

JOSÉ ANTONIO CARRILLO DE LA PLATA

EDUCATION: Ph.D. in Mathematics, University of Granada, May 1996

CURRENT POSITION: Professor of the Analysis of Nonlinear Partial Differential Equations, Mathematical Institute, University of Oxford. Tutorial Fellow in Applied Mathematics, The Queen's College.

PREVIOUS POSITIONS

Lecturer	University of Texas at Austin	September 1998 - May 2000
Associate Prof.	University of Granada	January 2000 - March 2003
ICREA Research Prof.	Univ. Autònoma de Barcelona	March 2003 - September 2012
Chair in Applied and Numerical Analysis	Imperial College London	October 2012 – March 2020

VISITING AND RESEARCH POSITIONS

Core participant	Program on Optimal Transport IPAM, UCLA	Jan. 2008 - June 2008
Visiting Professor	Norwegian Academy of Science and Letters, Oslo	Sept.-Oct. 2008
Visiting Professor	National University of Singapore	August 1-31, 2009
Visiting Professor	CEREMADE, Université Paris-Dauphine, Paris	February 2010
Visiting Professor	Newton Institute, Cambridge, United Kingdom	August-December 2010
Visiting Professor	Université Paris-Orsay	June 2012
Visiting Professor	MSRI, University of California at Berkeley	August-October 2013
Visiting Professor	Tsinghua University, Beijing	July-August 2015
Visiting Scholar	Mittag-Leffler Institute, Sweden	September-December 2016
Visiting Scholar	IMPAN, Warsaw, Poland	March 2017
Visiting Professor	Brown University, USA	August-September 2017
Changjiang Scholar	SWUFE, Chengdu, China	January 2018 – May 2021
Visiting Professor	Simons Institute, Berkeley, USA	August-September 2021
Visiting Professor	BCAM, Bilbao, Spain	1 month per year, 2021-

AWARDS, PRIZES and MAJOR GRANTS

- [SeMA \(Sociedad Española de Matemática Aplicada\) Young Researcher Prize](#), 2003.
- [Richard von Mises Prize](#) of the International Assoc. of Applied Mathematics and Mechanics-GAMM 2006.
- Royal Society [Wolfson Research Merit Award](#) 2012.
- 2016 [SACA Award](#) to the best PhD supervision at Imperial College London.
- Elected member of the [European Academy of Sciences](#) 2018.
- [SIAM Fellow Class 2019](#) and IMA Fellow 2021.
- [Highly Cited Researcher 2015, 2016, 2017, 2018, 2019 and 2020](#).
- ERC Advanced Grant 2020.
- Foreign member of the Real Academia de Ciencias exactas y Naturales of Spain 2021.
- Echegaray Medal 2022 of the Real Academia de Ciencias exactas y Naturales of Spain.
- Elected Member of the Section of Mathematics of the [Academia Europaea](#) 2023.

MENTORING: 18 Ph.D. Students and 26 Postdoctoral Fellows Supervised

PUBLICATIONS: Selected List of publications.

1. J. A. Carrillo, L. Wang, C. Wei, Structure preserving primal dual methods for gradient flows with nonlinear mobility transport distances, *SIAM J. Num. Anal.* 62, 376-399, 2024.
2. J. A. Carrillo, A. Esposito, J. S.-H. Wu, Nonlocal approximation of nonlinear diffusion equations, to appear in *Calc. Var. PDE*.
3. J. A. Carrillo, R. Shu, Minimizers of 3D anisotropic interaction energies, to appear in *Advances in Calculus of Variations*.
4. C. Falcó, D. J. Cohen, J. A. Carrillo, R. E. Baker, Quantifying tissue growth, shape and collision via continuum models and Bayesian inference, *J. R. Soc. Interface* 20, 20230184, 2023.
5. J. A. Carrillo, R. Shu, Existence of radial global smooth solutions to the pressureless Euler-Poisson equations with quadratic confinement, *Arch. Rat. Mech. Anal.* 247, 73, 2023.
6. J. A. Carrillo, P. Roux, S. Solem, Noise-driven bifurcations in a nonlinear Fokker-Planck system describing stochastic neural fields, *Physica D: Nonlinear Phenomena* 449, 133736, 2023.
7. J. A. Carrillo, R. Shu, Global Minimizers of a Large Class of Anisotropic Attractive-Repulsive Interaction Energies in 2D, *Comm. Pure Appl. Math.* 77, 1353-1404, 2024.
8. J. A. Carrillo, H. Holden, S. Solem, Noise-driven bifurcations in a neural field system modelling networks of grid cells, *J. Math. Biology* 85, 42, 2022.
9. J. A. Carrillo, R. Shu, From radial symmetry to fractal behavior of aggregation equilibria for repulsive-attractive potentials, *Calc. Var. Partial Differential Equation* 62, 28, 2023.
10. J. A. Carrillo, F. Hoffmann, A. M. Stuart, U. Vaes, Consensus Based Sampling, *Stud. Appl. Math.* 148, 1069-1140, 2022.
11. J. A. Carrillo, D. Gómez-Castro, Y. Yao, C. Zeng, Asymptotic simplification of Aggregation-Diffusion equations towards the heat kernel, *Arch. Rat. Mech. Anal.* 247, 11, 2023.
12. J. A. Carrillo, D. Gómez-Castro, J. L. Vázquez, Infinite-time concentration in Aggregation-Diffusion equations with a given potential, *J. Math. Pures et Appl.* 157, 346-398, 2022.
13. J. A. Carrillo, D. Kalise, F. Rossi, E. Trélat, Controlling swarms towards flocks and mills, *SIAM J. Control and Optimization* 60, 1863-1891, 2022.
14. J. A. Carrillo, M. Delgadino, J. Wu, Boltzmann to Landau from the Gradient Flow Perspective, *Nonlinear Anal.* 219, Paper No. 112824, 2022.
15. T. S. Gutleb, J. A. Carrillo, S. Olver, Computing Equilibrium Measures with Power Law Kernels, *Mathematics of Computation* 91, 2247-2281, 2022.
16. J. A. Carrillo, R. S. Gvalani, J. Wu, An invariance principle for gradient flows in the space of probability measures, *J. Diff. Eqns.* 345, 233-284, 2023.
17. J. A. Carrillo, M. G. Delgadino, R. L. Frank, M. Lewin, Fast Diffusion leads to partial mass concentration in Keller-Segel type stationary solutions, *Math. Models Methods Appl. Sci.* 32, 831-850, 2022.
18. J. A. Carrillo, Y.-P. Choi, Mean-field limits: from particle descriptions to macroscopic equations, *Arch. Rat. Mech. Anal.* 241, 1529-1573, 2021.
19. J. A. Carrillo, M. G. Delgadino, L. Desvillettes, J. Wu, The Landau equation as a Gradient Flow, to appear in *Analysis & PDE*.
20. J. A. Carrillo, R. S. Gvalani, Phase transitions for nonlinear nonlocal aggregation-diffusion equations, *Comm. Math. Phys.* 382, 485-545, 2021.
21. J. A. Carrillo, K. Craig, L. Wang, C. Wei, Primal dual methods for Wasserstein gradient flows, *Found. Comput. Math.* 22, 389-443, 2022.
22. J.A. Carrillo, U. Vaes, Wasserstein stability estimates for covariance-preconditioned Fokker-Planck equations, *Nonlinearity* 34, 2275-2295, 2021.
23. J. A Carrillo, J. Li, Z. Wang, Boundary spike-layer solutions of the singular Keller-Segel system: existence and stability, *Proceedings of the LMS* 122, 42-68, 2021.

24. J. A. Carrillo, J. Hu, L. Wang, J. Wu, A particle method for the homogeneous Landau equation, *J. Comp. Phys.* X 7, 100066, 2020.
25. J. A. Carrillo, J. Mateu, M.G. Mora, L. Rondi, L. Scardia, J. Verdera, The ellipse law: Kirchhoff meets dislocations, *Comm. Math. Phys.* 373, 507-524, 2020.
26. J. A. Carrillo, K. Hopf, J. L. Rodrigo, On the singularity formation and relaxation to equilibrium in 1D Fokker-Planck model with superlinear drift, *Adv. Math.* 360, 106883, 2020.
27. J. A. Carrillo, R. S. Gvalani, G. A. Pavliotis, A. Schlichting, Long-time behaviour and phase transitions for the McKean--Vlasov equation on the torus, *Arch. Rat. Mech. Anal.* 235, 635-690, 2020.
28. J. A. Carrillo, H. Murakawa, M. Sato, H. Togashi, O. Trush, A population dynamics model of cell-cell adhesion incorporating population pressure and density saturation, *J. Theor. Biology* 474, 14-24, 2019.
29. J. A. Carrillo, Y.-P. Choi, M. Hauray, S. Salem, Mean-field limit for collective behavior models with sharp sensitivity regions, *J. European Math. Soc.* 21, 121-161, 2019.
30. J. A. Carrillo, S. Hittmeir, B. Volzone, Y. Yao, Nonlinear Aggregation-Diffusion Equations: Radial Symmetry and Long Time Asymptotics, *Inventiones Mathematicae* 218, 889-977, 2019.
31. J. A. Carrillo, M. G. Delgadino, J. Dolbeault, R. L. Frank, F. Hoffmann, Reverse Hardy-Littlewood-Sobolev inequalities, *J. Math. Pure Appl.* 132, 133-165, 2019.
32. J. A. Carrillo, Y.-P. Choi, O. Tse, Convergence to Equilibrium in Wasserstein distance for damped Euler equations with interaction forces, *Comm. Math. Phys.* 365, 329-361, 2019.
33. J. A. Carrillo, K. Craig, F. S. Patacchini, A Blob Method For Diffusion, *Calc. Var. Partial Differential Equations* 58, Art. 53, 2019.
34. J. A. Carrillo, A. Wróblewska-Kaminska, E. Zatorska, On long-time asymptotics for viscous hydrodynamic models of collective behavior with damping and nonlocal interactions, *Mathematical Models and Methods in the Applied Sciences* 29, 31-63, 2019.
35. J. A. Carrillo, Y.-P. Choi, C. Totzeck, O. Tse, An analytical framework for a consensus-based global optimization method, *Math. Mod. and Meth. in the Applied Sciences* 28, 1037-1066, 2018.
36. J. A. Carrillo, A. Colombi, M. Scianna, Adhesion and volume constraints via nonlocal interactions lead to cell sorting, *J. Theo. Biology* 445, 75-91, 2018.
37. J. A. Carrillo, F. Hoffmann, E. Mainini, B. Volzone, Ground States in the Diffusion-Dominated Regime, *Calc. Var. Partial Differential Equations* 57, 57-127, 2018.
38. J. A. Carrillo, A. Figalli, F. S. Patacchini, Geometry of minimizers for the interaction energy with mildly repulsive potentials, *Ann. IHP* 34, 1299-1308, 2017.
39. J. A. Carrillo, M. G. Delgadino, A. Mellet, Regularity of local minimizers of the interaction energy via obstacle problems, *Comm. Math. Phys.* 343, 747-781, 2016.
40. J. A. Cañizo, J. A. Carrillo, F. S. Patacchini, Existence of Compactly Supported Global Minimisers for the Interaction Energy, *Arch. Rat. Mech. Anal.* 217, 1197-1217, 2015.
41. J. A. Carrillo, Y. Huang, S. Martin, Nonlinear stability of flock solutions in second-order swarming models, *Nonlinear Analysis: Real World Applications* 17, 332-343, 2014.
42. F. Bolley, J. A. Carrillo, Nonlinear diffusion: Geodesic Convexity is equivalent to Wasserstein Contraction, *Comm. PDEs* 39, 1860-1869, 2014.
43. J. A. Carrillo, Y. Huang, S. Martin, Explicit Flock Solutions for Quasi-Morse potentials, *European Journal of Applied Mathematics* 25, 553-578, 2014.
44. J. A. Carrillo, M. DiFrancesco, G. Toscani, Condensation phenomena in nonlinear drift equations, *Annali della Scuola Normale Superiore di Pisa XV*, 145-171, 2016.
45. J. A. Carrillo, P. Gwiazda, A. Ulikowska, Splitting-Particle Methods for Structured Population Models: Convergence and Applications, *Mathematical Models and Methods in the Applied Sciences* 24, 2171, 2014.
46. G. Albi, D. Balagué, J. A. Carrillo, J. von Brecht, Stability Analysis of Flock and Mill rings for 2nd Order Models in Swarming, *SIAM J. Appl. Math.* 74, 794-818, 2014.
47. J. A. Carrillo, S. Cordier, G. Deco, S. Mancini, Complexity Reduction of Rate-Equations Models for Two-Choice Decision-Making, *PLoS ONE* 8(12), e80820, 2013.

48. D. Balagué, J. A. Carrillo, T. Laurent, G. Raoul, Dimensionality of Local Minimizers of the Interaction Energy, *Archive for Rational Mechanics and Analysis* 209, 1055-1088, 2013.
49. D. Balagué, J. A. Carrillo, T. Laurent, G. Raoul, Nonlocal interactions by repulsive-attractive potentials: radial ins/stability, *Physica D* 260, 5-25, 2013.
50. J. A. Carrillo, M. d. M. González, M. P. Gualdani, and M. E. Schonbek, Classical Solutions for a nonlinear Fokker-Planck equation arising in Computational Neuroscience, *Comm. in PDEs* 38, 385-409, 2013.
51. M. J. Cáceres, J. A. Carrillo, B. Perthame, Analysis of Nonlinear Noisy Integrate & Fire Neuron Models: blow-up and steady states, *Journal of Mathematical Neuroscience* 1, 7, 2011.
52. F. Bolley, J. A. Cañizo, J. A. Carrillo, Stochastic Mean-Field Limit: Non-Lipschitz Forces & Swarming, *Math. Mod. Meth. Appl. Sci.* 21, 2179-2210, 2011.
53. E. A. Carlen, J. A. Carrillo, M. Loss, Hardy-Littlewood-Sobolev inequalities via fast diffusion flows, *Proc. Nat. Acad. USA* 107 (46), 19696-19701, 2010.
54. J. A. Carrillo, M. Fornasier, J. Rosado, G. Toscani, Asymptotic Flocking Dynamics for the kinetic Cucker-Smale model, *SIAM J. Math. Anal.* 42, 218-236, 2010.
55. J. A. Carrillo, M. DiFrancesco, A. Figalli, T. Laurent, D. Slepcev, Global-in-time weak measure solutions and finite-time aggregation for nonlocal interactions, *Duke Math. J.* 156, 229-271, 2011.
56. N. Ben Abdallah, M. J. Cáceres, J. A. Carrillo, F. Vecil, A deterministic solver for a hybrid quantum-classical transport model in nanoMOSFETs, *J. Comp. Phys.* 228, 6553-6571, 2009.
57. A. Blanchet, J. A. Carrillo, P. Laurençot, Critical mass for a Patlak-Keller-Segel model with degenerate diffusion in higher dimensions, *Calculus of Variations and PDEs* 35, 133-168, 2009.
58. A. Blanchet, V. Calvez, J. A. Carrillo, Convergence of the mass-transport steepest descent scheme for the sub-critical Patlak-Keller-Segel model, *SIAM J. Numer. Anal.* 46, 691-721, 2008.
59. A. Blanchet, J. A. Carrillo, N. Masmoudi, Infinite Time Aggregation for the Critical PKS model in \mathbb{R}^2 , *Comm. Pure and Applied Mathematics* 61, 1449-1481, 2008.
60. V. Calvez, J.A. Carrillo, Volume effects in the Keller-Segel model: energy estimates preventing blow-up, *Journal Mathématiques Pures et Appliquées* 86, 155-175, 2006.
61. J.A. Carrillo, R.J. McCann, C. Villani, Contractions in 2-Wasserstein length space and thermalization of granular media, *Arch. for Rat. Mech. and Anal.* 179, 217-263, 2006.
62. J. A. Carrillo, I. Gamba, A. Majorana, C. W. Shu, A WENO-solver for the transients of Boltzmann-Poisson for semiconductor devices. *Journal of Computational Physics* 184, 498-525, 2003.
63. J.A. Carrillo, R.J. McCann, C. Villani, Kinetic equilibration rates for granular media and related equations, *Revista Matemática Iberoamericana* 19, 1-48, 2003.
64. J. A. Carrillo, G. Toscani, Intermediate asymptotics for strong solutions of the thin film equation, *Comm. Math. Phys.* 225, 551-571, 2002.
65. A. V. Bobylev, J. A. Carrillo, I. Gamba, On some properties of kinetic and hydrodynamic equations for inelastic interactions, *J. Stat. Phys.*, 98, 743-773, 2000.
66. J. A. Carrillo, G. Toscani, Asymptotic L^1 -decay of solutions of the porous medium equation to self-similarity, *Indiana University Mathematics Journal*, 49, 113-141, 2000.

Book Chapters (Selected)

1. V. Calvez, J. A. Carrillo, F. Hoffmann, the geometry of diffusing and self-attracting particles in a one-dimensional fair-competition regime, *Lecture Notes in Mathematics* 2186, Springer, 2018.
2. J. A. Carrillo, M. Fornasier, G. Toscani, F. Vecil, Particle, Kinetic, and Hydrodynamic Models of Swarming, *Series: Modelling and Simulation in Science and Technology*, Birkhauser, (2010), 297-336.

INVITED LECTURES

Conference Talks (selected)

1. Invited Speaker at the 5th European Congress of Mathematicians, (Amsterdam 2008).
2. Invited Speaker at the 13th International Conference on Hyperbolic Problems, (Beijing 2010).
3. Plenary Speaker at the Canadian Mathematical Society Summer Meeting, (Halifax 2013).
4. Invited Speaker at Modern Perspectives in Applied Mathematics, (Washington 2014).
5. Invited Speaker at XV International Conference on Hyperbolic Problems, IMPA, (Rio de Janeiro 2014).
6. Invited Speaker at the 2nd joint SIAM-CAIMS Annual Meeting (Toronto 2020).
7. QJMAM Lecture at the joint BMC-BAMC (Glasgow 2021).
8. Plenary Speaker at SIAM PDE (Berlin 2022).
9. Plenary Speaker at the ICIAM 2023 (Tokyo).
10. Invited Speaker at the ENUMATH (Lisbon 2023).

PROFESSIONAL ACTIVITIES AND SERVICE

Serving Committees

- Head of the Division of the European Academy of Sciences, Section Mathematics, 2020-2022.
- Vice-president of the European Society of Mathematical and Theoretical Biology 2021-2023.
- Program Director of the SIAM activity group in Analysis of PDE 2019-2020.
- Applied Mathematics Committee, European Mathematical Society, 2010-2013. Chair 2014-2017.
- European Consortium for Mathematics in Industry Council, September 2005 - July 2012.
- Member of the ECMI Council, 2005 - October 2012.
- Comité Científico-Técnico de la Agencia Estatal de Investigación, Spain, 2021-2025.

Editorial Boards - Selected

- Kinetic and Related Models, 2008-
- SIAM Journal on Mathematical Analysis (SIMA), 2010-
- Discrete and Continuous Dynamical Systems - Series A (DCDS-A), 2013-
- Journal and Bulletin of the London Mathematical Society, 2013-
- Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal, 2017-

Conferences/Thematic Programs Organized - Selected

- “Optimal Transport,” IPAM, UCLA, March-June 2008.
- “Mathematical Biology: Modelling and Differential Equations,” CRM, Barcelona, January-June 2009.
- “Partial Differential Equations in Kinetic Theories”, Isaac Newton Institute for Mathematical Sciences, Cambridge (United Kingdom), August to December 2010.
- “Interactions between PDEs & Functional Inequalities”, Institut Mittag-Leffler, Fall 2016.
- “Year of Mathematical Biology”, 2018. It is joint venture of ESMTB and EMS.
- “Differential Equations arising from Organising Principles in Biology”, Oberwolfach, 23-29 September, 2018.
- “Frontiers in Kinetic Theory: Connecting Microscopic to Macroscopic Scales”, Isaac Newton Institute for Mathematical Sciences, Cambridge (United Kingdom), January to June 2022.

Panel Funding Agencies

- European Research Council, Committee Starting Grants in Mathematics, 2010-2011.
- European Research Council, Committee Consolidator Grants in Mathematics, Call 2012-2017.
- ICREA Research Professors 2017, 2019 and 2021.
- Swedish Research Council 2018-2020.
- NSERC of Canada, Selection Committee for the Discovery Institutes Support Grants 2022.