Curriculum Vitæ

Maria Pia Gualdani

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1 Education

Ph.D. in Mathematics	2005	Mainz University, Germany (Advisor: A. Jüngel)
Laurea in Matematica	2000	University of Florence, Italy (Advisor: A. Fasano)

2 Employment

From 09/2024	Professor (UT Austin)
09/2019-08/2024	Associate Professor (UT Austin)
08/2018-07/2019	Associate Professor (Royal Institute of Technology KTH) (on leave from George Washington University)
09/2016 - 08/2019	Associate Professor (George Washington Univ.)
09/2015-08/2016	Guest Researcher at KTH (Sabbatical year)
09/2012-08/2016	Assistant Professor (George Washington University)
08/2010-08/2012	Research Assistant Professor (UT Austin)
01/2007 - 08/2010	Instructor (UT Austin)
01/2006 - 01/2007	Postdoctoral fellowship (sponsored by the Alexander von Humboldt Foundation) ICES, UT Austin, USA

3 Funding

2025-2028 **NSF Grant DMS-2511625** (Single PI), *New prospectives and challenges in collisional kinetic theory.* Amount: $199,998.

2024-2028 **CNS SPARK grant** (Single PI), *Modeling interacting particles with partial differential equations: an application in biological aggregation.* Amount: $200,000.

2022-2025 **NSF Grant DMS-2206677** (Single PI), *Collisions in Plasma: The Landau Equation and Related Models.* Amount: $229,995.

2016-2024 **NSF Grant DMS- 1514761** (Single PI), **CAREER***: Nonlocal partial differential equations in collisional kinetic theory.* Amount: $410,000.

2018-2019 **NSF Grant DMS-1838371** (Co-PI, jointly with Svetlana Roudenko), Nonlinear Partial Differential Equations and Many Particle Systems. Amount $28,725.

2014 - 2019 **NSF Grant DMS-1406984** (Co-PI, jointly with Yongwu Rong (PI, Mathematics), Yinglei Lai (Statistics), Rahul Simha (Computer Science) and Murli Gupta (Mathematics)), *EXTREEMS-QED: GW Mathematics and Statistics Training, Education, & Research (MASTER)*. Amount: $600,000.

2014 - 2017 **NSF Grant DMS-1412748** (Single PI), *Analysis of nonlocal effects in nonlinear parabolic partial differential equations.* Amount: $170,000.

2011 - 2015 **NSF Grant DMS-1109682** (Single PI), *Analysis of Diffusion Equations with Nonlinear Singular Sources in Mean Field Games*. Amount: $208,430.

2008 - 2011 **NSF Grant DMS-0807636** (Single PI), *Existence Analysis and Qualitative Behavior of High Nonlinear Partial Differential Equations*. Amount: $ 78,000.

2006, 2007: **Feodor-Lynen Fellowship** (Single PI), Alexander von Humboldt Foundation (Germany).

Other Recognition

2016: Recipient of the **George Washington University Early Career Researcher Award**.
GW Early Career Scholar Award for faculty members who are recognized as the most promising up and coming researchers, whose trajectory projects remarkable success.

2015 - 2018: **Columbian College of Art and Science Dean's Research Chair**.

4 Publications

Preprints

M. Gualdani, N. Guillen, N. Pavlovic and M. Taskovic.
The fuzzy Landau equation: global well-posedness and Fisher information.

F. Caja, M. Delgadino, M Gualdani and M. Taskovic.
Contractivity of Wasserstein distance and exponential decay for the Landau equation with Maxwellian molecules.

Under Review

R. Alonso, M. Gualdani and W. Sun.
The $\mathscr{M}$-operator and uniqueness of nonlinear kinetic equations.

L. Desvillettes, W. Golding, M. Gualdani and A. Loher.
Production of the Fisher information for the Landau-Coulomb equation with L^1 initial data.

Published in peer reviewed journals

M. Gualdani, M. Ispizua and N. Zamponi.
A quasilinear Keller-Segel model with saturated discontinuous advection.
To apper in Comm. Partial Differential Equations.

M. Bonforte, M. Gualdani and P. Ibarrondo.
Time-Fractional Porous Medium Type Equations. Sharp Time Decay and Regularization.
To apper in Calc. Var. Partial Differential Equations (2025)

W. Golding, M. Gualdani and A. Loher.
Global smooth solutions to the Landau-Coulomb equation in $L^{3/2}$.
Arch. Ration. Mech. Anal. 249 (2025), no. 3, Paper No. 34.

M. Gualdani, R. Winter.
A blow-down mechanism for the Landau-Coulomb equation.
J. Funct. Anal. 288 (2025), no. 7, Paper No. 110816.

R. Cabrera, M. Gualdani and N. Guillen.
Regularization estimates of the Landau-Coulomb diffusion.
Nonlinear Anal. 251 (2025), Paper No. 113695, 8 pp..

W. Golding, M. Gualdani and A. Loher.
Nonlinear regularization estimates and global well-posedness for the Landau-Coulomb equation near equilibrium.
SIAM J. Math. Anal. 56 (2024), no. 6, 8037-8069.

W. Golding, M.P. Gualdani and N. Zamponi.
Existence of smooth solutions to the Landau-Fermi-Dirac equation with Coulomb potential.
Commun. Math. Sci. 20 (2022), no. 8, 2315-2365.

M.P. Gualdani and N. Guillen.
Hardy's inequality and the isotropic Landau equation.
J. Funct. Anal. 283 (2022), no. 6, Paper No. 109559, 25 pp.

J. Bedrossian, M. Gualdani and S. Snelson.
Non-existence of some approximately self-similar singularities for the Landau, Vlasov-Poisson-Landau, and Boltzmann equations
Trans. Amer. Math. Soc. 375 (2022), no. 3, 2187 - 2216.

J.L. Chern and M. Gualdani
Uniqueness of higher integrable solution to the Landau equation with Coulomb interactions.
Math. Res. Lett. 29 (2022), no. 4, 945-960.

F. Golse, M. Gualdani, C. Imbert, and A. Vasseur.
Partial regularity in time for the space homogeneous Landau equation with Coulomb potential.
Ann. Sci. Ec. Norm. Super. (4) 55 (2022), no. 6, 1575-1611.

E. Daus, M. Gualdani, J. Xu, N. Zamponi and X. Zhang.
Nonlocal porous media equations with fractional time derivative
Nonlinear Anal. 211 (2021), Paper No. 112486, 35 pp.

L. Caffarelli, M. Gualdani and N. Zamponi.
Existence of weak solutions to a continuity equation with space time nonlocal Darcy Law.
Comm. Partial Differential Equations 45 (2020), no. 12, 1799-1819.

E. Daus, M. Gualdani and N. Zamponi.
Long time behavior and weak-strong uniqueness for a nonlocal porous media equation
J. Differential Equations 268 (2020), no. 4, 1820-1839.

M.P. Gualdani and N. Guillen.
On A_p weights and the Landau equation.
Calc. Var. Partial Differential Equations 58 (2019), no. 1, 58:17, 55 pp.

M.P. Gualdani and N. Zamponi.
A Review on an isotropic Landau model.
115 - 144, Springer INdAM Ser., 28, Springer, Cham, (2018).

M.P. Gualdani and N. Zamponi.
Global existence of weak even solutions for an isotropic Landau equation with Coulomb potential.
SIAM J. Math. Anal. 50 (2018), no. 4, 3676 -3714.

M.P. Gualdani and N. Zamponi.
Spectral gap and exponential convergence to equilibrium for a multi-species Landau system.
Bulletin des Sciences Mathematiques, Volume 141 (6), 509-538 (2017)

M.P.Gualdani, S. Mischler and C. Mouhot.
Factorization of non-symmetric operators and exponential H-Theorem.
Memoires de la SMF 153 (2017), Volume 153, 137 pp.

M.P. Gualdani and N. Guillen.
Estimates for radial solutions of the homogeneous Landau equation with Coulomb potential.
Analysis & PDE, Vol. 9 (2016), No. 8, 1772-1809.

M.d.M Gonzalez, M.P. Gualdani and J.Sola-Morales.
Instability and bifurcation in a trend depending price formation model.
Acta Appl. Math. 144 (2016), 121 - 136.

M.d.M Gonzalez, M.P. Gualdani and H. Shahgholian.
A discrete Bernoulli free boundary problem.
Proceedings of the St. Petersburg Mathematical Society, Volume XV: Advances in Mathematical Analysis of Partial Differential Equations, (2014) 119-140.

J. A. Carrillo, M.d.M Gonzalez, M.P.Gualdani and M.E. Schonbek.
Classical Solutions for a nonlinear Fokker-Planck equation arising in Computational Neuroscience.
Comm. Partial Differential Equations 38 (2013), no. 3, 385-409.

A. Arnold, I.M.Gamba, M.P.Gualdani, S. Mischler, C. Mouhot and C. Sparber.
The Wigner-Fokker-Planck equation: Stationary states and large time behavior.
Math. Models Methods Appl. Sci. 22 (2012), no. 11, 1250034-1250065.

M.d.M Gonzalez, M.P. Gualdani.
Some non-standard Sobolev spaces: interpolation and its application to PDE.
Acta Appl. Math. 121 (2012), 57-67.

M.d.M Gonzalez, M.P. Gualdani.
Asymptotics for a free-boundary problem in price formation.
Nonlinear Analysis 74 (2011), pp. 3269-3294.

L. Chayes, M.d.M Gonzalez, M.P. Gualdani and I. Kim.
Global existence and uniqueness of solutions to a model in price formation.
SIAM J. Math. Anal. 41 (2009), no. 5, 2107-2135.

I.M. Gamba, M.P. Gualdani and R. Sharp.
An Adaptable Discontinuous Galerkin Scheme for the Wigner-Fokker-Planck Equation.
Comm. Math. Sci. (2009) Vol. 7, No. 3, 635-664.

M.d.M Gonzalez, M.P. Gualdani.
Asymptotics for a symmetric equation in price formation.
Applied Mathematics and Optimization: Volume 59, Issue 2 (2009), 233-246.

I. M. Gamba, M. Gualdani and P. Zhang.
On the blowing up of solutions to a quantum hydrodynamic model on a bounded domain.
Monatsh. Math 157 (2009), 37-54.

I.M. Gamba, M.P. Gualdani, C. Sparber.
A note on the time-decay of solutions for the linearized Wigner-Poisson system.
Kinetic and Related Models (2009), Volume: 2, Number: 1 (2009), 181-189.

J.A. Carrillo, M. Gualdani and A. Jüngel.
Convergence of Entropy Decay Schemes for nonlinear Fokker-Planck equations.
Publ. Mat. 52 (2008), 413-433.

J. A. Carrillo, M. Di Francesco, M. P. Gualdani.
Semidiscretization and long-time asymptotics of nonlinear diffusion equations.
Commun. Math. Sci. Supplemental Issue, No.1, 21-53 (2007).

M. P. Gualdani, A. Jüngel, G. Toscani.
A nonlinear fourth-order parabolic equation with non-homogeneous boundary conditions.
SIAM J. Math. Anal. 37 (2006), No. 6, 1761-1779.

J. A. Carrillo, M. P. Gualdani, G. Toscani.
Finite speed of propagation in porous media by mass transportation methods.
C. R. Acad. Sci. Paris, Ser. I 338 (2004) 815-818.

M. P. Gualdani, A. Jüngel.
Analysis of the viscous quantum hydrodynamic equations for semiconductors.
Europ. J. Appl. Math., (2004) vol. 15, 577-595.

M. P. Gualdani, A. Jüngel, and G. Toscani.
Exponential decay in time of solutions of the viscous quantum hydrodynamic equations.
Appl. Math. Lett. 16 (2003), 1273-1278.

M. P. Gualdani.
On a Mathematical model for the crystallization of Polymers.
Bollettino U.M.I. (8) 6-B (2003), 161-179.

5 Teaching (since 2017)

At The University of Texas at Austin:

M361K *Introduction to Real Analysis* Spring 2024.

M372K *Partial Differential Equations and Applications* Fall 2023

M361K *Introduction to Real Analysis* Spring 2023, 2025.

M 392C *Partial Differential equations part 1* (graduate course), Fall 2021, 2022, 2024.

M391C *Topics in Kinetic Theory* (graduate course), Spring 2021.

M365C *Real Analysis 1*, Spring 2020.

At Royal Institute of Technology (KTH):

SF 1624 *Linear Algebra* Fall 2018.

SF 1690 *Mathematics, basic course* Fall 2018

At George Washington University:

Math 6318 *Applied Mathematics 1* (graduate course) Fall 2017.

Reading courses

Fall 2022: with graduate student Patricia Ewald.

Fall 2020 - Spring 2021: with undergraduate Nan Sheldon.

Fall 2019: with graduate student William Golding.

Fall 2019: with undergraduate (exchange) student Jialiang Zhou.

6 Mentoring

Co-advisor of Francisco Unai Lopez, since Fall 2024.

Co-Mentor of Dominic Wynter, start Fall 2024.

Co-mentor of Rene Cabrera since Fall 2022.

Co-advisor of graduate student William Golding (Graduated Summer 2024). Post-doctoral fellow at University of Chicago.

Advisor of graduate student Jingjing Xu (graduated Spring 2022). Research Scientist at Amazon (Arlington, VA)

Advisor of graduate student Xinyu Zhang (graduated Spring 2021). Data Scientist at ByteDance (Mountain View, CA)

Advisor of graduate student Chubo Deng (graduated Summer 2018). Postdoctoral Researcher, Chinese Academy of Sciences, Beijing China.

7 Invited talks (since 2017)

Conferences and workshops:

Kinetic Limits and Probability, La Sapienza, Rome, June 9-13 2025.

Special Session at AMS Spring Section Meeting, Hartford CT, April 5-6 2025.

Workshop: *The many facets of Kinetic Theory.* ICMS in Edinburgh UK 23-27 September 2024.

Special Session: *Mathematical Physics and Numerical Methods.* AMS Sectional Meeting at the University of Texas, San Antonio, September 14-15, 2024.

UIMP Summer School *The Laplacian and beyond. Celebrating the mathematics of Luis Caffarelli*. July 21-26, 2024, Santander (Spain).

Workshop: *Stability and Multi-scale Analysis for PDEs.* UT Austin May 13-15 2024.

Conference: *Theoretical and Analytical Aspects of Kinetic equations in Plasmas.* CIRM (Centre International de Rencontres Mathematiques), Marseille, France, March 25-29, 2024.

Shocking Developments: New Directions in Compressible and Incompressible Flows: A Conference in Honor of Alexis Vasseur's 50th Birthday. June 26 - 30 2023, Max Planck Institute, Leipzig (Germany).

Conference: *Nonlinear diffusion and nonlocal interaction models - entropies, complexity, and multi-scale structures.* BIRS-IMAG May 28 - June 2 2023, Granada (Spain).

Workshop: *Frontiers in kinetic equations for plasmas and collective behavior*, April 25 - 29 2022, Isaac Newton Institute, Cambridge (UK).

The Oxbridge PDE Conference 2022, April 11-13 2022 at the Mathematical Institute, Oxford (UK).

SIAM Conference on Analysis of Partial Differential Equations (PD22) Technische Universitaet Berlin, 14-18 March 2022. (virtual)

Workshop *New Trends in Nonlinear Diffusion: a Bridge between PDEs, Analysis and Geometry.* September 5 - 10 2021 in Oaxaca (Mexico) (virtual)

Workshop *Elliptic and parabolic equations in both their local and nonlocal versions*, June 16-22, Madrid, Spain. *(Cancelled)*

Workshop *Kinetic Equations: Recent Developments and Novel Applications.* Oaxaca, from May 3 to May 08, 2020. *(Cancelled)*

Workshop *Variational Methods in Nonlinear Nonlocal PDEs* at the Sirius Mathematics Center in Sochi, Russia, October 5-9, 2020. *(Cancelled)*

28th Annual Workshop on Differential Equations, NCTS, National Taiwan University, Taipei, Dec 26-29 2019.

Workshop *Recent advances in kinetic equations and applications,* Rome (Italy) November 11-15 2019. *(not attended for family reasons)*

Summer School *Trails in kinetic theory: foundational aspects and numerical methods*, Bonn (Germany) May 20-24 2019. *(not attended for family reasons)*

Workshop *XVIII Italian Meeting on Hyperbolic Equations* Palermo (Italy) May 15-17 2019. *(not attended for family reasons)*

AMS Sectional Meeting at the University of Michigan in Ann Arbor, Michigan, October 20-21 2019. *(not attended for family reasons)*

Workshop *Kinetic Equations: Modeling, Analysis and Numerics,* in honor of I. Gamba 60th birthday, UT Austin, September 2017.

Conference *PDE/Probability Interactions: Kinetic Equations, Long time and Propagation of Chaos,* Marseille (France) April 18 -22 2017.

Seminars, Lectures and Short Courses:

Talk at Department Seminar at NTU (Taipei, Taiwan) Jan 7, 2025.

Short Course at Graduate Winter School in San Marcos TX Dec. 16-18 2024.

Talk at Calderon-Zygmund Analysis Seminar at UChicago, Febr 12, 2024.

Talk at Department Seminar at Ulm University (Germany) June 30, 2023.

Talk at Department Seminar at Autonoma University Madrid (Spain) June 9 2023.

Talk at Department Seminar at Simon Fraser University, Vancouver, (Canada) March 14, 2023

Colloquium at Emory University, Atlanta, GA. December 8 2022.

Talk at the London PDE seminar, UCL, London (UK), May 13 2022.

Talk at the Geometric Analysis and PDEs seminar at the University of Cambridge (UK), March 22 2022.

Talk at the Analysis seminar University of Warwick (UK), March 1 2022.

Tutorial: The Landau Equation. January 24 (part 1), Febr 1 (Part 2) 2022, Isaac Newton Institute, Cambridge (UK).

Talk at the University of Illinois, Chicago, April 12th 2021.

Talk at the Autonoma University Madrid (Spain) April 19, 2021.

Talk at the *Mini Conference in PDE*, Stockholm (Sweden), Sept 3-4 2018.

Short Course at the National Taiwan University on *Regularity for the homogeneous Landau equation.* June 2018, Taipei (Taiwan).

Colloquium at Michigan State University, April 12 2018.

Colloquium at Howard University, March 30 2018.

Talk at the summer graduate school on ''Nonlinear dispersive PDE, quantum many particle systems and the world between" in Cortona (Italy) July 21 2017.

Short Course at the National Taiwan University on A_p*-weights and regularization for the Landau equation.* June 26-27 2017, Taipei (Taiwan).

Talk at the Analysis Seminar at Columbia University, February 17 2017.

Talk at Department Seminar at the University of Minnesota, April 5 2017.

Colloquium at Baylor University, March 2 2017.

8 Member of Organizing Committees of the following events:

Co-organizer of Workshop *Partial differential equations and many particle systems*, ICERM 2026.

Co-Organizer of Workshop *Recent breakthroughs and new Perspectives on the interplay between fluid mechanics and kinetic theory*, Banff, 2026.

Co-Organizer of Workshop *Integro-differential equations in kinetic theory and many-particle interacting systems*, AIM, Caltech, 2025.

Co-organizer of the joint Graduate Spring School in Analysis and PDEs at UT Austin - Texas State San Marcos, May 13 - 20 2024.

Co-organizer of the Graduate Summer School in Analysis and PDEs at UT Austin August 15-19 2022.

Co-organizer of the BIRS workshop *Recent Progress in Kinetic and Integro-Differential Equations*, Banff, November 6 - 11, 2022.

Co-organizer of the SIAM Conference on Analysis of Partial Differential Equations (PD19) Dec 11-14, La Quinta, CA.

Co-Organizer of the conference *Nonlinear phenomena in Stockholm: kinetic meets dispersive*, KTH Sweden, Nov 19-21 2018.

Co-Organizer of the special session at the 12th AIMS conference *Nonlinear evolution equations* Taipei, Taiwan, July 4-8th 2018.

Co-Organizer of Workshop *Nonlocal PDEs in collective behavior*, AIM, San Jose, CA, June 18-22 2018.

Co-Organizer of the workshop *Nonlinear phenomena in DC* Washington DC, April 24, 2018.

Co-Organizer of Minisymposium *Mean Field Games and Social Dynamics*, SIAM PDE Baltimore, December 2017.

Co-organizer of Workshop *Kinetic Equations: Modeling, Analysis and Numerics,* in honor of I. Gamba 60th birthday, UT Austin, September 2017.

Co-organizer of Undergraduate EXTREME-QED Conference, College of William and Mary, April 8th 2017.

9 Administrative and committee services at UT Austin

Assistant Graduate Advisor in the Department of Mathematics (since June 2020).

Elected member of the Graduate Assembly and member of the Academic Committee AA 2022-2025.

Chair of the Bing Instructor Search committee, AA 2023-2024.

Chair of the hiring committee for tenure track position AA 2022-2023.

Chair of the Graduate Diversity/Equity/Inclusion Committee AA 2020-2021.

Member of the CNS Emerging Faculty Leaders, AA 2019-2020, AA 2020-2021.

Member of Bing Instructor Hiring Committee, AA 2019-2020.

Member of candidacy and dissertation committees for William Warner (Fall 2024), Joseph Miller (Spring 2024), Jiayun Meng (Spring 2024), Jeffrey Cheng (Spring 2024), Kenneth DeMason (Fall 2023), William Warner (December 2022), Amie Urban (Summer 2021).

10 Academic related service at national and international level

Since Fall 2024: Member of the Advisory Board of the School of Doctoral Education (Scuola di Alta Formazione Dottorale - SAFD) at the University of Pavia.

Chair of the AWM Sadosky Research Prize in Analysis 2024.

Committee Member for AWM Sadosky Research Prize in Analysis 2022.

External member of Jeremy Wu's doctoral exam, Oxford, UK, May 11, 2022.

Evaluator for post-doctoral candidates for the University of Granada, Spain, Spring 2022.

Member of search committee for tenure track candidate at University of Aquila (Italy), Fall 2021.

Panelist for NSF Division of Mathematical Science.

Ad hoc proposals reviewer for NSERC.

Referee for several mathematical journals.