

# Curriculum Vitae

✉ nathanael.fijalkow@labri.fr • 🌐 <https://nathanael-fijalkow.github.io/>

## Current Positions

### Full-time Researcher

*Chargé de recherche*

**CNRS, LaBRI, Bordeaux**

*Jan. 2018 – now*

### Research Fellow

*Formal Methods for Machine Learning Algorithms*

Head of the Logical Foundations research group

**Alan Turing Institute of Data Science, London**

*Jan. 2017 – now (5 years fellowship)*

## Past Positions

### Research Fellow

*Logical Structures in Computation*

Mentored by Prakash Panangaden

**Simons Institute, University of California, Berkeley**

*July 2016 – Dec. 2016*

### Research Assistant

*Dynamical Systems*

Jointly supervised by Joël Ouaknine and James Worrell

**University of Oxford**

*Nov. 2015 – July 2016*

## Education

### PhD in Computer Science

*Counting and Randomising in Automata Theory*

Jointly supervised by Mikołaj Bojańczyk and Thomas Colcombet

**Paris 7 & Warsaw**

*Sep. 2012 – Oct. 2015*

### Normalien (alumnus)

*Majoring in Computer Science*

**École Normale Supérieure de Cachan**

*Sep. 2008 – Aug. 2012*

## Research

My research is in computer science, more specifically automated verification. I am working at the intersection of formal methods and machine learning.

### Selection of five journal publications.....

1. COMPLETE SEMIALGEBRAIC INVARIANT SYNTHESIS FOR THE KANNAN-LIPTON ORBIT PROBLEM, with Pierre Ohlmann, Joël Ouaknine, Amaury Pouly, and James Worrell.  
In **ToCS**: *Theory of Computing Systems*, 2019, 25 pages.
2. CHARACTERISATION OF AN ALGEBRAIC ALGORITHM FOR PROBABILISTIC AUTOMATA.  
In **TCS**: *Theoretical Computer Science*, 2017, 31 pages.
3. MONADIC SECOND-ORDER LOGIC WITH ARBITRARY MONADIC PREDICATES, with Charles Paperman.  
In **ToCL**: *Transactions on Computational Logic*, 2017, 17 pages.
4. DECIDING THE VALUE 1 PROBLEM FOR PROBABILISTIC LEAKTIGHT AUTOMATA, with Hugo Gimbert, Edon Kelmendi and Youssef Oualhadj.  
In **LMCS**: *Logical Methods in Computer Science*, Volume 11, Issue 1, 2015, 37 pages.
5. 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. UNIVERSAL TREES GROW INSIDE SEPARATING AUTOMATA: QUASI-POLYNOMIAL LOWER BOUNDS FOR PARITY GAMES, with Wojciech Czerwiński, Laure Daviaud, Marcin Jurdziński, Ranko Lazić, and Paweł Parys.  
In **SODA'19: Symposium On Discrete Algorithms**, 15 pages.
2. THE STATE COMPLEXITY OF ALTERNATING AUTOMATA.  
In **LICS'18: Logics in Computer Science**, 10 pages.
3. EXPRESSIVENESS OF PROBABILISTIC MODAL LOGICS, REVISITED, with Bartek Klin and Prakash Panangaden.  
In **ICALP'17: International Colloquium on Automata, Languages, and Programming**, 12 pages.
4. 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.
5. 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.

## 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>

## Invited talks.....

### Complexity, Algorithms, Automata and Logic Meet

Chennai Mathematical Institute, India

21/01/2019

### 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

### Casting, FoSSaCS affiliated workshop

Eindhoven, Holland

02/04/2016

### AutoMathA final conference

Leipzig, Germany

08/05/2015

## Awards.....

### CNRS Momentum

Deep Synthesis

### Personal grant

Jan 2019 – Dec 2021

### PEPS JCJC

Learning for Program Synthesis

### Personal grant

Jan 2018 – Dec 2018

### Fellowship

Research Fellow at the Alan Turing Institute of data science

Jan 2017 – Dec 2021

### PhD thesis distinguished by Warsaw University

Jan 2016

## Scientific duties

---

### Steering committee memberships.....

- Since **2018**: leader of the GT ALGA (part of GDR-IM).
- Since **2017**: publicity chair of the conference Highlights of Logic, Games, and Automata.

### Programme committee memberships.....

- **2019**: International Conference on Reachability Problems (RP), Brussels.
- **2019**: International Colloquium on Automata, Languages and Programming (ICALP), Pratas.
- **2019**: Foundations of Software Systems and Computer Science (FoSSaCS), Prague.
- **2018**: Mathematical Foundations of Computer Science (MFCS), Liverpool.
- **2018**: Highlights of Logic, Games and Automata, Berlin.
- **2018**: Strategy Reasoning (SR), Oxford.

### 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.

### 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.
- **2017** – **2018**: 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.....

- Since **2018**: co-supervision of the PhD of Pierre Ohlmann.
- **2018**: co-supervision of Ritam Raha (M1), Timothée Jourde (M1), Corentin Barloy (L3), and Quentin de Goer de Hervé (L3).
- **2017**: supervision of Pierre Ohlmann (M1).
- **2015**: co-supervision of Magdalena Bojarska (M2).
- **2014**: co-supervision of Laureline Pinault (L3).

## 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.