Personal Details[1]

Riccardo Bonalli, born on 19/11/1989 in Varese, Italy (Italian citizen).
Associate Professor (Chargé de recherche CNRS) at Université Paris-Saclay, France.
Married, one child.

Languages:	Italian (native), English (fluent), French (fluent)
Address:	Laboratoire des Signaux et Système (L2S) Université Paris-Saclay, CNRS, CentraleSupélec Bât. Bréguet, 3 Rue Joliot Curie, 91190 Gif-sur-Yvette, France
E-mail:	riccardo.bonalli@cnrs.fr
Website:	https://rbonalli.github.io
Google Scholar:	h-index 14, 986 citations (on May 2025)

Accademic positions

Currently (from 10/2021)	CNRS Permanent Researcher at L2S Laboratory, Université Paris-Saclay, France. *Ranked 1st in the Systems and Control track in the 2021 CNRS national hiring process.*
08/2018–07/2021	Postdoctoral Fellow, Dep. of Aeronautics and Astronautics, Stanford University, USA. *Postdoctoral fellowship funded by NASA space program.*

Education and key qualifications

04/2015–07/2018	PhD in Applied Mathematics, Sorbonne Université, France. Defended on July 13, 2018. Optimal Control of Aerospace Systems with Control-State Constraints and Delays, supervised by Prof. Emmanuel Trélat and Dr. Bruno Hérissé. *Pursued in collaboration with ONERA–The French Aerospace Lab.*
03/2012–12/2014	MSc in Mathematical Engineering, Politecnico di Milano, Italy. *Six months break (03/2014–08/2014) due to extracurricular internship.*
10/2011–02/2012	Graduate Specialization in Numerical Analysis, Politecnico di Milano, Italy.
10/2008–09/2011	BSc in Physical Engineering, Politecnico di Milano, Italy.

Awards and Recognitions

2025–2027	PI of the ANR ERC Tremplin personal grant Provably Efficient and safe-against-Uncertainty control of autonomous systems. *Selective French grants awarded only if the PI's ERC-submitted project has passed the first step (30%).*
2023	Recipient of the IEEE CDC Outstanding Student Paper Award (as advisor).
2023	Recipient of the IEEE Control Systems Magazine Outstanding Paper Award.
2022–2025	PI of the ANR JCJC project ROCH–Risk-averse Optimal Control via Homotopy. *The most selective French starting grants: 17% of average acceptance rate.*
2021	Recipient of the Prime d'Excellence Scientifique (PES).
2018	Recipient of the ONERA Best PhD Student Award in Systems and Control.

Funding and Grants

2025	H-CoDe collaborative grant Séminaire d'automatique de Saclay. Funding: 2 000 €.
2025–2027	ANR ERC Tremplin personal grant Provably Efficient and safe-against-Uncertainty control of autonomous systems. Funding: 120 000 €.
2024	H-CoDe collaborative grant Séminaire d'automatique de Saclay. Funding: 2 000 €.
2023–2026	AMX scholarship from École Polytechnique, for one three-year PhD student. Funding: 120 000 €.
2023	H-CoDe collaborative grant ViBro–ViBrations in robotics. Funding: 6 900 €.
2023	H-CoDe collaborative grant Learning and Optimizationfor Autonomous Systems. Funding: 8 200 €.
2022–2025	STIC scholarship from Université Paris-Saclay, for one three-year PhD student. Funding: 120 000 €.
2022	H-CoDe collaborative grant Séminaire d'automatique de Saclay. Funding: 2 000 €.
2022–2025	ANR JCJC personal grant ROCH–Risk-averse Optimal Control via Homotopy. Funding: 230 000 €.
2021	STIC scholarship from Université Paris-Saclay, for one six-month graduate intern. Funding: 5 000 €.

Publications

Journal papers

[J19] G. Velho, J. Auriol, I. Boussaada, and R. Bonalli, Stabilization and Optimal Control of an Interconnected $n+m$ Hetero-directional Hyperbolic PDE–SDE System. Submitted.

[J18] L. Brogat-Motte, R. Bonalli, and A. Rudi, Learning Controlled Stochastic Differential Equations. Submitted.

[J17] T. Lew, R. Bonalli, and M. Pavone, Convex Hulls of Reachable Sets. Submitted.

[1] Blue text indicates URLs.

[J16] A. C. Morelli, C. Giordano, R. Bonalli, and F. Topputo, Characterization of Singular Arcs in Spacecraft Trajectory Optimization. Submitted.

[J15] G. Velho, J. Auriol, and R. Bonalli, A Gradient Descent-Ascent Method for Continuous-Time Risk-Averse Optimal Control. Submitted.

[J14] R. Bonalli and A. Rudi, Non-Parametric Learning of Stochastic Differential Equations with Non-asymptotic Fast Rates of Convergence. Foundations of Computational Mathematics (2025).

[J13] G. Velho, J. Auriol, R. Bonalli, and I. Boussaada. Stabilization and Optimal Control of Interconnected SDE – Scalar PDE System. IEEE Control Systems Letters, 8 (2024), pp. 2307–2312.

[J12] T. Lew, R. Bonalli, and M. Pavone, Sample Average Approximation for Stochastic Programming with Equality Constraints. SIAM Journal on Optimization, 34 (2024), pp. 3506–3533.

[J11] T. Lew, R. Bonalli, L. Janson, and M. Pavone, Estimating the Convex Hull of the Image of a Set with Smooth Boundary: Error Bounds and Applications. Discrete & Computational Geometry (2024), pp. 1–39.

[J10] C. Leparoux, R. Bonalli, B. Hérissé, and F. Jean, Statistical Linearization for Robust Motion Planning. Systems & Control Letters, 189 (2024), 105825.

[J9] R. Bonalli, C. Leparoux, B. Hérissé, and F. Jean, On the Accessibility and Controllability of Statistical Linearization for Stochastic Control: Algebraic Rank Conditions and their Genericity. Mathematical Control and Related Fields, 14 (2024), pp. 648–670.

[J8] T. Lew, R. Bonalli, and M. Pavone, Risk-Averse Trajectory Optimization via Sample Average Approximation. IEEE Robotics and Automation Letters, 9 (2023), pp. 1500–1507.

[J7] R. Bonalli and B. Bonnet, First-Order Pontryagin Maximum Principle for Risk-Averse Stochastic Optimal Control Problems. SIAM Journal on Control and Optimization, 61 (2023), pp. 1881–1909.

[J6] R. Bonalli, T. Lew, and M. Pavone, Analysis of Theoretical and Numerical Properties of Sequential Convex Programming for Continuous-Time Optimal Control. IEEE Transactions on Automatic Control, 68 (2023), pp. 4570–4585.

[J5] D. Malyuta, T. P. Reynolds, M. Szmuk, T. Lew, R. Bonalli, M. Pavone, and B. Açikmeşe, Convex Optimization for Trajectory Generation: A Tutorial on Generating Dynamically Feasible Trajectories Reliably and Efficiently. IEEE Control Systems Magazine, 42 (2022), pp. 40–113.
Awarded the ***IEEE CSM Outstanding Paper Award 2023****.*

[J4] M. P. Chapman, R. Bonalli, K. M. Smith, I. Yang, M. Pavone, and C. J. Tomlin, Risk-sensitive safety analysis using Conditional Value-at-Risk. IEEE Transactions on Automatic Control, 67 (2022), pp. 6521–6536.

[J3] R. Bonalli, T. Lew, and M. Pavone, Sequential Convex Programming for Non-Linear Stochastic Optimal Control. ESAIM: Control, Optimisation and Calculus of Variations, 28 (2022), total pp. 34.

[J2] R. Bonalli, B. Hérissé and E. Trélat, Optimal Control of Endo-Atmospheric Launch Vehicle Systems: Geometric and Computational Issues. IEEE Transactions on Automatic Control, 65 (2020), pp. 2418–2433.

[J1] R. Bonalli, B. Hérissé and E. Trélat, Continuity of Pontryagin Extremals with Respect to Delays in Nonlinear Optimal Control. SIAM Journal on Control and Optimization, 57 (2019), pp. 1440–1466.

Proceedings in conferences

[C19] L. Brogat-Motte, R. Bonalli, and A. Rudi, Safely Learning Controlled Stochastic Dynamics. Submitted.

[C18] G. Velho, J. Auriol, I. Boussaada, and R. Bonalli, Optimal Control of Interconnected SDE - Parabolic PDE System. Submitted.

[C17] E. Lai, R. Bonalli, A. Girard, and F. Jean, Continuous-time Nonlinear Optimal Control Problem under Signal Temporal Logic Constraints. Submitted.

[C16] G. Velho, J. Auriol, I. Boussaada, and R. Bonalli, Stabilization and Optimal Control of a Multi Input-Delayed SDE System. Submitted.

[C15] G. Velho, J. Auriol, R. Bonalli, and I. Boussaada. Stabilization and Optimal Control of Interconnected SDE – Scalar PDE System. Presentation of [J13] (different proceeding) at IEEE Conference on Decision and Control, 2024, Milan.

[C14] G. Velho, R. Bonalli, J. Auriol, and I. Boussaada. Mean-Covariance Steering of a Linear Stochastic System with Input Delay and Additive Noise. Proc. IEEE European Control Conference, 2024, Stockholm.

[C13] T. Lew, R. Bonalli, and M. Pavone, Risk-Averse Trajectory Optimization via Sample Average Approximation. Presentation of [J8] (different proceeding) at IEEE International Conference on Robotics and Automation, 2024, Yokohama.

[C12] T. Lew, R. Bonalli, and M. Pavone, Exact Characterization of the Convex Hulls of Reachable Sets. Proc. IEEE Conference on Decision and Control, 2023, Singapore.
Awarded the ***IEEE CDC 2023 Outstanding Student Paper Award****.*

[C11] F. Mahlknecht, J. I. Alora, S. Jain, E. Schmerling, R. Bonalli, G. Haller, and M. Pavone, Using Spectral Submanifolds for Nonlinear Periodic Control. Proc. IEEE Conference on Decision and Control, 2022, Cancun.

[C10] T. Lew, L. Janson, R. Bonalli, and M. Pavone, A Simple and Efficient Sampling-based Algorithm for General Reachability Analysis. Proc. Learning for Dynamics and Control Conference, 2022, Stanford.

[C9] A. Bylard, R. Bonalli, and M. Pavone, Composable Geometric Motion Policies using Multi-Task Pullback Bundle Dynamical Systems. Proc. IEEE International Conference on Robotics and Automation, 2021, Xi'an.

[C8] T. Lew, R. Bonalli, and M. Pavone, Chance-Constrained Sequential Convex Programming for Robust Trajectory Optimization. Proc. IEEE European Control Conference, 2020, Saint Petersburg.

[C7] S. Banerjee, T. Lew, R. Bonalli, A. Alfaadhel, I. A. Alomar, H. M. Shageer, and M. Pavone, Learning-based Warm-Starting for Fast Sequential Convex Programming and Trajectory Optimization. Proc. IEEE Aerospace Conference, 2020, Big Sky.

[C6] M. Kleinbort, K. Solovey, R. Bonalli, E. Granados, Refined Analysis of Asymptotically-Opimal Kinodynamic Planning in the State-Cost Space. Proc. IEEE International Conference on Robotics and Automation, 2020, Paris.

[C5] R. Bonalli, A. Cauligi, A. Bylard, T. Lew and M. Pavone, Trajectory Optimization on Manifolds: A Theoretically-Guaranteed Embedded Sequential Convex Programming Approach. proc. Robotics: Science and Systems, 2019, Freiburg.

[C4] R. Bonalli, A. Cauligi, A. Bylard and M. Pavone, GuSTO: Guaranteed Sequential Trajectory Optimization via Sequential Convex Programming. Proc. IEEE International Conference on Robotics and Automation, 2019, Montreal.

[C3] R. Bonalli, B. Hérissé, H. Maurer and Emmanuel Trélat. The Dubins Car Problem with Delay and Applications to Aeronautics Motion Planning Problems. Proc. French–German–Italian Conference on Optimization, 2017, Paderborn.

[C2] R. Bonalli, B. Hérissé and E. Trélat. Analytical Initialization of a Continuation-Based Indirect Method for Optimal Control of Endo-Atmospheric Launch Vehicle Systems. Proc. IFAC World Congress, 2017, Toulouse.

[C1] R. Bonalli, B. Hérissé and E. Trélat. Solving Optimal Control Problems for Delayed Control-Affine Systems with Quadratic Cost by Numerical Continuation. Proc. IEEE American Control Conference, 2017, Seattle.

Graduate thesis

[T1] PhD Thesis – R. Bonalli, Optimal Control of Aerospace Systems with Control-State Constraints and Delays. Defended on July 13, 2018 (Sorbonne Université). Supervised by Prof. Emmanuel Trélat and Dr. Bruno Hérissé. *Awarded the* ***ONERA Best PhD Student Award 2018*** *in Systems and Control.*

Projects

Software

[S3] `SCP Toolbox` – `Julia`-based library implementing state-of-the-art optimization-based methods for trajectory generation. Developed in collaboration with Danylo Malyuta, Taylor P. Reynolds, Michael Szmuk, Thomas Lew, Marco Pavone, and Behçet Açikmeşe, this library leverages the schemes we developed in [J5], offering efficient and reliable solutions to several complex real-world control problems, such as the rocket landing problem. This open-source and user-friendly toolbox is accessible at the following GitHub repository.

[S2] `PBDS` – `Julia`-based library implementing Pullback Bundle Dynamical Systems, a differential geometric paradigm for real-time policy generation that hinges upon my work [C9]. Developed in collaboration with Andrew Bylard and Marco Pavone, this library enables computing composed policies in the range 300-500 Hz, for complex, high-degree-of-freedom robotic systems operating in cluttered environments. The whole open-source library can be found at the following GitHub repository.

[S1] `SOCP` – `C++`-based industrial software implementing indirect shooting methods for real-time trajectory generation of endo-atmospheric, thruster-based systems. I developed this software in collaboration with Bruno Hérissé at ONERA [T1]. It can compute optimal solutions to complex non-convex endo-atmospheric rendezvous problems in few milliseconds, on onboard computers of few kilobytes of memory. Although this software is today owned by ONERA, an open-source, beta-version of my code can be found at the following GitHub repository.

Hardware experiments

[E2] Hardware experiments aboard the International Space Station – Developed in collaboration with Abhishek Cauligi and Marco Pavone, through these experiments we successfully validated some of our algorithms for grasping maneuvers on real NASA's space robots Astrobee. You can witness a portion of these validations in this video.

[E1] Hardware experiments at the Stanford Space Robotics facility – Developed in collaboration with Thomas Lew and Marco Pavone, through these experiments we stress-tested some of my latest optimal control algorithms [C10]. Specifically, as demonstrated in this video, we made realistic replica of space robots safely navigate simulated two-dimensional micro-gravity uncertain environments, outperforming popular state-of-the-art methods.

Academic Supervision

PhD students

From 01/2024	En Lai (35% with F. Jean and A. Girard), PhD student at École Polytechnique, France. Deterministic and Stochastic Optimal Control with Signal Temporal Logic Constraints.
03/2023–09/2023	Andrea C. Morelli, visiting PhD student from Politecnico di Milano, Italy. Optimization-based Trajectory Generation for Outer Space Robots under Uncertainty. Currently at Vyoma GmbH, Germany.

From 11/2022 Gabriel Velho (35% with J. Auriol and I. Boussaada), PhD student at Université Paris-Saclay, France.
Efficient and Reliable Control of coupled Stochastic and Partial differential Equations.

09/2019–09/2023 Thomas Lew (50% with M. Pavone), PhD in Sept. 2023 at Stanford University, USA.
Control-Oriented Learning for Robotics and Dynamical Systems.
Currently at Toyota Research Institute, USA.

08/2018–11/2021 Andrew Bylard (50% with M. Pavone), PhD in Nov. 2021 at Stanford University, USA.
Leveraging the Geometric Structure of Robotic Tasks for Motion Design.
Currently at Dexterity, USA.

Postdoctoral fellows

From 10/2025 Jules Berry (50% with L. Pfeiffer), postdoctoral fellow at Université Paris-Saclay, France.
Mean-field-based Risk-averse Stochastic Optimal Control.

10/2023–05/2025 Luc Brogat-Motte (50% with A. Rudi), postdoctoral fellow at Université Paris-Saclay, France.
Learning Methods for Safe-against-Uncertainty Control.

Teaching Activities

Currently (from 2025) Professor Mentor with Lumiere Education, USA.

Currently (from 2025) Principal instructor for the MSc course Optimal Control for Aerospace (24-Ci421g) at Institut Polytechnique des Sciences Avancées, France.

Currently (from 2024) Collaborating instructor for the BSc course Calculus and Probability (ECUE11.2) at Mines Paris – PSL, France.

Currently (from 2023) Principal instructor for the MSc course Optimal Control of Ordinary Differential Equations (SOD311) at Institut Polytechnique de Paris, France.

2023 Guest lecturer for the MSc course Control in Finite and Infinite Dimension (MU5MAM53) at Sorbonne Université, France.

2022–2023 Collaborating instructor for the BSc course Systems and Control (AUT201) at Institut Polytechnique de Paris, France.

2021 Guest lecturer for the MSc course Control in Finite and Infinite Dimension (MU5MAM53) at Sorbonne Université, France.

2019–2020 Collaborating instructor for the MSc course Optimal and Learning-based Control (AA203) at Stanford University, USA.

2016–2017 Teaching assistant and lecturer for the BSc course on Convex Optimization (AO101) at ENSTA ParisTech, France.

2015–2017 Teaching assistant and lecturer for the BSc course Analysis and Stability of Dynamical Systems (AO102) at ENSTA ParisTech, France.

Organization of Scientific Meetings

2021–2025 Organizer of the Séminaire d'Automatique du Plateau de Saclay.

2024 Organizer of the workshop Theoretical Approaches to Modern Machine Learning Methods at the French-German-Spanish Conference on Optimization, Gijòn, Spain.

2022 Organizer of the session Theoretical and Numerical Advances on the Optimal Control of Complex Systems at the international IFAC Workshop on Control Applications of Optimization, Gif-sur-Yvette, France.

2019 Organizer of the workshop Space Robotics at the international Robotics: Science and Systems conference, Freiburg, Germany.

Review and Institutional Activities

Currently (from 2025) Member of the board of directors of the Société d'Automatique, de Génie Industriel et de Productique (SAGIP).

Currently (from 2023) Associate Reviewer for Mathematical Reviews.

2025 Associate Editor for the IFAC Workshop Control of Complex Systems – 2nd COSY 2025.

2025 Member of the selection committee for Master intern scholarships in artificial intelligence "Fondation CS en IA" at L2S, Université Paris-Saclay.

2024 Member of Liangying Chen's PhD defense committee, Laboratoire Jacques-Louis Lions, Sorbonne Université.

2024 Associate Editor at Large (member of the Technical Program Committee) for IEEE Conference on Decision and Control 2024.

2022 Member of the evaluation committee for the L2S Best PhD Presentation Award 2022 at Université Paris-Saclay.

I am peer-reviewer for conferences and journals in theoretical and numerical control for aerospace and robotics.

- The list of top international conferences includes: IEEE International Conference on Robotics and Automation; IEEE Conference on Decision and Control; American Control Conference; IFAC World Congress; European Control Conference; Robotics: Science and Systems; IEEE Aerospace Conference.
- The list of top journals includes: IEEE Transactions on Automatic Control; IEEE Transactions on Robotics; SIAM Journal on Control and Optimization; ESAIM: Control, Optimisation and Calculus of Variations; European Journal of Control; Acta Applicandae Mathematicae; Optimal Control, Applications and Methods; IEEE Control Systems Letters; Mathematical Control and Related Fields.

Invited Talks

May 23 2025	Invited talk in the Congrès Annuel de la Société d'Automatique, de Génie Industriel et de Productique (Université de Haute-Alsace), Mulhouse, France.
Nov. 7 2024	Invited talk in the seminar series "Explorations Mathématiques" at the Laboratory of Mathematics and Computer Science (CentraleSupélec), Gif-sur-Yvette, France.
Oct. 23 2024	Invited talk at the Institute of Robotics and Mechatronics (German Aerospace Center, DLR), Munich, Germany.
Sep. 12 2024	Invited strategic talk at "Journée IA L2S", Gif-sur-Yvette, France.
June 25 2024	Invited talk at the workshop "Data-Driven Verification and Control with Provable Guarantees", European Control Conference 2024, Stockholm, Sweden.
Mar. 14 2024	Invited talk at the workshop "Réunion CT Cyber-physical Human Systems", Société d'Automatique, de Génie Industriel et de Productique (ENSAM Paris), Paris, France.
Feb. 1 2024	Invited seminar at the Centre for Autonomous and Cyber-physical Systems (Cranfield University), Cranfield, UK.
Jan. 26 2024	Invited strategic talk at SYCOMORE team (CentraleSupélec), Gif-sur-Yvette, France.
Nov. 21 2023	Invited seminar at the Information Processing and Systems Department of ONERA, Palaiseau, France.
July 26 2023	Invited talk at the workshop "Geometric Control Theory with Quantum and Classical Applications", SIAM Conference on Control and Its Applications 2023, Philadelphia, USA.
Mar. 22 2023	Invited seminar at the Finance and Euler Institutes (USI), Lugano, Switzerland.
Feb. 22 2023	Invited seminar at the Faculty of Science, Technology and Medicine (University of Luxembourg), Luxembourg.
Dec. 6 2022	Invited seminar at Laboratoire de Mathématiques de l'INSA (INSA Rouen Normandie), Rouen, France.
Nov. 15 2022	Invited seminar at the Institut für Automatik (ETH), Zürich, Switzerland.
Oct. 18 2022	Invited strategic talk at CentraleSupélec, Gif-sur-Yvette, France.
July 7 2022	Invited strategic talk at "Journée hors murs L2S", Jouy-en-Josas, France.
Oct. 29 2021	Invited talk in the seminar series "GdT Contrôle" at Laboratoire Jacques-Louis Lions (Sorbonne Université), Paris, France.
Oct. 18 2021	Welcoming seminar at Pôle Automatique et Systèmes of CentraleSupélec, Gif-sur-Yvette, France.
Feb. 10 2021	Invited seminar at the Department of Aeronautics (Imperial College), London, UK.
Jan. 29 2021	Invited seminar at UW Aeronautics and Astronautics (University of Washington), Seattle, USA.
Jan. 25 2021	Invited seminar at Université Catholique de Louvain, Louvain-la-Neuve, Belgium.
Jan. 20 2021	Invited seminar at Delft Center for Systems and Control (TU Delft), Delft, the Netherlands.
Dec. 3 2020	Invited seminar at Centre Automatique et Systèmes (MINES ParisTech), Paris, France.
Nov. 19 2020	Invited seminar at Laboratoire d'Analyse et d'Architecture des Systèmes, Toulouse, France.
Nov. 17 2020	Invited seminar at Laboratoire des Signaux et Systèmes (CentraleSupélec), Gif-surYvette, France.
Oct. 27 2020	Invited seminar at Inria SPHINX (Institut Elie Cartan de Lorraine), Nancy, France.
Oct. 19 2020	Invited talk in the seminar series "Autonomy Talks" at the Department of Mechanical and Process Engineering (ETH), Zürich, Switzerland.
July 7 2020	Invited talk in the seminar series "Progetto di Eccellenza" at the Dipartimento di Scienze Matematiche "G. L. Lagrange" (Politecnico di Torino), Torino, Italy.
July 2 2020	Invited seminar at Aero&Astro Department, (Stanford University), USA.
May 24 2019	Invited seminar at the Department of Electrical & Computer Engineering (Concordia University), Montreal, Canada.
May 15 2019	Invited talk in the seminar series "Informal Systems Seminar" at the Faculty of Engineering (McGill University), Montreal, Canada.
Oct. 1 2018	Invited talk for the "PhD Students Welcoming Day" at ONERA, Palaiseau, France.