

Academic appointments

Current positions

2015–present CNRS *Chargé de recherche* at CMAP, École Polytechnique.

2017–present Part time teaching position (Professeur chargé de cours) at École Polytechnique.

Previous positions

2012–2014 CNRS *Chargé de recherche* at Centre d'Écologie Fonctionnelle et Évolutive, Montpellier.

2010–2012 Post-doc at the University of Cambridge, Department of Applied Mathematics and Theoretical Physics.

Education

2009 PhD in mathematics, École Normale Supérieure de Cachan. Title: *Qualitative and numerical study of partial differential equation from natural sciences*. Supervisor: Laurent Desvillettes. Jury: L. Desvillettes, J. Dolbeault, P.E. Jabin, M. Langlais (Ref.) and B. Perthame (Ref.).

2006 Agrégation de mathématiques.

2006 Master degree in pure and applied mathematics, École Normale Supérieure de Lyon.

2005 ERASMUS semester in Freiburg, Germany.

2003–2006 École Normale Supérieure de Lyon.

Research funding

2022–present Member of the ERC project Stochastic dynamics of sINGle cells: Growth, Emergence and Resistance (SINGER, coordinator: S. Méléard).

2020–2024 Member of the ANR project Integro-Differential Equations from EVolutionary biology (DEEV, PI: S. Mirrahimi).

2018–2022 Member of the ANR project écologie évolutive spatiale des interactions hôtes-parasites. Structuration génétique et épidémiologique (SpatEvolEpid, PI: S. Lion).

2013 PI of the ANR grant *Mathematical models for evolutionary biology* (MODEVOL).

2013 PI (with J.A. Carrillo, Imperial College) of the CNRS/Royal Society exchange project *Mathematical analysis and simulation of collective dynamics models* (CODYN).

2013 Member of the ANR grant *Mechanisms of adaptation to Climate Change: how will phenotypic plasticity, microevolution and migration affect forest trees phenology ?* (MECC, PI: O. Ronce).

2013 Member of the ANR grant *Kinetic models in biology or related domains* (KIBORD, PI: L. Desvillettes).

Supervision of doctoral and master's students

2025–present Co-supervision of the PhD of Vianney de la Salle, with V. Bansaye. *Metastability of random competitive models for structured populations*.

2023–present Co-supervision of the PhD of Le Tuyet Nhi Pham, with G. Conforti. *Generative Models for Discrete State Spaces: Sharp Convergence Bound under Minimal Assumptions*.

2021–2024 Co-supervision of the PhD of Sirine Boucenna, with V. Dakos. *An eco-evolutionary framework to study the resilience and tipping points in ecosystems*.

- 2018–2021** Co-supervision of the PhD thesis of Julie Tourniaire, with P. Maillard. *Interface dynamics in ecology: deterministic and stochastic models*. Now an associate professor at Université de Besançon.
- 2015–2019** Co-supervision of José Mendez's PhD thesis with biologists N. Loeuille and F. Massol. *Modelling of the evolution of interaction networks and prediction of the dynamics of interacting species range*. Now working in a computer science start-up.
- 2013–2017** Co-supervision of the Quentin Griette's PhD thesis, with M. Alfaro and biologist S. Gandon. *Mathematical and numerical study of evolutionary epidemiology problems*. Now professor at Université du Havre.
- (Co-)supervision of master thesis:** Q. Griette (2013), J. Tourniaire (2018), L.T.N. Pham (2023), Q.V. Tran (2024), V. de la Salle (2025), D.D. Thai (2025), D.T.M.U. Nguyen (2026), T.D. Tran (2026).

Teaching

- 2017–present** Part time teaching position at École Polytechnique :
- Classes at bachelor and Master 1 level (analysis, PDE, etc.),
 - Master course *Partial differential models for ecology*, within the master of Mathematics for life sciences,
 - Supervision of projects and internships at bachelor and master level,
 - Administrative work for the bachelor of École polytechnique (Setting up the program, International relations, etc.).
 - Jury for projects and internships in the Master Mathematics for life sciences.
- 2022–present** Master course "Theoretical PDEs", Franco-Vietnamese master, Ho Chi Minh University of Sciences.
- 2026** Short course *Wasserstein distances and Convergence of Stochastic Processes* at the summer school SEAMS 2026 School on Applying mathematics to real-world problems, Vietnam.
- 2023, 2026** Short course *Systèmes Dynamiques*, University of Guyane.
- 2015** Short course *Why do Australian Toads' legs keep getting bigger ?* Master of Mathematics, University Paris-Sud.
- 2015–2019** Admission exam for biology students, École Normale Supérieure, Paris.
- 2014** Short course *Fisher KPP models in population dynamics*, at the Romanian-French Summer School in Applied Mathematics, Sinaia, Romania.
- 2012** Short course *PDE models for evolutionary biology* at the summer school *Modelling in population dynamics and evolution*, La Londe-les-Maures, France.
- 2007–2009** Numerical analysis (L3) and Integration theory (training for the agrégation de mathématiques), École Normale Supérieure de Cachan.

Popularisation of mathematics: BCPST (2022), JeudiX (2015), Science fair at the Ecole Polytechnique (2015-2020), *La recherche en mathématique appliquée* (2015).

Scientific activities

Conferences, workshops and summer schools organized

- 2026** Co-organisation with H.L. Long of the workshop Analysis of stochastic processes from biology and machine learning, VIASM, Vietnam.
- 2025** Co-organisation with H.H. Vo of the summer school Mathematical biology, VIASM, Vietnam.
- 2020** Co-organisation with C. Chapuisat, B. Cloez, C. Anderson and P. Pudlo of the summer school PDE and probability for biology, CIRM, Marseilles.
- 2017** Co-organisation with J.R. Li of the workshop *Mathematical and computational methods for life sciences*, École Polytechnique, Palaiseau.
- 2016** Co-organisation with V. Calvez, S. Méléard, M. Kirkpatrick and S. Otto of the workshop *Stochastic and deterministic models for evolutionary biology*, BIRS-Oaxaca, Mexico.
- 2016** Co-organisation with V. Bansaye, C. Coron, P. Gabriel and T. Lepoutre of the summer school *PDE and probability for biology*, CIRM, Marseilles.

- 2013** Co-organisation, with J. Bérard and V. Calvez of the conference *Biological invasions and evolutionary biology*, in Lyon.
- 2011** Organisation of the mini-workshop *Models for evolutionary biology*, SIAM PD11 conference, San Diego.
- 2010** Co-organisation, with K. Fellner of the mini-workshop *Evolutionary dynamics of structured populations*, at the Newton Institute, Cambridge.

Research visits and collaborations

- Vietnam Institute for Advanced Sciences, Hanoi, Vietnam (2026, 6 months),
- University of Guyane, Cayenne, France (2023, 2 weeks),
- Oxford University Clinical Research Unit, Ho Chi Minh, Vietnam (regular visits, 2022-2025), collaboration with M. Choisy.
- Ho Chi Minh University of Science (regular visits, 2022-2025).
- Univ. of Helsinki (2019, 1 week), collaboration with M. Gyllenberg and S. Geritz.
- Institut Mittag-Leffler (2018, 1 month), collaboration with M. Gyllenberg.
- Imperial College (2013-2015, 4 months in total), collaboration with P. Degond and J.A.J Carrillo,
- Univ. of Texas at Austin (2015, 1 month), collaboration with biologist M. Kirkpatrick,
- Univ. of Princeton (2015, 3 weeks), in the group of B. Grenfell,
- Univ. of Maryland at College Park (2015, 1 week), collaboration with P.E. Jabin,
- Univ. California at Los Angeles (2011-2012, 2 months in total), collaboration with T. Laurent,
- Univ. Aut. de Barcelona (2009-2015, 2 months in total), collaboration with S. Cuadrado and A. Calsina,
- Univ. of Vienna (2008, 5 months), collaboration with C. Schmeiser and K. Fellner.

Invited conference and seminar talks

- Invited talk at conferences: Franco-Vietnamese workshop (2023); CRM Montreal (2022); KIAS Seoul (2022); GSSI L'aquila (2017); Franco-Japanese workshop (2017); Franco-Korean workshop (2016); MMEE Paris (2015); AMS sectional meeting Washington (2015); IFIP Klagenfurt (2013); IFCAM Bangalore (2014); GDR Metice Paris 5 (2013); CIMPA La Habana (2013,2010); ECTB Krakow (2012); SIAM PD11 San Diego (2011); Banff (2012,2010,2009); Oberwolfach (2011); Equadiff Hull (2011);
- Invited talks at seminars: Museum national d'histoire naturelle (2024); Univ. Guyane (2023); Oxford University Clinical Research Unit (2023); Univ. Rouen (2022); Univ. Paris 6 (2022); Univ. Saigon (2022); Ho Chi Minh Univ. (2022); CCA Erlangen-Nürnberg (2021); National Univ. Singapore (2020); Univ. of Vienna (2018); Collège de France (2018, 2022); Univ. British Columbia (2017); Ohio State University (2017); Univ. Tokyo (2017); Univ. Marseilles (2017); Univ. Cambridge (2017); Imperial College (2015,2013); Univ. Austin (2015); Univ. Rutgers (2015); Univ. Princeton (2015); EHESS (2015); Ecole Polytechnique (2014); Univ Montpellier (2013, 2012), Univ. Graz (2013,2021); Univ. Autonomia Barcelona (2012,2010); INRA Avignon (2012); Univ. Dauphine Paris (2012); CEFE (2012); Riverside (2012); Heidelberg (2011); Univ. Toulouse (2011)

Editorial and reviewing activities

2018–present Editor for the journal of Mathematical Biology.

2013–present Referee for several national funding agencies.

2010–present Referee for peer-reviewed mathematical journals: Communications in Mathematical Physics, Communications in Partial Differential Equations, Journal de mathématiques pures et appliquées, Transactions of the AMS, Annales de l'Institut Henri Poincaré / Analyse non lineaire, Nonlinearity, Proceedings of the Royal Society A, Discrete and Continuous Dynamical Systems B, physica D, Journal of Mathematical Biology, Bulletin of Mathematical Biology, Communications in Mathematical Sciences, Nonlinear Analysis Series B: Real World Applications, Kinetic and Related Models, Networks and heterogeneous media, SIAM Mathematical analysis, Acta Applicandae Mathematica, Journal of Biological Dynamics, Electronic Journal of Differential Equations, ESAIM proceedings, Mathematical Biosciences and Engineering, European Journal of Applied Mathematics.

Publications and preprints

- [P1] G. Conforti, A. Durmus, L.T.N. Pham, G. Raoul, Non-Asymptotic Convergence of Discrete Diffusion Models: Masked and Random Walk dynamics, submitted.
- [P2] P. Magal, G. Raoul, On measure-valued solutions for a structured population model with transfers, submitted.

- [P3] V. Bansaye, G. Raoul, M. Tomasevic, Growing random planar network with oriented branching and fusion, submitted.
- [P4] M. Alfaro, G. Raoul, O. Ronce, When do leading and rear edges of the range shift slower or faster than climate? Insights from a mathematical model, *accepted in J. Evol. Biol.*
- [P5] G. Raoul, Exponential convergence to a steady-state for a population genetics model with sexual reproduction and selection, *accepted in Kinet. Relat. Mod.* .
- [P6] P. Magal, G. Raoul, Dynamics of a kinetic model describing protein transfers in a cell population, *Journal of Mathematical Biology* **91**(6), Article 76 (2025). DOI.
- [P7] S. Boucenna, V. Dakos, G. Raoul, A model for a population of trees structured by phenological traits, *Mathematical Biosciences* **395**, 109640 (2026). DOI.
- [P8] G. Raoul, Macroscopic limit from a structured population model to the Kirkpatrick-Barton model, *Bulletin des Sciences Mathématiques* **205**, 103697 (2025). DOI.
- [P9] S. Boucenna, G. Raoul, V. Dakos, Evolution between two competing macrophyte populations along a resource gradient leads to collapse in a bistable lake ecosystem, *Theoretical Population Biology* **164**, 23–36 (2025). DOI.
- [P10] Q. Griette, M. Alfaro, G. Raoul, S. Gandon, Evolution and spread of multiadapted pathogens in a spatially heterogeneous environment, *Evolution Letters* **8**, 3 427–436 (2024).
- [P11] P. Maillard, G. Raoul, J. Tourniaire, Spatial dynamics of a population in a heterogeneous environment, *arXiv preprint* 2021.
- [P12] C. Berardo, S. Geritz, M. Gyllenberg, G. Raoul, Interactions between different predator-prey states. A method for the derivation of the functional and numerical response, *J. Math. Biol.* **80** 2020.
- [P13] V. Calvez, J. Crevat, L. Dekens, B. Fabrèges, F. Kuczma, F. Lavigne and G. Raoul, Influence of the mode of reproduction on dispersal evolution during species invasion. *ESAIM: Proc* **67** 120–134, 2020.
- [P14] J. Mendez-Vera, G. Raoul, F. Massol, N. Loeuille, Effects of variations in adaptation potential on invasion speeds and species ranges, *arXiv preprint* 2019.
- [P15] N. Berestycki, C. Mouhot, G. Raoul, Existence of self-accelerating fronts for a non-local reaction-diffusion equations, *arXiv preprint* 2015.
- [P16] M. Alfaro, H. Berestycki, G. Raoul, The effect of climate shift on a species submitted to dispersion, evolution, growth and nonlocal competition, *SIAM J. Math. Anal.* **49**(1), 562–596 (2017).
- [P17] R. Aguilée, G. Raoul, F. Rousset, O. Ronce, Pollen dispersal slows geographical range shift and accelerates ecological niche shift under climate change, *Proc. Natl. Acad. Sci. USA* **113**(39), 5741–5748 (2016).
- [P18] A. Calsina, S. Cuadrado, L. Desvillettes, G. Raoul, Asymptotic profile in selection-mutation equations: Gauss versus Cauchy distributions, *J. Math. Anal. Appl.* **444**(2), 1515–1541 (2016).
- [P19] Q. Griette, G. Raoul, Existence and qualitative properties of traveling waves for an epidemiological model with mutations, *J. Differ. Equations* **260**, 7115–7151 (2016).
- [P20] Q. Griette, G. Raoul, S. Gandon, Virulence evolution at the front line of spreading epidemics. *Evolution* **11**(69), 2810–2819 (2015).
- [P21] V. Calvez, G. Raoul, C. Schmeiser, Confinement by biased velocity jumps: aggregation of E. coli. *Kinet. Relat. Mod.* **8**(4), 651–666 (2015).
- [P22] P. Degond, A. Frouvelle, G. Raoul, Local stability of perfect alignment for a spatially homogeneous kinetic model. *J. Stat. Phys.* **157**(1) 84–112 (2014).
- [P23] M. Alfaro, J. Coville, G. Raoul, Bistable traveling waves for nonlocal reaction diffusion equations. *Discret Contin. Dyn. Syst.* **34**(5) 1775–1791 (2014).
- [P24] M. Alfaro, J. Coville, G. Raoul, traveling waves in a nonlocal equation as a model for a population structured by a space variable and a phenotypical trait. *Comm. Partial Differential Equations* **38**(12) 2126–2154 (2013).
- [P25] D. Balague, J.A.J. Carrillo, T. Laurent, G. Raoul, Dimensionality of local minimizers of the interaction energy. *Arch. Ration. Mech. Anal.* **209**(3) 1055–1088 (2013).
- [P26] S. Mirrahimi, G. Raoul, Population structured by a space variable and a phenotypical trait. *Theo. Popul. Biol.* **84** 87–103 (2013).
- [P27] D. Balague, J.A. Carrillo, T. Laurent, G. Raoul, Nonlocal interactions by repulsive-attractive potentials: radial ins/stability. *Phys. D* **260** 5–25 (2013).
- [P28] A. Calsina, S. Cuadrado, L. Desvillettes, G. Raoul, Asymptotics of steady states of a selection mutation equation for small mutation rate, *Proc. Roy. Soc. Edinburgh Sect. A* **143**(06) 1123–1146 (2013).
- [P29] E. Bouin, V. Calvez, N. Meunier, S. Mirrahimi, B. Perthame, G. Raoul, R. Voituriez, Invasion fronts with

variable motility: phenotype selection, spatial sorting and wave acceleration. *C. R. Math. Acad. Sci. Paris* **350**(15-16), 761–766 (2012).

- [P30] G. Raoul, Non-local interaction equations: Stationary states and stability analysis. *Differential Integral Equations* **25**(5-6), 417–440 (2012).
- [P31] G. Raoul, Long time evolution of populations under selection and vanishing mutations. *Acta. Appl. Math.* **114**(1-2) 1–14 (2011).
- [P32] G. Raoul, Local stability of Evolutionary attractors for continuous structured populations. *Monatsh. Math.* **165**(1) 117–144 (2012).
- [P33] P.E. Jabin, G. Raoul, On selection dynamics for competitive interactions. *J. Math. Biol.* **63**(3) 493–517 (2011).
- [P34] K. Fellner, G. Raoul, Stability of stationary states of non-local equations with singular interaction potentials. *Math. Comput. Modeling* **53**(7-8), 1436–1450 (2011).
- [P35] N. Champagnat, P.E. Jabin, G. Raoul, Convergence to equilibrium in competitive Lotka-Volterra equations. *C. R. Math. Acad. Sci. Paris* **348**(23-24) 1267–1272 (2010).
- [P36] K. Fellner, G. Raoul, Stable stationary states of non-local interaction equations. *Math. Models Methods Appl. Sci.* **20**(12), 2267–2291 (2010).
- [P37] L. Desvillettes, P.E. Jabin, S. Mischler, G. Raoul, On selection dynamics for continuous structured populations. *Commun. Math. Sci.*, **6**(3), 729–747 (2008).