

Nathalie Bertrand

Inria Researcher

Inria, Campus Universitaire de Beaulieu
35042 Rennes Cedex, France
☎ +33 2 99 84 22 81
✉ nathalie.bertrand@inria.fr
📁 people.rennes.inria.fr/Nathalie.Bertrand

Work Experience and Education

- since 2007 **Inria researcher**, *Inria Rennes*.
nov. 2015 Habilitation
- 2006-2007 **Post-doc**, *TU Dresden*, supervised by Christel Baier.
- 2003-2006 **PhD in Computer Science**, *Laboratoire Spécification et Vérification*, ENS Cachan.
- 2003 **Agrégation in Mathematics**.
- 2002 **Masters in Computer Science**, *Université Paris 7*, Algorithmics.

Teaching

At University Rennes 1 and ENS Rennes

- since 2014 **L3**, *ENS Rennes*, Algorithmique 2.
- since 2009 **Agreg maths option info**, *ENS Rennes*, Leçons et oraux blancs.
- 2010-2013 **Agreg maths option info**, *ENS Rennes*, Cours sur les Langages formels.
- 2009-2014 **M2**, *University Rennes 1*, Advanced verification techniques, with Sophie Pinchinat.

At Epita Rennes

- 2018-2019 **2nd year**, *Epita Rennes*, 1-week seminar on Theory of regular languages (THLR).

Young researchers schools

- EJCIM 2015 *Contrôle des modèles probabilistes partiellement observables*, Orléans (FR), avec Serge Haddad.
- MOVEP 2016 *Control of probabilistic systems under partial observation*, MOVEP 2016, Genova (IT).

Students

PhD students

- Suman Sadhukhan, co-supervised with Nicolas Markey and Ocan Sankur, since oct 2018
- Anirban Majumdar, co-supervised with Patricia Bouyer, since sept 2018
- Engel Lefauchaux, co-supervised with Serge Haddad, sept 2015-sept 2018
- Paulin Fournier, co-supervised with Thierry Jéron, sept 2012-nov 2015
- Amélie Stainer, co-supervised with Thierry Jéron, oct 2010-nov 2013

Masters students

- Bastien Thomas, feb-july 2019

- Aina Toky Rasoamanana, co-supervised with Nicolas Markey, feb-july 2017
- Engel Lefauchaux, co-supervised with Serge Haddad, apr-july 2014
- Aminatou Mohamadou, co-supervised with Paulin Fournier, may-july 2014
- Paulin Fournier, feb-july 2012
- Amélie Stainer, co-supervised with Thierry Jéron, feb-july 2010

Undergraduate students

- A.R. Balasubramanian, Chennai Mathematical Institute, co-supervised with Nicolas Markey, may-july 2017
- Vincent Aubry, École Normale Supérieure, co-supervised with Ocan Sankur, june-july 2016
- Miheer Dewaskar, Chennai Mathematical Institute, co-supervised with Blaise Genest, may-july 2015
- Loïs Vanhée, École Normale Supérieure de Rennes, co-supervised with Sébastien Gambs, july-aug 2010

Visiting students

- Shibashis Guha, IIT Dehli, jan-feb 2013

PhD defense committees

- Philipp Schlehuber-Caissier - dec 2018. ISIR, Sorbonne Université.
- Ľuboš Korenčiak - **reviewer** - apr 2018. Masaryk University (CZ).
- Othmane Rezine - jan 2018. Uppsala University (SE).
- Thomas Geffroy - dec 2017. LaBRI, Bordeaux.
- Nicolas David - oct 2017. LN2S, Nantes.
- Ayman Aljarbouh - sept 2017. IRISA, Rennes.
- Daniel Stan - **reviewer** - march 2017. ENS Cachan.
- Nathanaël Fijalkow - oct 2015. LIAFA, Paris.
- Aaron Bohy - may 2014. Mons University (BE).
- Youssouf Oualhadj - dec 2012. LaBRI, Bordeaux.

Invited talks

- *Controlling a population of identical automata* 20th anniversary of LSV, May 2017, Cachan, FR
- *Controlling probabilistic systems under partial observation: a verification perspective* Annual meeting of GDR Informatique Mathématique, March 2017, Montpellier, FR
- *Diagnosis in Infinite-State Probabilistic Systems*, Workshop on Verification of Infinite-State Systems (Infinity 2016), Aug. 2016, Singapore
- *Fault diagnosis for Probabilistic Systems: a semantical and algorithmic journey*, Conference on the Mathematical Foundations of Programming Semantics (MFPS 2016), May 2016, Pittsburgh, PA, USA
- *Fault diagnosis for Probabilistic Systems*, Colloque sur la Modélisation des systèmes réactifs (MSR 2015), Nov. 2015, Nancy, FR
- *Parameterized verification of probabilistic selective broadcast networks*, International Symposium on Games, Automata, Logics and Formal Verification (Gandalf 2015), Sept. 2015, Genova, IT
- *Diagnosis of Probabilistic Systems* DIMAP logic day, June 2015, Warwick, UK
- *Probabilistic model checking from finite to parameterized systems* Annual meeting of GT verif, June 2013, Cachan, FR

- *Determinizing timed automata* QuantLA seminar, Dec. 2012, Dresden, DE

Visits and seminars

Long visits abroad

- Simons Institute for Theoretical Computer Science, Berkeley, CA, USA - 1 month stay - oct 2017
- Université de Mons, Belgium - 2 month stay - jan and june 2014
- Liverpool University, England - 9 month stay - nov 2011 to july 2012

Invitation to 1-week seminars

- Open problems in Concurrency Theory - Vienna, june 2017
- Uncertainty in Computation - Simons Institute Berkeley, oct 2016
- Automata logic and games - Singapore, aug 2016
- Trends and Challenges in Quantitative Verification - Mysore, feb 2016
- Non-zero sum games and control - Dagstuhl, feb 2015
- Quantitative models - Dagstuhl jan 2010

Participation to projects

Current projects

2016-2018 **QuantProb**, *Principal Investigator*, Inria Associated team with TU Dresden, Quantitative analysis of non-standard properties for probabilistic models.

2014-2018 **Stoch-MC**, *Participant*, ANR project, Scalable model checking for stochastic models.

Past projects

2014-2016 **AVerTS**, *Participant*, Indo-French project, Algorithmic Verification of Real-Time Systems.

2013-2015 **DISTOL**, *Participant*, Inria Associated team with Chennai Mathematical Institute, Distributed and Stochastic systems, Logic.

2012-2015 **VACSIM**, *Participant*, ANR project, Validation de la commande des systèmes critiques par couplage simulation et méthodes d'analyse formelle.

2011-2014 **ImpRO**, *Participant*, ANR project, Implementability and Robustness of Timed Systems.

2009-2011 **STP**, *Principal Investigator*, Tournesol bilateral project with Mons University (BE), Probabilistic Timed Systems.

2008-2010 **PIPS**, *Principal Investigator*, Procope bilateral project with TU Dresden, Partial Information Probabilistic Systems.

2008-2011 **TESTEC**, *Participant*, ANR project, TEst des Systèmes Temps réel Embarqués Critiques.

2008-2011 **COMBEST**, *Participant*.

2006-2007 **VOSS II**, *Participant*.

2003-2006 **ACI Persée**, *Participant*.

Scientific event committees

Steering committees

- Steering committee member of the young researcher school MOVEP (2017-)
- Steering committee member of the international conference QEST (2012-2015)
- Steering committee member of the French working group on verification (2014-2017)

Program committees

Programm committee co-chair of QEST'17, QAPL'15 and QAPL'14.

Program committee member of the international events

2019 MFCS'19, RP'19;

2018 FoSSaCS'18, ICALP'18, Highlights'18, RP'18, MoRe'18;

2017 LICS'17, FCT'17, MSR'17;

2016 STACS'16, TACAS'16, Concur'16, QEST'16;

2015 TACAS'15, Formats'15, QEST'15, ICLA'15, QAPL'15;

2014 TACAS'14, Infinity'14, QEST'14, QAPL'14;

2013 MFCS'13, QEST'13, QAPL'13, MSR'13;

2012 QEST'12, SYNT'12, QAPL'12;

2011 QAPL'11;

2010 QEST'10, QAPL'10, EXPRESS'10.

Academic Duties

since 2017 **Co-head of the French working group on verification.**

since 2016 **Nominated member of CNU27 (*Conseil National des Universités, section 27*).**

2012-2015 **Member and scientific secretary of Gilles Kahn PhD award committee.**

Hiring committees
Member for ENS Rennes in 2011, University Paris XII in 2015, University Paris Est Créteil in 2018, Inria Rennes in 2013, 2016 and 2018.

Publications

My publications are available at the following address:

<http://people.rennes.inria.fr/Nathalie.Bertrand/publis.html>

Note: in my research area, authors are usually listed in alphabetical order.

Edited books

- Nathalie Bertrand and Luca Bortolussi. *Proceedings of the 14th International Conference on Quantitative Evaluation of Systems (QEST 2017)*, volume 10503 of Lecture Notes in Computer Science, Springer, 2017.
- Nathalie Bertrand and Mirco Tribastone. *Proceedings of the 13th International Workshop on Quantitative Aspects of Programming Languages and Systems (QAPL 2015)*, volume 194 of Electronic Proceedings in Theoretical Computer Science, 2015.
- Nathalie Bertrand and Luca Bortolussi. *Proceedings of the 12th International Workshop on Quantitative Aspects of Programming Languages and Systems (QAPL 2014)*, volume 154 of Electronic Proceedings in Theoretical Computer Science, 2014.

Chapters in books

- Nathalie Bertrand and Serge Haddad. *Contrôle des modèles probabilistes partiellement observables*, in *Informatique Mathématique : Une photographie en 2015*, CNRS Éditions, 2015.

International journals

- Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye and Pierre Carlier. *When are stochastic transition systems tameable?* *Journal of Logic and Algebraic Methods in Programming*, 99 pages 41-96, 2018.
- Nathalie Bertrand, Blaise Genest and Hugo Gimbert. *Qualitative Determinacy and Decidability of Stochastic Games with Signals*. *Journal of the ACM* 64(5), pages 33:1-33:48, 2017.
- Aaron Bohy, Véronique Bruyère, Jean-François Raskin, and Nathalie Bertrand. *Symblicit algorithms for mean-payoff and shortest path in monotonic Markov decision processes* *Acta Informatica*, 54(6), pages 545-587, 2017.
- Nathalie Bertrand, Amélie Stainer, Thierry Jéron and Moez Krichen, *A game approach to determinize timed automata*. *Formal Methods in System Design* 46(1), pages 42-80, 2015.
- Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye, Quentin Menet, Christel Baier, Marcus Größer and Marcin Jurdzinski, *Stochastic Timed Automata*. *Logical Methods in Computer Science* 10(4), 72 pages, 2014.
- Nathalie Bertrand and Philippe Schnoebelen. *Computable fixpoints in well-structured symbolic model checking*. *Formal Methods in System Design* 43(2), pages 233-267, 2013.
- Nathalie Bertrand, Thierry Jéron, Amélie Stainer and Moez Krichen. *Off-line test selection with test purposes for non-deterministic timed automata*. *Logical methods in Computer Science* 8(4), 2012.
- Christel Baier, Nathalie Bertrand and Marcus Größer. *Probabilistic ω -automata*. *Journal of the ACM* 59(1), 2012.
- Nathalie Bertrand, Axel Legay, Sophie Pinchinat and Jean-Baptiste Raclet. *Modal event-clock specifications for timed component-based design*. To appear in *Science of Computer Programming*.
- Christel Baier, Nathalie Bertrand and Philippe Schnoebelen. *Verifying Nondeterministic Probabilistic Channel Systems against ω -Regular Linear-Time Properties*. *ACM Transactions on Computational Logic* 9(1), 2007.
- Christel Baier, Nathalie Bertrand and Philippe Schnoebelen. *A Note on the Attractor-Property of Infinite-State Markov Chains*. *Information Processing Letters* 97(2), pages 58–63, 2006.
- Parosh Abdulla, Nathalie Bertrand, Alexander Rabinovich and Philippe Schnoebelen. *Verification of Probabilistic Systems with Faulty Communication*. *Information and Computation* 202(2), pages 141–165, 2005.
- Nathalie Bertrand, Irène Charon, Olivier Hudry and Antoine Lobstein. *1-Identifying Codes on Trees*. *Australasian Journal of Combinatorics* 31, pages 21–35, 2005.

- Nathalie Bertrand, Irène Charon, Olivier Hudry and Antoine Lobstein. *Identifying and Locating-Dominating Codes on Chains and Cycles*. *European Journal of Combinatorics* 27(7), pages 969–987, 2004.

International conferences

- Christel Baier, Nathalie Bertrand, Clemens Dubslaff, Daniel Gburek and Ocan Sankur. *Stochastic Shortest Paths and Weight-Bounded Properties in Markov Decision Processes*. In *Proceedings of LICS'18*, ACM, pages 86-94.
- A. R. Balasubramanian, Nathalie Bertrand and Nicolas Markey. *Parameterized Verification of Synchronization in Constrained Reconfigurable Broadcast Networks*. In *Proceedings of TACAS'18*, volume 10806 of LNCS, pages 38-54, Springer.
- Nathalie Bertrand, Miheer Dewaskar, Blaise Genest and Hugo Gimbert. *Controlling a population*, In *Proceedings of Concur'17*, volume 85 of LIPIcs, pages 12:1-12:16, Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik.
- Nathalie Bertrand, Serge Haddad and Engel Lefaucheu. *Diagnosis in Infinite-State Probabilistic Systems* In *Proceedings of Concur'16*, volume 59 of LIPIcs, pages 37:1-37:15, Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik.
- Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye and Pierre Carlier, *Analysing decisive stochastic processes* In *Proceedings of ICALP'16*, volume 43 of LIPIcs, pages 101:1-101:14, Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik.
- Nathalie Bertrand, Serge Haddad and Engel Lefaucheu. *Accurate Approximate Diagnosability of Stochastic Systems* In *Proceedings of LATA'16*, volume 9618 of LNCS, pages 549-561. Springer.
- Nathalie Bertrand, Paulin Fournier and Arnaud Sangnier. *Distributed Local Strategies in Broadcast Networks* In *Proceedings of Concur'15*, volume 42 of LIPIcs, pages 44-57. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik.
- Nathalie Bertrand, Serge Haddad and Engel Lefaucheu. *Foundation of Diagnosis and Predictability in Probabilistic Systems* In *Proceedings of FSTTCS'14*, volume 29 of LIPIcs, pages 417-429. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik.
- Nathalie Bertrand, Thomas Brihaye and Blaise Genest. *Deciding the value 1 problem for reachability in 1-clock decision stochastic timed automata*. In *Proceedings of QEST'14*, volume 8657 of LNCS, pages 313-328. Springer.
- Nathalie Bertrand, Éric Fabre, Stefan Haar, Serge Haddad and Loïc Hélouët. *Active diagnosis for probabilistic systems*. In *Proceedings of FoSSaCS'14*, volume 8412 of LNCS, pages 134-148. Springer.
- Nathalie Bertrand, Paulin Fournier and Arnaud Sangnier. *Playing with probabilities in reconfigurable broadcast networks*. In *Proceedings of FoSSaCS'14*, volume 8412 of LNCS, pages 29-42. Springer.
- Nathalie Bertrand and Paulin Fournier. *Parameterized verification of many identical probabilistic timed processes*. In *Proceedings of the 33rd IARCS Annual Conference on Foundations of*

Software Technology and Theoretical Computer Science (FSTTCS'13), volume 24 of *LIPICs*, pages 501–513. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik.

- S. Akshay, Nathalie Bertrand, Serge Haddad and Loïc Hélouët. *The steady-state control problem for Markov decision processes*. In *Proceedings of the 10th International Conference on Quantitative Evaluation of Systems (QEST'13)*, volume 8054 of *LNCS*, pages 390-304. Springer.
- Paolo Ballarini, Nathalie Bertrand, Andras Horváth, Marco Paolieri, and Enrico Vicario. *Transient Analysis of Networks of Stochastic Timed Automata using Stochastic State Classes*. In *Proceedings of the 10th International Conference on Quantitative Evaluation of Systems (QEST'13)* volume 8054 of *LNCS*, pages 355-371. Springer.
- Nathalie Bertrand and Sven Schewe. *Playing Optimally on Timed Automata with Random Delays*. In *Proceedings of the 10th International Conference on Formal Modeling and Analysis of Timed Systems (Formats'12)*, volume 7595 of *LNCS*, pages 43–58. Springer.
- Nathalie Bertrand, John Fearnley and Sven Schewe. *Bounded Satisfiability for PCTL*. In *Proceedings of the 21st EACSL Annual Conferences on Computer Science Logic (CSL'12)*, volume 16 of *LIPICs*, pages 92–106. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2012.
- Nathalie Bertrand, Giorgio Delzanno, Barbara König, Arnaud Sangnier and Jan Stückrath. *On the Decidability Status of Reachability and Coverability in Graph Transformation Systems*. In *Proceedings of 23rd International Conference on Rewriting Techniques and Applications (RTA'12)*, volume 15 of *LIPICs*, pages 101-116. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2012.
- Nathalie Bertrand and Blaise Genest. *Minimal Disclosure in Partially Observable Markov Decision Processes*. In *Proceedings of the 31st Annual Conference Foundations on Software Technology and Theoretical Computer Science (FSTTCS'11)*, *LIPICs*. Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2011.
- Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye and Amélie Stainer. *Emptiness and Universality Problems in Timed Automata with Positive Frequency*. In *Proceedings of the 38th International Colloquium on Automata, Languages and Programming (ICALP'11)*, volume 6756 of *LNCS*, pages 246–257. Springer, 2011.
- Nathalie Bertrand, Thierry Jéron, Amélie Stainer and Moez Krichen. *Off-line Test Selection with Test Purposes for Non-Deterministic Timed Automata*. In *Proceedings of the 17th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS'11)*, volume 6605 of *LNCS*, pages 96–111. Springer, 2011.
- Nathalie Bertrand, Amélie Stainer, Thierry Jéron and Moez Krichen. *A Game Approach to Determinize Timed Automata*. In *Proceedings of the 14th International Conference on Foundations of Software Science and Computation Structures (FoSSaCS'11)*, volume 6604 of *LNCS*, pages 245–259. Springer, 2011.
- Nathalie Bertrand, Axel Legay, Sophie Pinchinat and Jean-Baptiste Raclet. *A Compositional Approach on Modal Specifications for Timed Systems*. In *Proceedings of the 11th International Conference on Formal Engineering Methods (ICFEM'09)*, volume 5585 of *LNCS*, pages 679–697. Springer, 2009.

- Christel Baier, Nathalie Bertrand, Patricia Bouyer, and Thomas Brihaye. *When are timed automata determinizable?* In *Proceedings of the 36th International Colloquium on Automata, Languages and Programming (ICALP'09)*, volume 5556 of *LNCS*, pages 43–54. Springer, 2009.
- Nathalie Bertrand, Blaise Genest and Hugo Gimbert. *Qualitative Determinacy and Decidability of Stochastic Games with Signals*. In *Proceedings of the 24th Annual IEEE Symposium on Logic in Computer Science (LICS'09)*, pages 319–328. IEEE Computer Society Press, 2009.
- Nathalie Bertrand, Sophie Pinchinat and Jean-Baptiste Raclet. *Refinement and Consistency of Timed Modal Specifications*. In *Proceedings of the 3rd International Conference on Language and Automata Theory and Applications (LATA'09)*, volume 5457 of *LNCS*, pages 152–163. Springer, 2009.
- Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye and Nicolas Markey. *Quantitative Model-Checking of One-Clock Timed Automata under Probabilistic Semantics*. In *Proc. 5th Int. Conf. on the Quantitative Evaluation of Systems (QEST'08)*, pages 55–64. IEEE Computer Society Press, 2008.
- Christel Baier, Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye and Marcus Größer. *Almost-Sure Model Checking of Infinite Paths in One-Clock Timed Automata*. In *Proc. 23rd Annual IEEE Symp. on Logic in Computer Science (LICS'08)*, pages 217–226. IEEE Computer Society Press, 2008.
- Christel Baier, Nathalie Bertrand and Marcus Größer. *On Decision Problems for Probabilistic Büchi Automata*. In *Proc. 11th Int. Conf. on Foundations of Software Science and Computation Structures (FoSSaCS'08)*, volume 4962 of *LNCS*, pages 287–301. Springer, 2008.
Awarded EATCS best theory paper at ETAPS
- Christel Baier, Nathalie Bertrand, Patricia Bouyer, Thomas Brihaye and Marcus Größer. *Probabilistic and Topological Semantics for Timed Automata*. In *Proc. 27th Conf. on Foundations of Software Technology and Theoretical Computer Science (FSTTCS'07)*, volume 4855 of *LNCS*, pages 179–191. Springer, 2007.
- Christel Baier, Nathalie Bertrand and Philippe Schnoebelen. *On Computing Fixpoints in Well-Structured Regular Model Checking, with Applications to Lossy Channel Systems*. In *Proc. 13th Int. Conf. on Logic for Programming, Artificial Intelligence, and Reasoning (LPAR'06)*, volume 4246 of *LNAI*, pages 347–361. Springer, 2006.
- Christel Baier, Nathalie Bertrand and Philippe Schnoebelen. *Symbolic Verification of Communicating Systems with Probabilistic Message Losses: Liveness and Fairness*. In *Proc. 26th Int. Conf. on Formal Techniques for Networked and Distributed Systems (FORTE'06)*, volume 4229 of *LNCS*, pages 212–227. Springer, 2006.
- Nathalie Bertrand and Philippe Schnoebelen. *Model Checking Lossy Channels Systems is Probably Decidable*. In *Proc. 6th Int. Conf. on Foundations of Software Science and Computation Structures (FoSSaCS'03)*, volume 2620 of *LNCS*, pages 120–135. Springer, 2003.

Theses

- *Contributions to the verification and control of timed and probabilistic models*, Habilitation, IRISA, Université Rennes 1 , France, November 2015.

- *Modèles stochastiques pour les pertes de messages dans les protocoles asynchrones et techniques de vérification automatique*, PhD Thesis, Laboratoire Spécification et Vérification, ENS Cachan, France, October 2006.