Benoît Bonnet-Weill

CRCN, Chargé de Recherche CNRS

Junior CNRS Researcher

(Last update on May 23, 2022)

Personal information

Civil Status: Born the 27th of April 1993 in Paris, XII$^{\text{ième}}$ arrondissement.
Married since the 25th of August 2018, no children.

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Google Scholar: https://scholar.google.fr/citations?user=Ow5eQawAAAAJ&hl=fr

Education

- **October 2016 – October 2019:** Ph.D. in Applied Mathematics. Specialisation in Control Theory.
  - **Title:** Optimal Control in Wasserstein Spaces
  - **Advisers:** Francesco Rossi (Director), *Università degli Studi di Padova*, Padova.
    Maxime Hauray (Codirector), *Aix-Marseille Université*, Marseille.
  - **Jury:** Filippo Santambrogio (President), *Université Claude Bernard*, Lyon.
    Pierre Cardaliaguet (Referee), *Université Paris-Dauphine*, Paris.
    Nicola Gigli (Referee), *Scuola Internazionale Superiore Degli Studi Avanzati*, Trieste.
    José Antonio Carrillo (Examinator), *Oxford University*, Oxford.
    Francesca Chittaro (Examinator), *Laboratoire d'Informatique et Systèmes*, Toulon.
    Hélène Frankowska (Examinator), *CNRS & Institut de Mathématiques de Jussieu*, Paris.
    Francesco Rossi (Director), *Università degli Studi di Padova*, Padova.
    Maxime Hauray (Codirector), *Aix-Marseille Université*, Marseille.
    Jean-Paul Gauthier (Invited), *Laboratoire d'Informatique et Systèmes*, Toulon.
- **September 2015 – August 2016:** M.Sc. in Applied Mathematics. Specialisation in Optimisation, Calculus of Variations and Geometric Control. *Université Paris-Saclay*, Orsay.
- **September 2013 – September 2016:** Engineering curriculum in Applied Mathematics. Specialisation in Optimisation, Control Theory and Operational Research. *École Nationale Supérieure de Techniques Avancées (ENSTA Paris)*, Palaiseau.
- **September 2011 – September 2013:** French "Classes Préparatoires aux Grandes Écoles". Mathematics and Physics majors (MPSI - MP*). *Lycée Blaise Pascal*, Orsay.
- **September 2008 – September 2011:** High School. Mathematics and Physics majors (1$^{\text{ère}}$ - Terminale S). *Lycée Descartes*, Antony.

Academic positions

- **November 2021 – Now:** Junior CNRS Researcher in the team Méthodes et Algorithmes de Commande (MAC), *Laboratoire d'Analyse et d'Architecture des Systèmes*, Toulouse.
- **February 2021 – October 2021:** INRIA Postdoctoral Fellow under the supervision of Mario Sigalotti and Nastassia Pouradier Duteil, *Laboratoire Jacques-Louis Lions*, Paris.
- **November 2019 – February 2021:** CNRS Postdoctoral Fellow under the supervision of Hélène Frankowska, *Institut de Mathématiques de Jussieu - Paris Rive Gauche*, Paris.
- **October 2016 – October 2019:** Ph.D. Student in Applied Mathematics under the supervision of Francesco Rossi and Maxime Hauray, *Laboratoire d'Informatique et Systèmes*, Marseille & *Università degli Studi di Padova*, Padova.

Grants

- **February 2021 – October 2021:** 15-month competitive Postdoctoral Fellowship from INRIA (interrupted to take my position at CNRS), *Université Pierre et Marie Curie*, Paris.
- **October 2016 – October 2019:** 3-year Ph.D. Funding from the Archimède French Excellence Laboratory, *Laboratoire d'Informatique et Systèmes*, Marseille.

Conference organisation

[O1] Mini-course on the topic *Measure differential equations : modelling and numerical solutions* (with D. Henrion, S. Marx and F. Rossi) – 22nd Symposium on Mathematical Theory of Networks and Systems (MTNS2022), Bayreuth (September 2022).

Publications

The available preprints of my articles can be found on my Homepage or via my Google Scholar account.

Submitted and under-revision

[S4] R. Bonalli and B. Bonnet. First-Order Pontryagin Optimality Conditions for Risk-Averse Stochastic Optimal Control Problems. *Submitted*, 2022.

[S3] B. Bonnet and H. Frankowska. Carathéodory Theory and A Priori Estimates for Continuity Inclusions in the Space of Probability Measures. *Submitted*, 2022.

[S2] B. Bonnet, N. Pouradier Duteil and M. Sigalotti. Consensus Formation in First-Order Graphon Models with Time-Varying Topologies. *Under revision*, 2021.

[S1] B. Bonnet, C. Cipriani, M. Fornasier and H. Huang. A Measure Theoretical Approach to the Mean-Field Maximum Principle for Training NeurODEs. *Under revision*, 2021.

Published and accepted journal papers

[J8] B. Bonnet and H. Frankowska. Semiconcavity and Sensitivity Analysis in Mean-Field Control and Applications. *Journal de Mathématiques Pures et Appliquées*, 157:282-345, 2022.

[J7] B. Bonnet and H. Frankowska, Necessary Optimality Conditions for Optimal Control Problems in Wasserstein Spaces. *Applied Mathematics and Optimization*, 84:1281-1330, 2021.

[J6] B. Bonnet and F. Rossi. Intrinsic Lipschitz Regularity of Mean-Field Optimal Controls. *SIAM Journal on Control and Optimization*, 59 (3):2011-2046, 2021.

[J5] B. Bonnet and É. Flayac, Consensus and Flocking Under Communication Failures for a Class of Cucker-Smale Systems. *Systems and Control Letters*, 152:104930, 2021.

[J4] B. Bonnet and H. Frankowska. Differential Inclusions in Wasserstein Spaces: The Cauchy-Lipschitz Framework. *Journal of Differential Equations*, 271:594-637, 2021.

[J3] B. Bonnet. A Pontryagin Maximum Principle in Wasserstein Spaces for Constrained Optimal Control Problems. *ESAIM COCV*, 25 (52), 2019.

[J2] B. Bonnet, J.P. Gauthier and F. Rossi. Generic Singularities of the 3D-Contact Conjugate Locus. *Comptes Rendus Mathématiques*, 357 (6):520-527, 2019.

[J1] B. Bonnet and F. Rossi. The Pontryagin Maximum Principle in the Wasserstein Space. *Calculus of Variations and Partial Differential Equations* 58:11, 2019.

Conference proceedings

[C5] B. Bonnet and H. Frankowska. Viability and Exponentially Stable Trajectories for Differential Inclusions in Wasserstein Spaces. *Submitted to the proceedings of the 2022 IEEE Conference on Decision and Control (CDC)*, 2022.

[C4] B. Bonnet and H. Frankowska. On the Properties of the Value Function Associated to a Mean-Field Optimal Control Problem of Bolza Type. In *2021 IEEE Conference on Decision and Control (CDC)*, 4558-4563, 2021.

[C3] B. Bonnet and F. Rossi. Variance Optimization and Control Regularity for Mean-Field Dynamics. In *IFAC-PapersOnLine*, 54 (19):13-18, 2021.

[C2] B. Bonnet and H. Frankowska. Mean-Field Optimal Control of Continuity Equations and Differential Inclusions. In *2020 IEEE Conference on Decision and Control (CDC)*, 470-475, 2020.

[C1] B. Bonnet and F. Rossi. Sparse Control of Kinetic Cooperative Systems to Approximate Alignment. In *Proceedings of the 20th IFAC World Congress*, 2017.

Presentations at conferences and seminars

Invited talks at conferences, seminars and workshops

[I12] *Consensus formation, macroscopic approximations, and their interactions in the context of multi-agent dynamics* – DO Seminar, LAAS-CNRS, Toulouse (May 2022).

[I11] *Set-Valued Dynamics in the Space of Probability Measures* – Journée Rencontre de l'Équipe Combinatoire et Optimisation, IMJ-PRG, Paris (April 2022).

[I10] *A Mean-Field Optimal Control Approach to the Training of NeurODEs* – BrainPOP Seminar, LAAS-CNRS, Toulouse (January 2022).

[I9] *Fine Properties of the Value Function in Mean-Field Optimal Control* – Invited session "Mean-Field Games and Applications", PGMO Days, Palaiseau (December 2021).

[I8] *Nonsmooth and Set-Valued Analysis in Wasserstein Spaces with Applications in Mean-Field Control* – Séminaire Parisien d'Optimisation, IHP, Paris (November 2021).

[I7] *Sufficient Conditions for the Lipschitz Regularity of Mean-Field Optimal Controls* – Groupe de Travail de Calcul des Variations, Remote talk (March 2021).

[I6] *Exponential Flocking under Communication Failures for some Cucker-Smale Models* – Seminar of the INRIA Team MAMBA, LJLL, Remote talk (March 2021).

[I5] *Continuity Inclusions and Applications in Mean-Field Optimal Control* – Seminar of Analysis and Applications, Université de Bretagne Occidentale, Remote talk (February 2021).

[I4] *Flocking for the Cucker-Smale Systems under Communication Failures* – Seminar of INRIA Team CAGE, LJLL, Remote talk (May 2020).

[I3] *Intrinsic Lipschitz Regularity in Mean-Field Optimal Control Problems* – Seminar of Probability, Statistics and Control Theory, ENSTA Paris, Palaiseau (October 2019).

[I2] *Topics in Analysis and Optimal Control of Multi-Agent Systems* – Seminario di Equazioni Differenziale, Università degli Studi di Padova, Padova (March 2019).

[I1] *Optimal Control Problems in Wasserstein Spaces* – Invited session "Variational Analysis and Optimal Control", 14th Viennese Conference on Optimal Control and Dynamics Games, Vienna (August 2018).

Presentations at international conferences and research schools

[P6] *Variance Optimization and Control Regularity in Mean-Fields Dynamics* – 7th IFAC Workshop on Lagrangian and Hamiltonian Methods for Nonlinear Control, Remote talk (October 2021).

[P5] *Mean-Field Control and Continuity Inclusions* – 59th Conference on Decision and Control, Remote talk (December 2020).

[P4] *Some Problems in Modelling and Optimal Control of Multi-Agent Systems* – Poster session at the conference Crowds: models and control, CIRM, Marseille (June 2019).

[P3] *Optimal Control of Multi-Agent Systems: A Pontryagin Approach* – Toulouse Winter School in Calculus of Variations and Probability Theory, IMT, Toulouse (February 2019).

[P2] *Optimal Control Problems in Wasserstein Spaces* – 12th International Young Researcher Workshop on Geometry, Mechanics and Control, Università degli Studi di Padova, Padova (January 2018).

[P1] *Sparse Alignment of Kinetic Cooperative Systems* – 20th IFAC World Congress, Toulouse (July 2017).

Editorial activities

Reviewer for the journals *SIAM Journal on Control and Optimization*, *Probability Theory and Related Fields*, *Mathematics of Computations*, *IEEE Transactions on Automatic Control*, *Journal of Mathematical Analysis and Applications*, *Journal of Dynamical and Control Systems*, and for the proceedings of the *IEEE Conference on Decision and Control*, *American Control Conference* and *IFAC World Congress*.

Teaching activities

- **2019 – 2022:** Exercises sessions for the course Differentiable Optimisation I.
  Master 1 level, 15-hour teaching, *ENSTA Paris* & *UPSAY*, Palaiseau.
- **2020 – 2021:** Exercises sessions for the course Differentiable Optimisation II.
  Master 1 level, 15-hour teaching, *ENSTA Paris* & *UPSAY*, Palaiseau.
- **2020 – 2021:** Exercises sessions for the course Optimisation.
  Bachelor 3 level, 18-hour teaching, *UPP1*, Paris.
- **2019 – 2020:** Exercises sessions for the course Quadratic Optimisation.
  Bachelor 3 level, 15-hour teaching, *ENSTA Paris*, Palaiseau.
- **2017 – 2019:** Lectures for the course Introduction to Lebesgue Integration.
  Bachelor 3 level, 4-hour teaching, *ECM*, Marseille.
- **2017 – 2019:** Lectures for the course Introduction to Optimisation Theory.
  Bachelor 3 level, 2-hour teaching, *ECM*, Marseille.
- **2017 – 2018:** Exercises sessions for the course Preliminaries and Recalls to Optimisation.
  Master 2 level, 14-hour teaching, *ECM* & *AMU*, Marseille.

Miscellaneous Skills, Hobbies and Interests

- **Languages:**
  - French (Mother tongue)
  - Italian (Basic, lived in Italy for a while)
  - English (Fluent, C2-level CEFR)
  - German & Chinese (Small remnants)
- **Hobbies:**
  - Drums (10-year regular practice)
  - Billiard (6-year regular practice)
  - Chess (1-year somewhat practice)
  - Bodhran (celtic traditional drums) & Guitar
  - Bouldering (indoor climbing) & bike travels
  - Video, board & card games
- **Interests:**
  - Epistemology of mathematics & physics
  - Socio-economics forecasting
  - Science fiction & fantasy novels
  - Climate sciences (MyCO2 ambassador)
  - Sociology & history
  - “Bandes dessinées” and mangas