

CV Gaël Raoul

Research ID: [M-9794-2015](#)

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Born on September 16th, 1983, French citizen

married, 2 children

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.

CURRENT POSITIONS

- (since 2015) CNRS young researcher (permanent position) at CMAP, École Polytechnique.
- (since 2015) Associate member of the Centre d'Écologie Fonctionnelle et Évolutive, Montpellier.

PREVIOUS POSITIONS

- (2012-2014) CNRS young researcher (permanent position) at Centre d'Écologie Fonctionnelle et Évolutive, Montpellier.
- (2010-2012) Post-doc at the University of Cambridge, Department of Applied Mathematics and Theoretical Physics.

FUNDING

- (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 GRADUATE STUDENTS

- (2013-...) Supervision of a 1-year internship, and then co-supervision of the Quentin Griette's PhD thesis, with M. Alfaro and biologist S. Gandon. Title: *Mathematical and numerical study of evolutionary epidemiology problems*.
- (2015-...) co-supervision of José Mendez's PhD thesis with biologists N. Loeuille and F. Massol. Title: *Modelling of the evolution of interaction networks and prediction of the dynamics of interacting species range*.

MAIN VISITS AND COLLABORATIONS

- Imperial College (2013-2015, 4 months in total), collaboration with P. Degond (1 paper) 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.

ORGANISATION OF SCIENTIFIC MEETINGS

- (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.

*: scheduled

INVITED TALKS

- Invited talk at conferences: 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: 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); Univ. Autonoma Barcelona (2012,2010); INRA Avignon (2012); Univ. Dauphine Paris (2012); CEFE (2012); Riverside (2012); Heidelberg (2011); Univ. Toulouse (2011)

COMMISSION OF TRUST

- (2013-...) Referee for several national funding agencies.
- (2010-...) 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.

- (2015) Short course *Why do Australian Toads' legs keep getting bigger ?* MAster of Mathematics, University Paris-Sud.
- (2015-...) 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 Maurs, France.
- (2007-2009) Numerical analysis (L3) and Integration theory (training for the agrégation de mathématiques), École Normale Supérieure de Cachan.

Popularisation of mathematics: JeudiX (2015, seminar for science journalists), Science fair at the Ecole Polytechnique (2015), article in the short book *La recherche en mathématique appliquée* (2015).

PUBLICATIONS

- [1] N. Berestycki, C. Mouhot, G. Raoul, Existence of self-accelerating fronts for a non-local reaction-diffusion equations, *arXiv preprint* 2015 (33 pages).
- [2] M. Alfaro, H. Berestycki, G. Raoul, The effect of climate shift on a species submitted to dispersion, evolution, growth and nonlocal competition, *arXiv preprint* 2015 (30 pages).
- [3] P. Magal, G. Raoul, Dynamics of a kinetic model for exchanges between cells, *arXiv preprint* 2015 (24 pages).
- [4] A. Calsina, S. Cuadrado, L. Desvillettes, G. Raoul, Asymptotic profile in selection-mutation equations: Gauss versus Cauchy distributions, *arXiv preprint* 2015 (22 pages).
- [5] Q. Griette, G. Raoul, Existence and qualitative properties of traveling waves for an epidemiological model with mutations, accepted in *J. Differ. Equations*.
- [6] Q. Griette, G. Raoul, S. Gandon, Virulence evolution at the front line of spreading epidemics. *Evolution* (on line first).
- [7] V. Calvez, G. Raoul, C. Schmeiser, Confinement by biased velocity jumps: aggregation of E. coli. *Kinet. Relat. Mod.* **8**(4), 651–666 (2015).
- [8] 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).
- [9] M. Alfaro, J. Coville, G. Raoul, Bistable travelling waves for nonlocal reaction diffusion equations. *Discret Contin. Dyn. Syst.* **34**(5) 1775–1791 (2014).
- [10] M. Alfaro, J. Coville, G. Raoul, Travelling 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).
- [11] 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).
- [12] S. Mirrahimi, G. Raoul, Population structured by a space variable and a phenotypical trait. *Theo. Popul. Biol.* **84** 87–103 (2013).
- [13] D. Balague, J.A. Carrillo, T. Laurent, G. Raoul, Nonlocal interactions by repulsive-attractive potentials: radial ins/stability. *Phys. D* **260** 5–25 (2013).
- [14] 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).
- [15] 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).
- [16] G. Raoul, Non-local interaction equations: Stationary states and stability analysis. *Differential Integral Equations* **25**(5-6), 417–440 (2012).

- [17] G. Raoul, Long time evolution of populations under selection and vanishing mutations. *Acta. Appl. Math.* **114**(1-2) 1–14 (2011).
- [18] G. Raoul, Local stability of Evolutionary attractors for continuous structured populations. *Monatsh. Math.* **165**(1) 117–144 (2012).
- [19] P.E. Jabin, G. Raoul, On selection dynamics for competitive interactions. *J. Math. Biol.* **63**(3) 493–517 (2011).
- [20] 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).
- [21] 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).
- [22] K. Fellner, G. Raoul, Stable stationary states of non-local interaction equations. *Math. Models Methods Appl. Sci.* **20**(12), 2267–2291 (2010).
- [23] L. Desvillettes, P.E. Jabin, S. Mischler, G. Raoul, On selection dynamics for continuous structured populations. *Commun. Math. Sci.*, **6**(3), 729–747 (2008).