Curriculum Vitae

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Research Positions

Full-time researcher — **CNRS, LaBRI, Bordeaux**
Chargé de recherche — *Jan. 2018 – now*

Research Fellow — **Alan Turing Institute of Data Science, London**
Formal Methods for Machine Learning Algorithms — *Jan. 2017 – Dec. 2017*
Convenor for the Logical Foundations of Data Science research group

Research Fellow — **Simons Institute, University of California, Berkeley**
Logical Structures in Computation — *July 2016 – Dec. 2016*
Mentored by Prakash Panangaden

Research Assistant — **University of Oxford**
Dynamical Systems — *Nov. 2015 – July 2016*
Jointly supervised by Joël Ouaknine and James Worrell

Education

PhD in Computer Science — **Paris 7 & Warsaw**
Counting and Randomising in Automata Theory — *Sep. 2012 – Oct. 2015*
Jointly supervised by Mikołaj Bojańczyk and Thomas Colcombet

Normalien (alumnus) — **École Normale Supérieure de Cachan**
Majoring in Computer Science — *Sep. 2008 – Aug. 2012*

M.Sc. MPRI (Computer Science) — **Paris 7**
with high honours — *2010 – 2012*
Specialisation in Automata Theory and Logics

M.Sc. LMFI (Mathematical Logics) — **Paris 7**
with high honours — *2009 – 2011*

Research

My research is in Computer Science, more specifically Automated Verification. I have been working on games, automata, and logic, program verification, learning theory, process algebra, and dynamical systems. In all of these topics I focus on stochastic systems.

Journal publications

1. Characterisation of an Algebraic Algorithm for Probabilistic Automata.
   In **TCS**: *Theoretical Computer Science*, 2017, 31 pages.
2. Monadic Second-Order Logic with Arbitrary Monadic Predicates, with Charles Paperman.
   In **ToCL**: *Transactions on Computational Logic*, 2017, 17 pages.
3. Deciding the Value 1 Problem for Probabilistic Leaktight Automata, with Hugo Gimbert, Edon Kelmendi and Youssouf Oualhadj.
   In **LMCS**: *Logical Methods in Computer Science*, Volume 11, Issue 1, 2015, 37 pages.
4. Parity and Streett Games with Costs, with Martin Zimmermann.
   In **LMCS**: *Logical Methods in Computer Science*, Volume 10, Issue 2, 2014, 28 pages.

Selection of five articles in international conference proceedings

1. Expressiveness of Probabilistic Modal Logics, Revisited, with Bartek Klin and Prakash Panangaden.
   In **ICALP'17**: *International Colloquium on Automata, Languages, and Programming*, 12 pages.
2. The Bridge Between Regular Cost Functions and Omega-Regular Languages, with Thomas Colcombet.
   In **ICALP'16**: *International Colloquium on Automata, Languages, and Programming*, 12 pages.
3. Characterisation of an Algebraic Algorithm for Probabilistic Automata.
   In **STACS'16**: *Symposium on Theoretical Aspects of Computer Science*, 12 pages.
4. Trading Bounds for Memory in Games with Counters, with Florian Horn, Denis Kuperberg and Michał Skrzypczak.
   In **ICALP'15**: *International Colloquium on Automata, Languages, and Programming*, 12 pages.
5. Deciding the Value 1 problem for Probabilistic Leaktight Automata, with Hugo Gimbert and Youssouf Oualhadj.
   In **LICS'12**: *Logics in Computer Science*, 10 pages.

Software

1. Flides. Flides is written in Javascript, to create slides in HTML5 format.
2. Stamina, with Hugo Gimbert, Edon Kelmendi and Denis Kuperberg. Stamina is written in C++, it is the successor of Acme, geared towards solving the starheight problem from automata theory. See `https://github.com/nathanael-fijalkow/stamina`
3. Acme, with Denis Kuperberg. Acme is written in OCaML, implementing algebraic techniques to solve decision problems from automata theory. See `https://github.com/nathanael-fijalkow/acme`

Grants and awards

Personal grant on Learning for Synthesis
January 2018

Five-year Fellowship at the Alan Turing Institute
January 2017

PhD thesis distinguished by Warsaw University
January 2016

Invited Talks

Logical Structures for Computation reunion workshop
Simons Institute at Berkeley, United States *12/12/2017*

Warwick-Turing research day
Warwick, United Kingdom *06/12/2017*

Cassting, FoSSaCS affiliated workshop
Eindhoven, Holland *02/04/2016*

AutoMathA final conference
Leipzig, Germany *08/05/2015*

Seminar Talks

At least once seminar talk in the following research groups: Simons Institute (Berkeley, USA), 68NQRT (Rennes, France), LSV (Cachan, France), MoVe (Marseille, France), LaBRI (Bordeaux, France), Theory group (Cambridge, UK), Algorithms group (Liverpool, UK), PUMA (Munich, Germany), LACL (Créteil, France), Verification group (Oxford, UK), ONERA (Toulouse, France), ULB (Brussels, Belgium), Reactive Systems group (Saarebrücken, Germany), LIGM (Marne-la-Vallée, France), Automata group (Warsaw, Poland) and Automata group (Paris, France).

Awards

PEPS JCJC — **Personal grant**
Learning for Program Synthesis — *Jan 2018 – Dec 2018*

Fellowship
Research Fellow at the Alan Turing Institute of data science — *Jan 2017 – Dec 2021*

Organisation of scientific events

- **2018** : co-organisation of the FoPSS school "Logic and learning" in Oxford, affiliated to FLOC.
- **2018** : co-organisation of the workshop "Summit on Machine Learning Meets Formal Methods" in Oxford, affiliated to FLOC.
- **2018** : co-organisation of the workshop "Logic and learning" in London.
- **2015** : co-organisation of the yearly meeting of the GT ALGA.

Organisation of seminars and working groups

- Since **2018** : organisation of the reading group "Theory of machine learning" in LaBRI.
- Since **2018** : co-organisation of the team seminar "Formal methods" in LaBRI.
- Since **2017** : co-organisation of the Logic seminar at the Turing Institute.
- **2016** : organisation of the Verification seminar in Oxford.
- **2015** : co-organisation of the Fellows Logic Open seminar at the Simons Institute.
- **2014 – 2015** : co-organisation of the Automata seminar at LIAFA.

Student supervision

- From **Sept. 2018** : co-supervision of the PhD of Pierre Ohlmann.
- **2017** : supervision of Pierre Ohlmann (M1).
- **2015** : co-supervision of Magdalena Bojarska (M2).
- **2014** : co-supervision of Laureline Pinault (L3).

Scientific and administrative duties

Local

- Since **2017** : leader of the "Logical foundations of data science" group at the Turing Institute.
- **2012 – 2015** : PhD representative at LIAFA.

National

- Since **2018** : leader of the GT ALGA (part of GDR-IM).

International

- Since **2017** : Publicity chair of the conference Highlights of Logic, Games, and Automata.
- External reviewer for more than 50 articles in conferences and journals. Reviewer for Mathematical Reviews, part of the American Mathematical Society (AMS).

Programme committee memberships

- 2019 : Foundations of Software Systems and Computer Science, Prague.
- 2018 : Mathematical Foundations of Computer Science, Liverpool.
- 2018 : Highlights of Logic, Games and Automata, Berlin.
- 2018 : Strategy Reasoning, Oxford.

Teaching

At University level

- **2012 – 2015**: Introduction to programmation (C and Java) at Université Paris 7, 128h.
- **2010 – 2012**: Functional programming (OCaML) at Lycée Henri IV and Louis-le-grand, 128h.

- **2010 – 2011**: Oral exminations at Lycée Fénelon Sainte-Marie, 32h.

At high-school level

- Two lectures at the BMC club in Berkeley.
- Organiser of a mathematics club in Pristina, Kosovo, for the French association Animath.
- Convenor for a cooperation project between France and Laos.

Skills

- **Languages:** *French* (mother tongue), *English* (proficient), and *Polish* (intermediate).
- **Programming:** Strong programming experience in OCaML.
  Good programming experience in C, C++, Java, Prolog, x86 ASM, and Maple.
- **Web Technologies:** Strong programming experience in HTML, PHP, MySQL, Javascript, and JQuery.