

Curriculum Vitae

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

Current Positions

Junior Researcher

Chargé de recherche

CNRS, LaBRI, Bordeaux

Jan. 2018 – now

Research Fellow

Logical Foundations of Data Science

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

Aug. 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

Research

My research is in computer science, at the intersection of formal methods and machine learning. My interests include games, machine learning, verification, and dynamical systems. Below is a selection of my research publications, a complete list can be found online.

Selection of Five Journal Publications.....

1. CONSISTENT UNSUPERVISED ESTIMATORS FOR ANCHORED PCFGs, with Alexander Clark.
In **TACL**: *Transactions of the Association for Computational Linguistics*, 2020, 10 pages.
2. EXPRESSIVENESS OF PROBABILISTIC MODAL LOGICS: A GRADUAL APPROACH, with Florence Clerc, Bartek Klin, and Prakash Panangaden.
In **I&C**: *Information and Computation*, 2019, 31 pages.
3. 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.
4. CHARACTERISATION OF AN ALGEBRAIC ALGORITHM FOR PROBABILISTIC AUTOMATA.
In **TCS**: *Theoretical Computer Science*, 2017, 31 pages.
5. MONADIC SECOND-ORDER LOGIC WITH ARBITRARY MONADIC PREDICATES, with Charles Paperman.
In **ToCL**: *ACM Transactions on Computational Logic*, 2017, 17 pages.

Selection of Five Articles in International Conference Proceedings.....

1. DATA GENERATION FOR NEURAL PROGRAMMING BY EXAMPLE, with Judith Clymo, Haik Manukian, Adrià Gascón, and Brooks Paige.
In **AI&STATS'20**: *International Conference on Artificial Intelligence and Statistics*, 10 pages.
2. ASSUME-GUARANTEE SYNTHESIS FOR PROMPT LINEAR TEMPORAL LOGIC, with Bastien Maubert and Moshe Y. Vardi.
In **IJCAI'20**: *International Joint Conference on Artificial Intelligence*, 22 pages.
3. 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.
4. THE STATE COMPLEXITY OF ALTERNATING AUTOMATA.
In **LICS'18**: *Logics in Computer Science*, 10 pages.
5. EXPRESSIVENESS OF PROBABILISTIC MODAL LOGICS, REVISITED, with Bartek Klin and Prakash Panangaden.
In **ICALP'17**: *International Colloquium on Automata, Languages, and Programming*, 12 pages.

Selection of Five Invited Talks.....

Invited survey lecture

Jewels of Automata: from Mathematics to Applications (AutoMathA) 25/04/2020

Tutorial speaker

European Conference on Artificial Intelligence 29/08/2020

Invited speaker

International Symposium on Games, Automata, Logics, and Formal Verification 02/09/2019

Lecturer

ForMaL DigiCosme Spring School on Formal Methods and Machine Learning 05/06/2019

Invited speaker

Logical Structures for Computation at the Simons Institute in Berkeley 12/12/2017

Seminar Talks.....

London School of Economics (London, UK), RWTH i5 and i7 (Aachen, Germany), Data Factory (Bordeaux, France), 68NQRT (Rennes, France), LSV (Cachan, France), Bellairs Research Centre (Holetown, Barbados), MoVe (Marseille, France), LaBRI (Bordeaux, France), DIMAP (Warwick, UK), 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.....

CNRS Momentum (3 years, 180k€)

Deep Synthesis

Personal grant

Jan 2019 – Dec 2021

PEPS JCJC (1 year, 10k€)

Learning for Program Synthesis

Personal grant

Jan 2018 – Dec 2018

Alan Turing Institute of Data Science

Research Fellowship

Jan 2017 – Dec 2021

Scientific Duties

Steering Committee Memberships.....

- Since **2018**: leader of the GT ALGA (part of GDR-IM, a French network gathering computer scientists and mathematicians).
- Since **2017**: publicity chair of the conference Highlights of Logic, Games, and Automata.

Programme Committee Memberships of International Conferences.....

- **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** and **2019**: Highlights of Logic, Games and Automata, Berlin and Warsaw.

Organisation of Scientific Events.....

- **2020**: Learning and Verification day, second edition in Bordeaux (LaBRI).
- **2019**: Learning and Verification day, first edition in London (UCL).
- **2018**: Logic and learning FoPSS school in Oxford, affiliated to FLOC.
- **2018**: Summit on Machine Learning Meets Formal Methods in Oxford, affiliated to FLOC.
- **2018**: Logic and learning workshop in London (Alan Turing Institute of Data Science).

Organisation of Seminars and Working Groups.....

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

Student Supervision.....

- Since **2019**: supervision of Guillaume Lagarde (postdoc).
- Since **2019**: co-supervision of Ritam Raha (PhD).
- Since **2018**: co-supervision of Pierre Ohlmann (PhD).
- Since **2017**: several summer interns from ENS, IIT Bombay, and Chennai Mathematical Institute.

Teaching.....

- Since **2018**: Introduction to Reinforcement Learning, AI Master in Bordeaux.
- Since **2018**: Theory and Practice of Reinforcement Learning, PhD programme course.