Charles Bertucci

Curriculum Vitae

Born 18th, March 1993 in Marseille, France

Professional address CMAP, Ecole Polytechnique, Route de Saclay, 91128 Palaiseau

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Formation

2022 **Habilitation à diriger les recherches**, *Institut Polytechnique de Paris*, Palaiseau.
Title : Monotonicity in mean field games and dynamics of the spectrum of large random matrices, defended on the 13th, June 2022.

2016–2018 **PhD in Applied Mathematics**, *Université Paris-Dauphine*, Paris.
Title : Contributions to the mean field game theory ; Supervisor : Pierre-Louis Lions, defended on the 11th, December 2018.

2015–2016 **Master 2**, *Mathématiques de la modélisation, Université Pierre et Marie Curie*, Paris, *Mention Très bien*.

2012–2016 **Engineer diploma**, *École polytechnique*, Palaiseau.

2010–2012 **Classes préparatoires**, *Lycée Thiers*, Marseille.

Professional experience

2022– **Part time professor**, *École polytechnique*, Palaiseau.

2019– **CNRS researcher (Chargé de recherches)**, *CMAP, École polytechnique*, Palaiseau.

2019– **Member of the chair Finance et Développement Durable (EDF-CACIB-Dauphine-X)**, Paris-Palaiseau.
Member of the scientific board and steering committee

2016– **Research missions**, Paris.
Missions with namely Kayrros, l'Institut Louis Bachelier, Banque de France and Morpho Labs.

2020–2022 **Part time assistant professor**, *École polytechnique*, Palaiseau.

2016–2019 **Doctoral student**, *Université Paris-Dauphine*, Paris.

Prizes and distinctions

Pierre Lamoure prize 2024 ; Cours Peccot 2022-2023 ; Best paper award (in collaboration with L. Bertucci, J.-M. Lasry and P.-L. Lions) in *AFFI Annual meeting* and *Cryptocurrency Research Conference* in 2002 for *How resilient is the Bitcoin protocol ?* ; PGMO thesis prize in 2019 ; First prize for a thesis in Mathematics from the Chancellerie des Universités de Paris in 2019 ; Thesis

prize from the Fondation Dauphine in 2019.

Scientific domain of interest

Partial differential equations ; Optimization ; Game theory ; Probabilities ; Optimal transport ; Numerical methods ; mean field games ; Economics.

Students supervision

— PhD thesis of Charles Meynard started October 2022 in École Polytechnique.
— PhD thesis of Matthias Rakotomalala started November 2022 in École Polytechnique.
— PhD thesis of Valentin Pesce started September 2024 in École Polytechnique.
— Supervision of the CIFRE PhD thesis ofLucien Boulet (CACIB and École polytechnique), started in November 2024.
— Co-supervision (with Nizar Touzi) of the postdoc of Alekos Cecchin in CMAP, (now researcher in Padova).

Articles scientifiques

— C. Bertucci : Optimal stopping in mean field games, an obstacle problem approach ; *Journal de Mathématiques Pures et Appliquées* ; 2018 ; Volume 120 ; p 165-194.
— C. Bertucci : Fokker-Planck equations of jumping particles and mean field games of impulse control ; Annales de l'Institut Henri Poincaré C, Analyse non linéaire (Vol. 37, No. 5, pp. 1211-1244).
— C. Bertucci, J.-M. Lasry et P.-L. Lions : Some remarks on mean field games ; Communications in Partial Differential Equations, 2019, vol. 44, no 3, p. 205-227.
— C. Bertucci : A remark on Uzawa's algorithm and an application to mean field games systems ; ESAIM : Mathematical Modelling and Numerical Analysis, 2020, vol. 54, no 3, p. 1053-1071.
— C. Bertucci, S. Vassilaras, J.-M. Lasry, G. S. Paschos, M. Debbah, et P.-L. Lions : Transmit strategies for massive machine-type communications based on mean field games. In 2018 15th International Symposium on Wireless Communication Systems (ISWCS) (pp. 1-5). IEEE, 2018.
— C. Bertucci, J.-M. Lasry et P.-L. Lions : Strategic advantages in mean field games with a major player, 2020, Comptes Rendus. Mathématique, 2020, vol. 358, no 2, p. 113-118.
— C. Bertucci, J.-M. Lasry et P.-L. Lions : Master equation for the finite state space planning problem. Archive for Rational Mechanics and Analysis, 2021, p. 1-16.
— C. Bertucci, L. Bertucci, J.-M. Lasry et P.-L. Lions : Mean Field Game Approach to Bitcoin Mining. SIAM Journal on Financial Mathematics, 15(3), 960-987, 2024.
— C. Bertucci : Monotone solutions for mean field games master equations : finite state space and optimal stopping. Journal de l'École polytechnique–Mathématiques, 2021, vol. 8, p. 1099-1132.
— C. Bertucci, M. Debbah, J.-M. Lasry et P.-L. Lions : A Spectral Dominance Approach to Large Random Matrices. Journal de Mathématiques Pures et Appliquées, 164, 27-56, 2022.
— Y. Achdou, C. Bertucci, J.-M. Lasry, P.-L. Lions, A. Rostand et J. Scheinkman : A class of short-term models for the oil industry addressing speculative storage. Finance and Stochastics, 26(3), 631-669, 2022.
— C. Bertucci : Monotone solutions for mean field games master equations : continuous state space and common noise. Communications in Partial Differential Equations, 2023, 48(10-12),

1245-1285.

— C. Bertucci, L. Bertucci, J.-M. Lasry et P.-L. Lions : How resilient is the Bitcoin protocol ?. Available at SSRN 3907822, 2021.
— C. Bertucci : Mean field games with incomplete information : hal-03666652, 2022.
— C. Bertucci et A. Cecchin : Mean field games master equations : from discrete to continuous state space, à paraître dans SIAM Journal on Mathematical analysis, 2024.
— C. Bertucci : On monotone solutions of mean field games master equations. Séminaire Laurent Schwartz–EDP et applications, 1-13, 2022.
— C. Alasseur, M. Basei, C. Bertucci et A. Cecchin : A mean field model for the development of renewable capacities. Mathematics and Financial Economics, 2023, vol. 17, no 4, p. 695-719.
— C. Bertucci, J.-M. Lasry et P.-L. Lions : A singular infinite dimensional Hamilton-Jacobi-Bellman equation arising from a storage problem. arXiv preprint arXiv :2210.02780, 2022.
— C. Bertucci, J.-M. Lasry et P.-L. Lions : On Lipschitz solutions of mean field games master equations. à paraître dans Journal of Functional Analysis.
— C. Bertucci : Stochastic optimal transport and Hamilton-Jacobi-Bellman equations on the set of probability measures. arXiv preprint arXiv :2306.04283, 2023.
— C. Bertucci et C. Meynard, Noise through an additional variable for mean field games master equation on finite state space, hal-04444126, 2024.
— C. Bertucci et P.-L. Lions : A two spaces extension of Cauchy Lipschitz theorem, à paraître dans Journal of Differential Equations, 2024.
— C. Bertucci et P.-L. Lions : An approximation of the squared Wasserstein distance and an application to Hamilton-Jacobi equation, arXiv :2409.11793, 2024.
— C. Bertucci et M. Rakotomalala : Strategic geometric graphs through mean field games, arXiv :2404.13975, 2024.
— C. Bertucci, M. Rakotomalala et M. Tomasevic : Curvature in chemotaxis : a model for ant trail pattern formation, arXiv :2408.13363, 2024.
— C. Bertucci, J.-M. Lasry et P.-L. Lions : A spectral dominance to large random matrices : part II, à paraître dans Journal de Mathématiques Pures et Appliquées, 2024.
— C. Bertucci, L. Bertucci, M. Gontier Delaunay, O. Guéant et M. Lesbre, Agents' behavior and interest rate model optimization in DeFi lending, SSRN 4802776, 2024.
— C. Bertucci et C. Meynard, A study of common noise in mean field games, arXiv preprint arXiv :2412.12741, 2024.
— C. Bertucci and V. Pesce, A new approach for the unitary Dyson Brownian motion through the theory of viscosity solutions, arXiv preprint arXiv :2504.16551, 2025.
— C. Bertucci, J.-M. Lasry and P.-L. Lions, The equilibrium price of bubble assets, arxiv, 2025.

Selected talks

Sep 2024 **Large scale behavior of interacting diffusions : from stochastic control to functional inequalities**, *Università di Padova, Padova*.

Juin 2024 **New trends and Challenges in stochastic differential games**, *BIRS, Kelowna*.

Juin 2024 **Mean-field models in optimal control and multi-agent dynamics**, *RISM, Varese*.

Mai 2024 **Variational and analytical methods in metric mesure spaces**, *CIRM, Marseille*.

Jan 2024 **Séminaire équations aux dérivées partielles**, *Université Versailles Saint Quentin, Versailles*.

Dec 2023 **Mean-Field Interaction, Singular Kernels, and Approximation**, *IHP, Paris*.

Mar 2023 **Seminario di equazioni differeni e applicioni**, *Universita di Padova, Padoue*.

Fev 2023 **Distributed Solutions to Complex Societal Problems Reunion Workshop**, *IMSI, Chicago*.

Nov 2022 **PGMO days 2022**, *EDF, Saclay*.

Avril 2022 **Workshop on Mean Field Games**, *CRM, Montreal*.

Mars 2022 **Séminaire Laurent Schwartz**, *IHES, Bures-sur-Yvette*.

Fev. 2022 **Séminaire Parisien d'Optimisation**, *IHP, Paris*.

Dec. 2021 **Mathematical advances in Mean Field Games**, *University of Chicago, Chicago*.

Nov. 2021 **Schrödinger Problem and MF PDE Systems**, *CIRM, Marseille*.

Mars 2021 **Séminaire du Laboratoire Jacques-Louis Lions**, *Sorbonne Université*.

Fev. 2020 **Mean Field Games : Recent Progress**, *University of Chicago, Chicago*.

Sept. 2019 **MFG and related topics 5**, *Levico Terme, Trento (Italy)*.

Avril 2019 **Workshop Mean field games and applications**, *ICMS, Edimburgh*.