

# Curriculum Vitae

## Luis E. Silvestre

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### *Personal Information*

Citizenship: Argentina and USA.

### *Education*

**Ph.D. Mathematics** May 2005  
University of Texas, Austin, TX  
Advisor: Prof. Luis Caffarelli

**Licenciado en Matematica** December 2000  
Universidad Nacional de La Plata, Argentina.

### *Positions*

**Full Professor** September 2018 - present  
University of Chicago. Chicago, IL.

**Associate Professor** September 2013 - August 2018  
University of Chicago. Chicago, IL.

**Assistant Professor** September 2008 - August 2013  
University of Chicago. Chicago, IL.

**Courant Instructor** Fall 2005 - August 31st 2008  
Courant Institute. New York University. New York, NY.

### *Fellowships and Awards*

- First Prize in the Paenza Mathematical Contest 1995, 1997, 1998 and 1999
- Liftoff Fellowship from the Clay Mathematics Institute. Summer 2005
- NSF grant DMS-0701016 June 2007 - May 2010
- Sloan Research Fellowship 2009 - 2011
- NSF grant DMS-1001629 June 2010 - May 2013
- NSF FRG Project DMS-1065971 - with Luis Caffarelli, Yanyan Li, Fanghua Lin and Henri Berestycki 2011 - 2014
- NSF CAREER grant DMS-1254332 June 2013 - May 2018
- Invited speaker for the ICM 2014 in Seoul, South Korea August 2014
- NSF grant DMS-1764285 July 2018 - June 2021
- NSF grant DMS-2054888 July 2021 - June 2024
- Fellow of the AMS class 2024.

## *Publications*

1. *On the monotonicity of the Fisher information for the Boltzmann equation.* Cyril Imbert, Luis Silvestre and Cedric Villani. Preprint.
2. *Partial regularity in time for the space-homogeneous Boltzmann equation with very soft potentials.* François Golse, Cyril Imbert and Luis Silvestre. Preprint.
3. *The Landau equation does not blow up.* Nestor Guillen and Luis Silvestre. Preprint.
4. *Conditional  $L^\infty$  estimates for the non-cutoff Boltzmann equation in a bounded domain.* Zhimeng Ouyang and Luis Silvestre. Archive of Rational Mechanics and Analysis. Accepted for Publication.
5. *Entropy dissipation estimates for the Boltzmann equation without cut-off* Jamil Chaker and Luis Silvestre. Kinet. Relat. Models 16 (2023), no. 5.
6. *Holder estimates for kinetic Fokker-Planck equations up to the boundary* Luis Silvestre. Ars Inveniendi Analytica. 2022, Paper No. 6, 35
7. *Regularity estimates and open problems in kinetic equations* Luis Silvestre. Barrett lectures 2021.
8. *Solutions to the non-cutoff Boltzmann equation uniformly near a Maxwellian* Stanley Snelson and Luis Silvestre. Mathematics in Engineering 5 (2023), no. 2, Paper No. 034.
9. *Singular solutions to parabolic equations in nondivergence form.* Luis Silvestre. Annali della Scuola Normale Superiore, Classe di Scienze 2022: VOL. XXIII, ISSUE 2.
10. *Regularity for the Boltzmann equation conditional to macroscopic bounds* Cyril Imbert and Luis Silvestre. EMS Surveys in Mathematical Sciences 7 (2020), no. 1.
11. *Global regularity estimates for the Boltzmann equation without cut-off* Cyril Imbert and Luis Silvestre. Journal of the American Mathematical Society. 35 (2022), no. 3.
12. *Coercivity estimates for integro-differential operators.* Jamil Chaker and Luis Silvestre. Calc. Var. Partial Differential Equations 59 (2020), no. 4, Paper No. 106.
13. *Gaussian lower bounds for the Boltzmann equation without cut-off.* Cyril Imbert, Clement Mouhot and Luis Silvestre. SIAM J. Math. Anal. 52 (2020), no. 3, 2930–2944.
14. *The Schauder estimate for kinetic integral equations.* Cyril Imbert and Luis Silvestre. Anal. PDE 14 (2021), no. 1, 171–204.
15. *Multi-dimensional Burgers equation with unbounded initial data: well-posedness and dispersive estimates.* Denis Serre and Luis Silvestre. Archive of Rational Mechanics and Analysis. Arch. Ration. Mech. Anal. 234 (2019), no. 3, 1391–1411.
16. *Decay estimates for large velocities in the Boltzmann equation without cut-off.* Cyril Imbert, Clement Mouhot and Luis Silvestre. J. Éc. polytech. Math. 7 (2020), 143–184.
17. *Oscillation properties of scalar conservation laws.* Luis Silvestre. Communications on Pure and Applied Mathematics. 72 (2019), no. 6, 1321–1348.
18. *Global a priori estimates for the inhomogeneous Landau equation with moderately soft potentials.* Stephen Cameron, Stanley Snelson and Luis Silvestre. Annales de l’Institut Henri Poincaré (C) Anal. Non Linéaire. 35 (2018), no. 3,
19. *The Weak Harnack inequality for the Boltzmann equation without cut-off.* Cyril Imbert and Luis Silvestre. Journal of the European Mathematical Society. Accepted for publication.
20. *Hölder gradient estimates for a class of singular or degenerate parabolic equations.* Cyril Imbert, Tianling Jin and Luis Silvestre. Advances in Nonlinear Analysis. 8 (2019), no. 1, 845–867.
21. *Upper bounds for parabolic equations and the Landau equation.* Luis Silvestre. Journal of Differential Equations 262 (2017), no. 3, 3034–3055.
22. *An integro-differential equation without continuous solutions.* Luis Silvestre and Stanley Snelson. Mathematical Research letters 23 (2016), no. 4, 1157–1166.

23. *Hölder gradient estimates for parabolic homogeneous  $p$ -Laplacian equations.* Tianling Jin and Luis Silvestre. *Journal de Mathematiques Pures et Appliquees.* (9) 108 (2017), no. 1.
24. *Regularity estimates for fully non linear elliptic equations which are asymptotically convex.* Luis Silvestre and Eduardo Teixeira. *Progress in Nonlinear Differential Equations and their Applications*, 86, Birkhäuser/Springer, Cham, 2015.
25. *A new regularization mechanism for the Boltzmann equation without cut-off.* Luis Silvestre. *Communications in Mathematical Physics* 348 (2016), no. 1, 69-100.
26. *Regularity for parabolic integro-differential equations with very irregular kernels.* Russell Schwab and Luis Silvestre. *Analysis and PDE* 9 (2016), no. 3, 727-772.
27. *Propagation in a non local reaction diffusion equation with spatial and genetic trait structure.* Henri Berestycki, Tianling Jin and Luis Silvestre. *Nonlinearity* 29 (2016), no. 4, 1434-1466.
28. *Regularity estimates for parabolic integro- differential equations and applications.* Luis Silvestre. *Proceedings of the ICM 2014.*
29. *On a transport equation with nonlocal drift.* Luis Silvestre and Vlad Vicol. *Transactions of the American Mathematical Society* 368 (2016), no. 9, 6159-6188.
30. *A non local Monge-Ampere equation.* Luis Caffarelli and Luis Silvestre. *Communications in Analysis and Geometry* 24 (2016), no. 2, 307-335.
31. *On Landis' conjecture in the plane* Carlos Kenig, Luis Silvestre and Jenn-Nan Wang. *Communications in Partial Differential Equations.* 40 (2015), no. 4, 766-789.
32. *Overdetermined problems for fully nonlinear elliptic equations.* L. Silvestre and B. Sirakov. *Calculus of Variations and PDE.* 54 (2015), no. 1, 989-1007.
33. *Boundary regularity for viscosity solutions of fully nonlinear elliptic equations.* L. Silvestre and Boyan Sirakov. *Communications in Partial Differential Equations.* 39 (2014), no. 9, 1694-1717.
34. *Estimates on elliptic equations that hold only where the gradient is large.* C. Imbert and L. Silvestre. *Journal of the European Mathematical Society* 18 (2016), no. 6, 1321-1338.
35. *Uniqueness of radial solutions for the fractional Laplacian.* R. L. Frank, E. Lenzmann and L. Silvestre. *Communications on Pure and Applied Mathematics* 69 (2016), no. 9, 1671-1726.
36. *Holder regularity for generalized master equations with rough kernels.* L. Caffarelli and L. Silvestre. *Advances in Analysis: The Legacy of Elias M. Stein.* Princeton University Press, 2014.
37. *On the loss of continuity for super-critical drift-diffusion equations.* L. Silvestre, V. Vicol, A. Zlatoš. *Archive of Rational Mechanics and Analysis.* 207 (2013), no. 3, 845-877.
38. *Global well-posedness of slightly supercritical active scalar equations.* M. Dabkowski, A. Kiselev, L. Silvestre and V. Vicol. *Analysis and PDE.* 7 (2014), no. 1, 43-72.
39.  *$C^{1,\alpha}$  regularity of solutions of degenerate fully non-linear elliptic equations.* C. Imbert and L. Silvestre. *Advances in Mathematics.* 233 (2013), 196-206.
40. *Holder continuity to Hamilton-Jacobi equations with superquadratic growth in the gradient and unbounded right-hand side.* P. Cardaliaguet and L. Silvestre. *Communications in Partial Differential Equations.* 37 (2012), no. 9, 1668-1688.
41. *Partial regularity of solutions of fully nonlinear uniformly elliptic equations.* S. Armstrong, L. Silvestre and C. Smart. *Communications on Pure and Applied Mathematics.* 65 (2012), no. 8, 1169-1184.
42. *Holder continuity for a drift-diffusion equation with pressure.* V. Vicol and L. Silvestre. *Annales de l'Institut Henri Poincaré (C) Anal. Non Linéaire.* 29 (2012), no. 4, 637-652.
43. *Unique continuation for fully nonlinear elliptic equations.* S. Armstrong and L. Silvestre. *Mathematical Research Letters.* Volume 18, Issue 5, September 2011 pp. 921-926.
44. *On the differentiability of the solution to an equation with drift and fractional diffusion.* L. Silvestre. *Indiana University Mathematical Journal.* 61 (2012), no. 2, 557-584.

45. *On divergence free drifts.* G. Seregin, L. Silvestre, V. Sverak and A. Zlatoš. Journal of Differential Equations 252 (2012), no. 1, 505-540.
46. *Holder estimates for advection fractional-diffusion equations.* L. Silvestre. Annali della Scuola Normale Superiore di Pisa. Classe di Scienze (5) 11 (2012), no. 4, 843-855.
47. *Full regularity of a free boundary problem with two phases.* H. Jiang, C. Larsen and L. Silvestre. Calculus of Variations and PDE 42 (2011), no. 3-4, 301-321.
48. *Holder continuity for integro-differential parabolic equations with polynomial growth respect to the gradient.* L. Silvestre. Discrete and Continuous Dynamical Systems Volume: 28, Number: 3, November 2010. A special issue Dedicated to Louis Nirenberg on the Occasion of his 85th Birthday Part II
49. *Eventual regularization of the slightly supercritical fractional Burgers equation.* C. H. Chan, M. Czubak and L. Silvestre. Discrete and Continuous Dynamical Systems Volume: 27, Number: 2, June 2010. A special issue Trends and Developments in DE/Dynamics Part I.
50. *On the differentiability of the solution to the Hamilton-Jacobi equation with critical fractional diffusion.* L. Silvestre. Advances in Mathematics. 226 (2011), no. 2, 2020-2039
51. *Smooth approximations to solutions of nonconvex fully nonlinear elliptic equations.* L. Caffarelli and L. Silvestre. American Mathematical Society Translations–Series 2 Advances in the Mathematical Sciences 2010; Volume: 229. Nonlinear Partial Differential Equations and Related Topics: Dedicated to Nina N. Uraltseva.
52. *On the Evans-Krylov theorem.* L. Caffarelli and L. Silvestre. Proceedings of the AMS. 138 (2010), 263-265.
53. *The Evans-Krylov theorem for non local fully non linear equations.* L. Caffarelli and L. Silvestre. Annals of Mathematics. 174 (2011), no. 2, 1163-1187.
54. *Regularity results for nonlocal equations by approximation.* L. Caffarelli and L. Silvestre. Archive of Rational Mechanics and Analysis. Volume 200, Issue 1 (2011), Page 59.
55. *Eventual regularization in the slightly supercritical quasi-geostrophic equation.* L. Silvestre. Annales de l'Institut Henri Poincaré (C) Non Linear Analysis 27 (2010), Issue 2, Pages 693-704.
56. *The Dirichlet Problem for the Convex Envelope* A. Oberman and L. Silvestre. Transactions of the AMS 363 (2011), no. 11, 5871-5886.
57. *Regularity theory for fully nonlinear integro-differential equations.* L. Caffarelli and L. Silvestre. Communications on Pure and Applied Mathematics. 62 (2009) Issue 5, 597–638.
58. *A characterization of optimal two-phase multifunctional composite designs.* L. Silvestre. Proc. of the Royal Soc. of London A 463, Number 2086 (2007).
59. *Regularity estimates for the solution and the free boundary to the obstacle problem for the fractional Laplacian.* L. Caffarelli, S. Salsa and L. Silvestre. Inventiones Mathematicae. 171, Number 2 (2008).
60. *Regularity for the nonlinear Signorini problem.* E. Milakis and L. E. Silvestre. Advances in Mathematics. 217, Issue 3 (2008).
61. *An extension problem related to the fractional laplacian.* L. A. Caffarelli and L. E. Silvestre. Communications in Partial Differential Equations, 32 (2007) 8, 1245.
62. *Regularity of the obstacle problem for a fractional power of the laplace operator.* L. E. Silvestre. Communications on Pure and Applied Mathematics. 60 (2007), no. 1, 67–112.
63. *Issues in homogenization for problems with nondivergence structure.* L. A. Caffarelli and L. E. Silvestre. Calculus of variations and nonlinear partial differential equations, 43–74, Lecture Notes in Math., 1927, Springer, Berlin, 2008.
64. *Hölder estimates for solutions of integro differential equations like the fractional laplace.* L. E. Silvestre. Indiana University Mathematical Journal 55 (2006), 1155-1174.

65. *Regularity for fully nonlinear elliptic equations with Neumann boundary data.* E. Milakis and L. E. Silvestre. *Communications in Partial Differential Equations* 31 (2006), No. 8
66. *The two membranes problem.* L. E. Silvestre. *Communications in Partial Differential Equations* 30 (2005), no. 1-3, 245–257
67. *Weak Matrix Majorization.* F. D. Martínez Pería, P. Massey and L. E. Silvestre. *Linear Algebra Appl.* 403 (2005), 343–368.

***Some selected talks***

- International Congress of Mathematicians. Seoul, South Korea. August 2014.
- Annual meeting of the Argentinian Mathematical Union. Plenary speaker. Argentina. September 2016.
- Rivière-Fabes symposium. University of Minnesota. Minneapolis, April 2017.
- International Congress of Mathematical Physics. Invited talk. Geneva (and Zoom). August 2021.

***Editorial boards***

- *Advances in Calculus of Variations*
- *Analysis in Theory and Applications*
- *Discrete and Continuous Dynamical Systems - A.*
- *Interfaces and Free boundaries.*
- *Journal of Functional Analysis.*
- *Orbita Mathematicae*
- *Potential Analysis*
- *Revista de la Union Mathematica Argentina*

***Other service***

- Refereed articles for many journals.
- Organizer of the workshop “Nonlocal PDEs, Variational Problems and their Applications” at IPAM. 2012
- Organized of the concentration period on nonlinear elliptic PDEs. Chicago. May 2012.
- Organizer of the Inaugural Chicago Summer School In Analysis. June 2014.
- Scientific committee of the 3rd Conference on Nonlocal Operators and Partial Differential Equations. Bedlewo, Poland, June 2016.
- Organizing committee for the SIAM Conference on Analysis of Partial Differential Equations (PD17)
- Centennial Fellowship Committee. July 2017 to June 2019.
- Organizer of the Fourth Chicago Summer School In Analysis. June 2017.
- Organizer of the conference *Non Standard Diffusions in Fluids, Kinetic Equations and Probability.* Marseille. December 2018.