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Education

- 2016 **Ph.D. in Applied Mathematics**, *Department of Applied Mathematics*, University of Washington, Seattle.
Advisors: Randall J. LeVeque & Hong Qian
- 2012 **M.Sc. in Applied Mathematics**, *Department of Applied Mathematics*, University of Washington, Seattle.
- 2010 **B.Sc. in Physics**, *Universidad Nacional Autónoma de México (UNAM)*, Mexico City.

Professional Experience

- Since 2025 **Group leader**, *Zuse Institute Berlin and Freie Universität Berlin.*
- 2022–2025 **Project leader**, *principal investigator of independent DFG funded project, Department of Mathematics and Computer Science, Freie Universität Berlin.*
- 2021–2022 **Research Fellow**, *Dutch Institute for Emergent Phenomena, Van 't Hoff Institute for Molecular Sciences and Korteweg-de Vries Institute for Mathematics, University of Amsterdam.*
- 2020 **CRC Young Investigator**, *Department of Mathematics and Computer Science, DFG Collaborative Research Centre on Scaling Cascades in Complex Systems, Freie Universität Berlin.*
- 2017–2019 **Postdoctoral Researcher**, *Department of Mathematics and Computer Science, Computational Molecular Biology/AI4Science Group, Freie Universität Berlin.*
Postdoctoral advisor: Frank Noé
- Sep–Dec 2017 **Visiting Scholar**, *Institute for Pure and Applied Mathematics, University of California, Los Angeles.*
Long program on Complex High-Dimensional Energy Landscapes
- Mar–Apr 2017 **Visiting Scholar**, *Department of Chemistry, Rice University, Houston.*
Host: Cecilia Clementi

Journal publications

16. M. J. del Razo and M. Kostré (2025) *Open reaction-diffusion systems: bridging probabilistic theory and simulations across scales*. J. Phys. A: Math. Theor. 58 14500 [arXiv][git]
15. J. Armas, , W. Merbis, J. Meylahn, S. Rafiee Rad, M. J. del Razo (2025) *Risk aversion can promote cooperation* J. Phys. Complex. 6 015010 [arXiv]
14. M. J. del Razo and L. Delle Site (2025) *Dynamics of systems with varying number of particles: from Liouville equations to general master equations for open systems*. SciPost Phys. 18, 001 [arXiv]
13. M. J. del Razo, D. Crommelin and P. Bolhuis (2024) *Data-driven dynamical coarse-graining for condensed matter systems*. J. Chem. Phys. 160, 024108 [arXiv]
12. M. J. del Razo, S. Winkelmann, R. Klein and F. Höfling (2023) *Chemical diffusion master equation: formulations of reaction-diffusion processes on the molecular level*. J. Math. Phys. 64.1 : 013304 [arXiv]
11. M. J. del Razo, D. Frömberg, A. V. Straube, C. Schütte, F. Höfling and S. Winkelmann (2022) *A probabilistic framework for particle-based reaction-diffusion dynamics using classical Fock space representations*. Lett. Math. Phys. 112, 49 [arXiv]
10. M. J. del Razo, M. Dibak, C. Schütte, F. Noé (2021) *Multiscale molecular kinetics by coupling Markov state models and reaction-diffusion dynamics*. J. Chem. Phys. 155, 124109 [arXiv] [git]

9. T. Hempel, M. J. del Razo, C. T. Lee, B. C. Taylor, R. E. Amaro and F. Noé (2021) *Independent Markov Decomposition: Towards modeling kinetics of biomolecular complexes*. Proc. Natl. Acad. Sci. U.S.A. 118 (31) [[bioRxiv](#)]
8. M. Kostré, C. Schütte, F. Noé and M. J. del Razo (2020) *Coupling particle-based reaction-diffusion simulations with reservoirs mediated by reaction-diffusion PDEs*. SIAM Multiscale Model. Simul. 19(4), 16591683 [[arXiv](#)] [[git](#)]
7. M. J. del Razo, H. Qian and F. Noé (2018) *Grand canonical diffusion-influenced reactions: a stochastic theory with applications to multiscale reaction-diffusion simulations*. J. Chem. Phys. 149.04: 044102 [[arXiv](#)]
6. M. Dibak, M. J. del Razo, D. De Sancho, C. Schütte, and F. Noé (2018) *MSM/RD: Coupling Markov state models of molecular kinetics with reaction-diffusion simulations*. J. Chem. Phys. 148.21: 214107 [[arXiv](#)] [[git](#)]
5. M. J. del Razo and R. J. LeVeque (2017) *Numerical methods for interface coupling of compressible and almost incompressible fluids*. SIAM J. Sci. Comput. 39.3: B486-B507 [[arXiv](#)] [[git](#)]
4. M. J. del Razo and H. Qian (2016) *A discrete stochastic formulation for reversible bimolecular reactions via diffusion encounter*. Commun. Math. Sci. 14.6: 1741-1772 [[arXiv](#)]
3. M. J. del Razo, Y. Morofuji, J. S. Meabon, B. R. Huber, E. R. Peskind, W. A. Banks, P. D. Mourad, R. J. LeVeque and D. G. Cook (2016) *Computational and in vitro studies of blast-induced blood-brain barrier disruption*. SIAM J. Sci. Comput. 38.3: B347B374. [[arXiv](#)] [[git](#)]
2. M. J. del Razo and R. J. LeVeque (2014) *Computational study of shock waves propagating through air-plastic-water interfaces*. Bull. Braz. Math. Soc. New Series, 47.2: 1-16 [[arXiv](#)]
1. M. J. del Razo W. Pan, H. Qian and G. Lin (2014) *Fluorescence correlation spectroscopy and nonlinear stochastic reaction diffusion*. J. Phys. Chem. B 118.25: 7037-7046. [[arXiv](#)]

Books

- D. I. Ketcheson, R. J. LeVeque, and M. J. del Razo (2020) *Riemann problems and Jupyter solutions*. SIAM Fundamentals of Algorithms [[git](#)] [[html](#)] – Interactive and printed book to illustrate Riemann solvers written in Jupyter.

Preprints

- M. J. del Razo, T. Lamma and W. Merbis (2024) *Field theories and quantum methods for stochastic reaction-diffusion*. (submitted) [[arXiv](#)]
- A. Lanconelli, B. T. Perçin, and M. J. del Razo (2023) *Solution formula for the general birth-death chemical diffusion master equation*. (submitted) [[arXiv](#)]

Fellowships and awards

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| 2022–2025 | DFG individual research grant. Grant to conduct an independent research project for €300 200 (awarded 2021). Deutsche Forschungsgemeinschaft, Germany. |
| 2020–2023 | Emergence fellowship grant (~ €180 000). Three year interdisciplinary research grant. Dutch institute for emergent phenomena, University of Amsterdam. |
| 2015 | Boeing research award for outstanding research by a graduate student in applied mathematics. Department of Applied Mathematics, University of Washington, USA. |
| 2014–2015 | National fund for culture and arts, “Jovenes Creadores” award to complete interactive media art proposal in: “math + art”. FONCA-CONACULTA, Mexico. |
| 2012–2014 | Complementary scholarship for graduate studies. DGRI-SEP, Mexico. |
| 2011–2016 | Graduate student fellowship. Department of Applied Mathematics, University of Washington, USA. |

2010–2016 National council of science and technology fellowship for graduate studies abroad, “Becarios en el extranjero”

Student mentoring

Since 2025 **Philippe Lafargeas**, *PhD student*.
Since 2024 **Ming Lu**, *Master’s student*.
Since 2024 **Yuhe Bai**, *Master’s student*.
Since 2024 **Jakub Tarka**, *Master’s student*.
2022 **Dana Wehner**, *Bachelor’s thesis: Chemical reaction systems at multiple scales.*, Thesis grade: 1.0 (top grade).
2019 **Margarita Kostré**, *Master’s thesis: Hybrid models and simulations of reaction-diffusion processes.*, Thesis grade: 1.3 (very good).
2016 **Karen Luong**, *Undergraduate research project: Bistable stochastic systems.*

Teaching

2021 **Teacher**: Emergence (special topics course)
2017 **Teaching Assistant**: Stochastic analysis II. (graduate)
2016 **Teaching Assistant**: Dynamical systems. (graduate)
2014 **Co-teacher**: Scientific computing with Python. (graduate)
2014 **Teaching Assistant**: Dynamical systems. (graduate)
2012 **Teaching Assistant**: Applied analysis.
2011 **Teaching Assistant**: Calculus with analytic geometry I. (undergraduate)

Invited Presentations

Dec 2024 Seminario de Física Cuántica y Fotónica, UNAM, México
Sep 2024 Giersch intl. conference: from multiscale models to digital twins, FIAS, Frankfurt
Mar 2024 CWI seminar, Amsterdam
Aug 2023 10th ICIAM, Waseda University, Tokyo
Jan 2023 Seminario Sotero Prieto, Instituto de Física, UNAM, México
May 2022 Universal Biology Institute, University of Tokyo, Japan
Nov 2021 Computational systems biology and humanities seminar, Zuse Institute Berlin, Germany
Sep 2021 Seminar on Mathematics for Complex Biological Systems, UC San Diego, CA.
Jun 2021 Workshop on modeling and analysis in molecular biology, Beijing, China.
Mar 2021 Soft matter group seminar, University of Amsterdam, The Netherlands.
Jan 2021 Dynamical aspects of theoretical chemistry seminar, Freie Universität Berlin, Germany.
Nov 2020 Open systems seminar, Freie Universität Berlin, Germany.
Jun 2020 Seminar on applied stochastic analysis, University of Washington, Seattle, WA
Jun 2019 Complex high-dimensional energy landscapes, UCLA Lake Arrowhead, CA
Apr 2019 Centre for synthetic and systems biology, University of Edinburgh, UK.
Nov 2018 Open systems seminar, Freie Universität Berlin, Germany.
Mar 2018 Complex systems workshop, Champéry, Switzerland.
Jun 2017 Numerical mathematics and optimization seminar, HHU, Düsseldorf, Germany.
Jul 2016 Polymer physics (POLYPHYS) seminar, ETH, Zürich, Switzerland.
Jul 2016 Computational molecular biology seminar, Freie Universität Berlin, Germany.
Oct 2015 Pacific northwest numerical analysis seminar, Bellingham, WA.
Nov 2014 BIRS workshop in particle-based stochastic reaction-diffusion models, Banff, Canada.

Computer skills

Software development

- **deepRD:** A python package with deep learning tools and simulations schemes of reaction-diffusion processes (main developer). [\[git\]](#)
- **MSM/RD:** A C++ package with python interface to couple Markov models of molecular kinetics with particle-based simulations (main developer). [\[git\]](#)
- **Clawpack:** Conservation laws package to solve hyperbolic PDEs using finite volume methods (contributor). [\[webpage\]](#) [\[git\]](#)

Programming Languages	Python	● ● ● ● ●	Matlab	● ● ● ● ●
	pyTorch	● ● ● ● ●	Mathematica	● ● ● ● ●
	C++	● ● ● ● ●	Maple	● ● ● ● ●
	C	● ● ● ● ●	LaTeX	● ● ● ● ●
Others	Jupyter, PyBind11, Git, Bokeh, Javascript and others.			

Languages

Spanish: Native speaker
English: Fluent

Portuguese: Intermediate
German: Intermediate (B2)

Last updated: April 2025