academic responsibilities
  - Member of the Council of the Faculty of Science at UMONS (2020–2023).
  - Co-organizer of the *MTV seminar* at LaBRI (academic year 2023–2024).
  - Member of the organizing committee of Highlights 2024 of Logic, Games and Automata at LaBRI, Université de Bordeaux.
- ICPC
  - Participation in ICPC (students' programming contests) from 2016 to 2018. Our team CPUMONS won a bronze medal (rank 12/114) during NWERC 2016, 3rd place during BAPC 2016 and 2018, 5th place during BAPC 2017.
  - Coach of the teams and *Preliminaries* organizer at UMONS in 2019, 2020, 2021, and 2022.
- Driving License B