

Charles Collot

Born September 13, 1990. French nationality.

Current Position and research field

2020 - **Chargé de Recherche (associate prof.) CNRS**, *Cergy Paris Université*, France.

I defended my PhD thesis under the direction of P. Raphaël on Nov. 2016 at J.A. Dieudonné laboratory, Nice Côte d'Azur University (France), then held a postdoctoral position at New York University (U.S.A. and U.A.E. campuses), before joining the CNRS in February 2020. I am interested in qualitative properties of solutions of nonlinear evolution partial differential equations. My topics of research include:

- Dynamics near solitons, self-similar solutions and steady states.
- Singularity formation and long time behavior for equations of parabolic, hyperbolic, or wave types.
- Certain statistical physics problems: weak wave turbulence, dynamics of infinitely many particles.

Past positions

2018-2020 **Courant Instructor (supervisors P. Germain and N. Masmoudi)**, *Courant Institute, New York University*, New York, U.S.A..

2017-2018 **Postdoctoral associate (supervisor N. Masmoudi)**, *New York University in Abu Dhabi*, Abu Dhabi, U.A.E..

Education

2014-2017 **Ph.D. with P. Raphaël "On critical and supercritical blow-up for the semi-linear heat and wave equations"**, *Université Nice Côte d'Azur*, Nice, France.

Defended on November 8, 2016,

Rapporteurs: T. Cazenave, N. Masmoudi, Jury: T. Cazenave, G. Lebeau, F. Merle, P. Raphaël, L. Vega.

2011-2013 **Master's Degree "Partial Differential Equations and Numerical Calculation" with first class honors**, *École Normale Supérieure and Orsay University*, Paris.

2008-2011 **Bachelor's Degree**, *École Normale Supérieure*, Paris.

Publications

Derivation of the homogeneous kinetic wave equation: longer time scales, *arXiv:2007.03508*, submitted, with P. Germain.

Stability of Steady States for Hartree and Schrodinger Equations for Infinitely Many Particles, *arXiv:2007.00472*, submitted, with A.-S. de Suzonni.

On the derivation of the homogeneous kinetic wave equation, *arXiv:1912.10368*, submitted, with P. Germain.

UFR Sciences et Techniques AGM - Département mathématiques

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Refined description and stability for singular solutions of the 2D Keller-Segel system, *arXiv:1912.00721*, submitted, with T.-E. Ghoul, N. Masmoudi and V.-T. Nguyen.

Spectral analysis for singularity formation of the two dimensional Keller-Segel system, *arXiv:1911.10884*, submitted, with T.-E. Ghoul, N. Masmoudi and V.-T. Nguyen.

Unsteady separation for the inviscid two-dimensional Prandtl's system, *arXiv:1903.08244*, submitted, with T.-E. Ghoul and N. Masmoudi.

Stability of equilibria for a Hartree equation for random fields, *Journal de Mathématiques Pures et Appliquées*, 137, 70-100 (2020), with A.-S. de Suzzoni.

On singularity formation for the two-dimensional unsteady Prandtl's system, *arXiv:1808.05967*, submitted, with T.-E. Ghoul, S. Ibrahim and N. Masmoudi.

Singularity formation for Burgers equation with transversal viscosity, *arXiv:1803.07826*, submitted, with T.-E. Ghoul and N. Masmoudi.

Strongly anisotropic type II blow up at an isolated point, *Journal of the American Mathematical Society*, 33(2), 527-607 (2020), with F. Merle and P. Raphaël.

On the stability of type I blow up for the energy super critical heat equation, *Memoirs of the American Mathematical Society*, 260(1255) (2019), with P. Raphaël and J. Szeftel.

Dynamics near the ground state for the energy critical nonlinear heat equation in large dimensions, *Communications in Mathematical Physics*, 352(1), 215-285 (2017), with F. Merle and P. Raphaël.

Stability of ODE blow-up for the energy critical semilinear heat equation, *Comptes Rendus Mathématique*, 355(1), 65-79 (2017), with F. Merle and P. Raphaël.

Non radial type II blow up for the energy supercritical semilinear heat equation, *Analysis & PDE*, 10(1), 127-252 (2017).

Type II blow up manifolds for a supercritical semi-linear wave equation, *Memoirs of the American Mathematical Society*, 252(1205) (2018).

Organization

- 2020- **Co-organizer of Geometry, Partial Differential Equations and Mathematical Physics seminar**, *Cergy Paris Université*, Cergy-Pontoise.
- 2014-2016 **Co-organizer of a J.A. Dieudonné Laboratory's PDE seminar, Co-organizer of the Ph.D. students' workshop, co-organizer of the Ph.D. students' seminar on PDEs and numerical analysis**, *Nice Sophia Antipolis University*, Nice.

Talks given at conferences and seminars

2020: CAMS Colloquium at University of Southern California (Jan., Los Angeles), Paris 13 Analysis Seminar (Mar., Villetaneuse), Institut Mathématiques de Bordeaux analysis seminar (Apr., Bordeaux), Shanghai Tech PDE Seminar (Apr., Shanghai), Long Time Behavior and

Singularity Formation in PDEs conference (May, Abu Dhabi), NCTS PDE and Analysis Seminar (Jun., Taipei), Princeton Analysis Seminar (Sep, Princeton)

2019: New York University in Abu Dhabi (Jan., U.A.E.), University of Sharjah (Jan., U.A.E), Fluid dynamics seminar (Feb. Princeton), Columbia (Apr., New York), Waves Cote d'Azur conference (Jun., Nice), Advances in Dispersive Equations workshop (Jul., Banff, Canada), minicourse given at USTC (Aug., Hefei, China), University of Maryland (Oct., Washington), Effective Equations in Quantum Physics session of AMS joint meeting (Gainesville, Florida), Brown University (Nov., Providence), University of British Columbia (Dec., Canada)

2018: Conference in honor of Lin and Shatah (Jan., Abu Dhabi), University of Victoria (Jan., Victoria), Courant Institute (Feb., New York), Journées Jeunes EDPistes (Mar., Nancy), Université libre de Bruxelles (Jun., Bruxelles), Conference Jeunes Chercheurs en EDP dispersives (Jun., Paris), Nonlinear Waves Conference (Jul., Karlsruhe), Courant Instructors day (Oct., New York), Cergy-Pontoise university seminar (Nov., Paris), Courant Institute (Dec., Paris).

2017: Journées jeunes EDPistes (Mar., Autrans), Lille university (May), Paris Dauphine university (May), Strasbourg university (Jun.), Nonlinear Waves and Dispersive Equations (Jun., Oberwolfach), Analyse asymptotique des équations d'évolution (Jul., C.I.R.M, Marseille), Nonlinear equations and singularity formation (Oct., Pauli Institute, Vienne), analysis seminar (Nov., American University of Sharjah).

2016: Ph.D. students seminar (Jan., Nice), Imperial college (Fev., London), Ph.D. students in sciences day (May, Nice), Laurent Schwartz seminar at IHES (May, Paris), Orsay University (Oct., Paris), Ph.D. students seminar (Oct., Rennes), Second Workshop on Evolution Equations (Dec., Valdivia, Chile).

2015: Ph.D. students seminar (May, Nice), Ph.D. students workshop (June, Nice), Ph.D. students seminar (Oct., Berkeley).

2014: workshop of the analysis team of Nice (Sep., Lecco), analysis team seminar (Nov., Nice).

Long term stays

Spring 2019: Invited researcher for two months at IHÉS, Bures-sur-Yvettes.

Winter 2019: Invited researcher for one month at NYUAD, Abu Dhabi.

Spring 2018: Invited researcher for three months at IHÉS, Bures-sur-Yvettes.

Winter 2018: One month at Courant Institute, New York.

Fall 2015: Program associate for "New Challenges in PDE" at MSRI, Berkeley.

Spoken languages

French and English (fluent), Spanish (intermediate), German and Portuguese (basic level).

Teaching

2019-2020 **Linear Algebra Instructor**, *New York University*.

2018-2019 **Analysis Instructor**, *New York University*.

2018-2019 **Calculus I Instructor**, *New York University*.

2016-2017 **Tutorial in mathematics for economy (first year BA), tutorial in statistics for economy (first year BA)**, *Université Nice Côte d'Azur*.

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2014-2016 **Course in mathematics for biology (first year BA), tutorial in discrete mathematics (first year BA), Université Nice Côte d'Azur.**