

## Olga MULA

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### Professional experience

<b>TENURED ASSISTANT PROFESSOR</b> Paris Dauphine University. Research Centre in Applied Mathematics (Ceremade).	<b>2015–...</b>
<b>RESEARCHER ON SECONDMENT</b> Inria-Paris. Commedia Team. (Délégation)	<b>2019–21</b>
<b>POSTDOCTORAL FELLOW</b> RWTH Aachen University. AICES.	<b>2014–15</b>

### Education

<b>PHD IN APPLIED MATHEMATICS</b> Sorbonne Université. Laboratoire Jacques Louis Lions. Supervisor: Y. Maday. Title: <i>Some contributions towards the parallel simulation of time dependent neutron transport and the integration of observed data in real time.</i>	<b>2011–14</b>
<b>DOUBLE MASTERS DEGREE</b> École Polytechnique (Paris-Saclay) Universidad Politécnica de Madrid (ETSII) Majors: Applied Mathematics and Energy Engineering.	<b>2005–11</b> 2007–11 2005–07

### Research

#### Research Topics

My research interests lie in the areas of numerical analysis, approximation theory, and machine learning. I like combining data of different nature such as sensor measurements and PDE models to solve problems, and I am particularly interested in the interplay between disciplines, where theory drives applications and applications influence theory development. My research activities include:

- **Approximation and Learning:** model reduction, neural networks, tensor methods.
- **Inverse Problems and Data Assimilation:** optimal reconstruction schemes, sensor placement.
- **Numerical Analysis of PDEs:** numerical solution of kinetic problems, a posteriori error estimation, domain decomposition.
- **Applications:** haemodynamics, pollution, epidemiology, nuclear engineering.

#### Grants

**2019-23:** PI of a project *Émergences* from the Paris City Council entitled *Models and Measures* (230 k€)

**2018-22:** Member of the project ANR Jeune Chercheur on *Adaptive Dynamical Approximations via Parallel Tensor methods (ADAPT)*

**2015-19:** Member of the project ANR on time domain decomposition entitled *Ciné-Para (ANR-15-CE23-0019)*

**2017:** PI of a project PEPS Jeunes chercheurs on the *Homogenization of the Energy variable in the Neutron Transport equation* (3 k€)

## Publications

### Preprints

- [1] A. Cohen, W. Dahmen, O. Mula, and J. Nichols. “Nonlinear reduced models for state and parameter estimation”. 2020. URL: <https://arxiv.org/abs/2009.02687>.
- [2] J. Aghili and O. Mula. “Depth-Adaptive Neural Networks from the Optimal Control Viewpoint”. 2020. URL: <https://arxiv.org/abs/2007.02428>.
- [3] A. Bakhta, T. Boiveau, Y. Maday, and O. Mula. “Epidemiological short-term Forecasting with Model Reduction of Parametric Compartmental Models. Application to the first pandemic wave of COVID-19 in France”. 2020. URL: <https://arxiv.org/abs/2009.09200>.
- [4] F. Galarce, D. Lombardi, and O. Mula. “Reconstructing Haemodynamics Quantities of Interest from Doppler Ultrasound Imaging”. 2020. URL: <https://arxiv.org/abs/2006.04174>.
- [5] F. Galarce, J.-F. Gerbeau, D. Lombardi, and O. Mula. “State estimation with nonlinear reduced models. Application to the reconstruction of blood flows with Doppler ultrasound images”. Mar. 2019. URL: <https://arxiv.org/abs/1904.13367>.
- [6] H. Gong, Y. Maday, O. Mula, and T. Taddei. “PBDW method for state estimation: error analysis for noisy data and nonlinear formulation”. June 2019. URL: <https://arxiv.org/abs/1906.00810>.

### Peer-reviewed Journal Articles

- [1] A. Cohen, W. Dahmen, R. DeVore, J. Fadili, O. Mula, and J. Nichols. “Optimal reduced model algorithms for data-based state estimation”. In: *Accepted in SIAM Journal of Numerical Analysis* (Mar. 2020).
- [2] Y. Maday and O. Mula. “An Adaptive Parareal Algorithm”. In: *Journal of Computational and Applied Mathematics* (2020). DOI: <https://doi.org/10.1016/j.cam.2020.112915>.
- [3] V. Ehrlacher, D. Lombardi, O. Mula, and F.-X. Vialard. “Nonlinear model reduction on metric spaces. Application to one-dimensional conservative PDEs in Wasserstein spaces”. In: *ESAIM M2AN* (2020). DOI: [10.1051/m2an/2020013](https://doi.org/10.1051/m2an/2020013).
- [4] W. Dahmen, F. Gruber, and O. Mula. “An Adaptive Nested Source Term Iteration for Radiative Transfer Equations”. In: *Mathematics of Computation* (2020). DOI: [10.1090/mcom/3505](https://doi.org/10.1090/mcom/3505).
- [5] H. Hutridurga, O. Mula, and F. Salvarani. “Homogenization in the energy variable for a neutron transport model”. In: *Asymptotic Analysis* (2019). DOI: <https://content.iospress.com/articles/asymptotic-analysis/asy191544>.
- [6] P. Binev, A. Cohen, O. Mula, and J. Nichols. “Greedy Algorithms for Optimal Measurements Selection in State Estimation Using Reduced Models”. In: *SIAM/ASA Journal on Uncertainty Quantification* 6.3 (2018), pp. 1101–1126. DOI: [10.1137/17M1157635](https://doi.org/10.1137/17M1157635).
- [7] J.-P. Argaud, B. Bouriquet, F. de Caso, H. Gong, Y. Maday, and O. Mula. “Sensor placement in nuclear reactors based on the generalized empirical interpolation method”. In: *Journal of Computational Physics* 363 (2018), pp. 354–370. ISSN: 0021-9991. DOI: [10.1016/j.jcp.2018.02.050](https://doi.org/10.1016/j.jcp.2018.02.050).
- [8] F. Gruber, A. Klewinghaus, and O. Mula. “The DUNE-DPG library for solving PDEs with Discontinuous Petrov-Galerkin finite elements”. In: *Archive of Numerical Software* 5.1 (2017), pp. 111–127. ISSN: 2197-8263. DOI: [10.11588/ans.2017.1.27719](https://doi.org/10.11588/ans.2017.1.27719).
- [9] Y. Maday, O. Mula, and G. Turinici. “Convergence analysis of the Generalized Empirical Interpolation Method”. In: *SIAM J. Numerical Analysis* 54.3 (2016), pp. 1713–1731. DOI: [10.1137/140978843](https://doi.org/10.1137/140978843).
- [10] Y. Maday, O. Mula, A.T. Patera, and M. Yano. “The Generalized Empirical Interpolation Method: Stability theory on Hilbert spaces with an application to the Stokes equation”. In: *Computer Methods in Applied Mechanics and Engineering* 287.0 (2015), pp. 310–334. ISSN: 0045-7825. DOI: [10.1016/j.cma.2015.01.018](https://doi.org/10.1016/j.cma.2015.01.018).
- [11] Y. Maday and O. Mula. “A Generalized Empirical Interpolation Method: application of reduced basis techniques to data assimilation”. English. In: *Springer INdAM Series 4* (2013). Ed. by Franco Brezzi, Piero Colli Franzone, Ugo Gianazza, and Gianni Gilardi, pp. 221–235. DOI: [10.1007/978-88-470-2592-9\\_13](https://doi.org/10.1007/978-88-470-2592-9_13).

### Peer-reviewed Proceedings and Book Chapters

- [1] H. Gong, Q. Li, Y.R. Yu, J. P. Argaud, B. Bouriquet, Y. Maday, and O. Mula. “A new data-driven approach for reconstruction with noisy data and physical constraints: application to nuclear reactor physics”. In: *Proceedings of the International Congress on Advances in Nuclear Power Plants*. 2019.
- [2] J. P. Argaud, B. Bouriquet, H. Gong, Y. Maday, and O. Mula. “Stabilization of (G)EIM in Presence of Measurement Noise: Application to Nuclear Reactor Physics”. In: *Spectral and High Order Methods for Partial Differential Equations ICOSAHOM 2016*. Ed. by Marco L. Bittencourt, Ney A. Dumont, and Jan S. Hesthaven. Cham: Springer International Publishing, 2017, pp. 133–145. ISBN: 978-3-319-65870-4. DOI: [10.1007/978-3-319-65870-4\\_8](https://doi.org/10.1007/978-3-319-65870-4_8).
- [3] J. P. Argaud, B. Bouriquet, H. Gong, Y. Maday, and O. Mula. “Monitoring flux and power in nuclear reactors with data assimilation and reduced models”. In: *International Conference on Mathematics and Computational Methods Applied to Nuclear Science & Engineering*. 2017.
- [4] A.-M. Baudron, J.J. Lautard, Y. Maday, and O. Mula. “The parareal in time algorithm applied to the kinetic neutron diffusion equation”. English. In: *Domain Decomposition Methods in Science and Engineering XXI*. Vol. 98. Lecture Notes in Computational Science and Engineering. Springer International Publishing, 2014, pp. 437–445. ISBN: 978-3-319-05788-0. DOI: [10.1007/978-3-319-05789-7\\_41](https://doi.org/10.1007/978-3-319-05789-7_41).
- [5] Y. Maday, O. Mula, and G. Turinici. “A priori convergence of the Generalized Empirical Interpolation Method”. In: *10th International Conference on Sampling Theory and Applications*. Zenodo, 2013. DOI: [10.5281/zenodo.54367](https://doi.org/10.5281/zenodo.54367).
- [6] A.M. Baudron, J.J. Lautard, Y. Maday, and O. Mula. “MINARET: Towards a time-dependent neutron transport parallel solver”. In: *SNA+ MC 2013-Joint International Conference on Supercomputing in Nuclear Applications+ Monte Carlo*. EDP Sciences. 2014, p. 04103. DOI: [10.1051/snmc/201404103](https://doi.org/10.1051/snmc/201404103).
- [7] N.E. Stauff, M. Agard, L. Buiron, B. Fontaine, X. Jeanningros, O. Mula, G. Rimpault, and M. Zabiego. “A new methodology for enhanced natural safety GEN-IV SFR core design: application to a carbide-fueled core”. In: *Proceedings of the the International Congress on Advances in Nuclear Power Plants*. Vol. 3-4. paper 11162. 2011. URL: [https://inis.iaea.org/search/search.aspx?orig\\_q=RN:44092836](https://inis.iaea.org/search/search.aspx?orig_q=RN:44092836).

### Short reports, extended abstracts

- [1] O. Mula. *Optimal Sensor Selection Using Reduced Models*. Oberwolfach Reports. Mathematisches Forschungsinstitut Oberwolfach, 2018. URL: [https://www.mfo.de/occasion/1817/www\\_view](https://www.mfo.de/occasion/1817/www_view).

### For the greater public

- [1] J. Atif, O. Cappé, A. Kazakci, Y. Léo, L. Massoulié, and O. Mula. *Feedback on mobility during the Covid-19 epidemic*. 2020. URL: [https://www.psl.eu/sites/default/files/PDF/Scientific\\_initiative\\_facing\\_virus.pdf](https://www.psl.eu/sites/default/files/PDF/Scientific_initiative_facing_virus.pdf).

### Thesis

- [1] O. Mula. “Some contributions towards the parallel simulation of time dependent neutron transport and the integration of observed data in real time”. PhD thesis. Université Pierre et Marie Curie-Paris VI, 2014. URL: <http://hal.upmc.fr/tel-01081601/document>.

## Research Software Contributions

Currently I mainly code in Python since I like the simplicity of its syntax and the amount of software libraries that it offers. I can also code in C++ when performance is absolutely a must and I am learning Julia. I use Git for version control.

- >2019: I am trying to post online all the codes and libraries produced for my research work for reproducibility. A few codes are already available on my [GitHub](#) and [GitLab](#).
- 2015-18: I have actively helped to code some parts of the [dune-dpg library](#), a C++ library for solving transport dominated PDEs with Discontinuous Petrov–Galerkin finite elements.
- 2011-14: Implementation (C++) and parallelization (MPI) of the kinetic module in Minaret, a 3D production solver of the neutron transport equation which is used at CEA for nuclear safety studies. Discretizations: time-stepping in time, multi-group in energy, SN in angle, Discontinuous Galerkin in space.

## Interactions and Scientific Outreach from collaborations with industrial partners

- **Covid-19 pandemic:** Working with anonymized mobility data provided by private companies (Facebook, Roofstreet, Orange) to understand how to incorporate mobility information in the modeling of the outbreak dynamics (2020).
- **EDF:** Data assimilation with model reduction, incorporated in a production code for monitoring. Implemented during Helin Gong's PhD which I co-supervised (2015–18).
- **CEA:** Implementation and parallelization of Minaret, a 3D industrial solver of the kinetic neutron transport equation. Implemented by myself during my PhD thesis (2011–14).
- **REPSOL:** Study on the impact of renewable energies and the prize of fuel on the Spanish electricity prize. One-year internship funded by Repsol during my last year of master studies (2011).

## Awards and distinctions

- 2016-20: Prime d'Encadrement Doctoral et de Recherche (PEDR)
- Two PhD thesis awards:
  - 2015: Paul Cazeaux Award given by EDF. Jury: members of the French Academy of Technologies.
  - 2013: L'Oréal Unesco Award for Women in Science. Jury: members of the French Academy of Sciences.
- 2011: Valedictorian at Universidad Politécnica de Madrid (ETSII).

## Collective responsibilities

### Administrative responsibilities

- **Hiring committees:**
  - For Assistant Professors: Sorbonne Université (LJLL, April 2018), UTC Compiègne (April 2020), U. Strasbourg (April 2020).
  - For Lecturers: Université Paris Dauphine (September 2018)
- *Since Nov. 2018:* **Elected member at the “Conseil de laboratoire Ceremade”**, the Applied Mathematics Laboratory of Paris Dauphine University.
- *Since Sept. 2018:* In charge of updating the webpage of Ceremade with the latest news.
- *Since April 2018:* **Elected member at the “Conseil de département MIDO”**, the Mathematics and Informatics Department Council of Paris Dauphine University.

### Organization of conferences, mini-symposia, seminars, working groups

- Since Sept. 2017:** Working group STAT-NUM [[website](#)]  
at Paris Dauphine University, co-organised with A. Roche and R. Ryder.
- July-August 2021:** Member of the organizing committee of CEMRACS on the topic of  
*Data Assimilation and Model Reduction in High Dimensional Problems* [[website](#)],  
at CIRM, Luminy, France, organized with V. Ehrlacher, D. Lombardi, F. Nobile, T. Taddei.
- July 2020:** Mini-symposium on *Numerical Aspects of Transport, Boltzmann and Kinetic Equations*,  
at the WCCM-ECCOMAS 2020 conference, Paris, co-organized with B. Després, M. Campos-Pinto and O. Laffite. [[Postponed to January 2021 due to pandemic.](#)]
- Feb 2020:** Member of the organizing committee of the  
*Workshop on Mathematics of Reduced Order Models* [[website](#)],  
at ICERM, Brown University, co-organised with P. Benner, A. Cohen, S. Gugercin, A. Narayan and K. Veroy-Grepl.
- July 2019:** Mini-symposium on Manifold Sensing and Sparse Recovery,  
at the ICIAM 2019 conference, Valencia, Spain, co-organised with J. Nichols and K. Veroy.
- June 2019:** Summer School on *Sparity for Physics, Signals and Learning* [[website](#)],  
at INRIA Paris, co-organised with V. Duval, N. Keriven and G. Peyré

- June 2019:** Mini-symposium on *Data-Driven Computational Mechanics*, at the 14th French National Conference on Structural Mechanics (CSMA), co-organized with F. Chinesta and P. Ladevèze.
- June 2019:** One day meeting for the ANR project Ciné-Para, at Dauphine, co-organised with C. Japhet and Y. Maday. [[website](#)]
- Jan 2019:** Launch meeting for the project Models and Measures, at Dauphine, co-organized with A. Roche, C. Dion. [[website](#)]
- May 2018:** Member of the organizing committee of the *Workshop on Parallel in Time Methods*, at Roscoff Marine Station, co-organised with C. Japhet and Y. Maday. [[website](#)]
- Sept. 2017:** Mini-symposium on Generalized Sampling, Reduced Modeling and Sparse recovery, at the ENUMATH conference, Voss, Norway, co-organised with C. Poon.

## Participation in French Activity Groups

- Since Jan. 2021:** **Vice-President** of the **MaNu** activity group (Mathematics for Nuclear applications)
- Since March 2020:** Member of **Facing the virus**, a scientific initiative on Covid-19 launched by researchers from PSL University. [[website](#)]
- Since Dec. 2019:** Member of the **FHU Senec**.  
An FHU is like a working group in the field of medicine. The goal is to create interactions and gain visibility in project calls. FHU Senec gathers a multidisciplinary research team including medical doctors and applied mathematicians around the topic of “Senescent Cells”, which play a major role in ageing and also in the evolution of certain diseases like sickle cell disease and cystic fibrosis. The ultimate goal is translate the research into care and benefit for patients.
- Since Oct. 2019:** Member of the **Liaison Committee of SIGMA**, the activity group on Signal-Image-Geometry-Modelling-Approximation. [[website](#)]
- Since 2017:** Member of the **AMORE** activity group (Advanced Model Order REduction) [[website](#)]

## Reviewing activities

- Associate Editor for **Calcolo** since Oct. 2019.
- Reviewer for Funding Agencies:
  - Agence Nationale de la Recherche (ANR, France),
  - Netherlands Organization for Scientific Research (NWO, Netherlands)
- Reviewer of about 30 articles for the following journals:

- |                                   |                          |                           |
|-----------------------------------|--------------------------|---------------------------|
| 1. Acta Applicandae Mathematicae, | 6. M2AN                  | 12. Adv. Comp. Math.      |
| 2. Comp. Meth. Appl. Mech. Eng.   | 7. SIAM J. Sci. Comput.  | 13. J. Comp. Phys.        |
| 3. Constr. Approx.                | 8. SIAM J. Num. Anal.    | 14. CRAS                  |
| 4. IMA J. Numer. Anal.            | 9. SIAM J. UQ            | 15. Parallel Computing    |
| 5. App. Comp. Harmonic Analysis   | 10. SIAM J. Matrix Anal. | 16. Commun. Comput. Phys. |
|                                   | 11. J. Comp. Appl. Math. | 17. Comput. Vis. Sci.     |

## Scientific dissemination to the greater public

**2020:** **Report** on mobility effects during the Covid-19 epidemic.

**2017:** Member of the jury of the national science competition **C-Génial** for high school students.

## Supervising activities

## Supervising of young researchers and students

### Postdoctoral fellows:

**2019–20:** **Joubine Aghili.**

Topic: Data assimilation for Inverse Problems and Statistical Learning.  
Next position: Assistant Professor of Applied Mathematics at Strasbourg University.

**2016–18:** **Walid Kheriji** (co-supervised with Y. Maday).

Topic: The parareal algorithm and its application to the neutron transport equation.  
Next position: Software engineer.

### PhD students:

**2020–...:** **Agustín Somacal** (co-supervised with A. Cohen)

Topic: Nonlinear reduced models and machine learning in forward modeling and inverse problems.

**2017–...:** **Felipe Galarce** (thesis at INRIA co-supervised with J.F. Gerbeau and D. Lombardi).

Topic: Reconstruction of blood flows with reduced models and Doppler ultrasound images.

**2015-18:** **Helin Gong** (CIFRE thesis co-supervised with Y. Maday and in collaboration with EDF).

Title: Data assimilation with reduced basis and noisy measurements. Applications to nuclear reactor cores.

Next position: Nuclear engineer.

### Master theses and undergraduate internships:

**April-Sept 2019:** Master thesis of Changqing Fu (co-supervised with R. Ryder).

Title: Classification methods with Approximate Bayesian Computation methods.

**March-Sept 2017:** Master thesis of Felipe Galarce (co-supervised with J.F. Gerbeau and D. Lombardi).

Title: Enhancing Hemodynamics Measurements with Mathematical Modeling.

**June-July 2019:** Internship of Lucas Perrin, first year master student (co-supervised with D. Gontier).

Title: Tensor methods for quantum chemistry.

**June-July 2017:** Internship of Thanh Bao Tran, second year undergraduate student.

### CEMRACS Research Projects:

**July-August 2017:** Topic: Quantification of Uncertainties in the Vlasov-Poisson equation.

Students: J. Bernier (ENS Rennes), P. Gerhard (Univ. Strasbourg), A. Yurova (Max-Planck Institute for Plasma-Physik).

Co-supervised with M. Campos-Pinto (Sorbonne Université) and K. Kormann (MPI).

## Participation as a jury member in PhD and Habilitation defenses

### PhD:

**Oct. 2020:** **Antonio Galia.** A dynamic homogenization method for nuclear reactor core calculations. Supervised by R. Sánchez and I. Zmijarevic.

**Nov. 2019:** **Wesley Ford.** The Advancement of Stable, Efficient and Parallel Acceleration Methods for the Neutron Transport Equation. Supervised by C. Calvin and E. Masiello.

**Dec. 2018:** **Amina Benaceur.** Model reduction of nonlinear thermo-mechanic problems. Supervised by A. Ern and V. Ehrlacher.

**Dec. 2018:** **Pierre Terrier.** Numerical simulation for predicting the microstructural evolution of ferritic alloys, A study of cluster dynamics. Supervised by G. Stolz and M. Athènes.

**July 2018:** **Helin Gong.** Data assimilation with reduced basis and noisy measurement: Applications to nuclear reactor cores. Supervised by Y. Maday and O. Mula.

**June 2018:** **Léandre Giret.** Numerical analysis of a non-conforming domain decomposition for the multigroup  $SP_N$  equations. Supervised by P. Ciarlet Jr. and E. Jamelot.

### Habilitation:

**July 2020:** **Nissrine Akkari.** Études mathématiques et numériques de la réduction d'ordre des équations non-linéaires.

## Teaching

### Lectures

#### Doctoral/research level courses:

- 2020:** Lecture on Model Order Reduction and Data Assimilation at the MOR Summer School organized online by EPFL (1h30).
- 2020:** Lecture on Model Order Reduction and Data Assimilation at the EU Regional School organized by AICES, RWTH Aachen (3 hours) [[postponed due to pandemic](#)]
- 2018:** Two-day school on *Magic Points* at the Technical University of Compiègne (3 hours).
- 2016:** Summer school CEA-EDF-INRIA on *Reduced Order Models for numerical simulation* (in charge of part of the computer sessions, 4 hours)

#### Executive Master on Artificial Intelligence:

- 2018-19:** Refresher course on Linear Algebra (Dauphine U.,  $\approx$  25 students)

#### 1st year Master:

- 2018-19:** Course on Optimization and Dynamic Programming (Dauphine U.,  $\approx$  40 students, 2 TA)  
Lectures notes: [link](#)
- 2015-17:** Computer Lab for “Numerical Methods for Time-Dependent Problems” (Dauphine U.,  $\approx$  40 students)
- 2017-18:** 1h15min lecture on reduced basis methods and data assimilation for the course “Numerical methods for high dimensional problems” (Ecole des Ponts,  $\approx$  15 students).

#### 3rd year undergraduate:

- 2012-14:** TA for “Calcul numérique matriciel” (Sorbonne Université,  $\approx$  20 students)

#### 2nd year undergraduate:

- 2016-19:** Course on Numerical Analysis (Dauphine,  $\approx$  220 students, 8 teaching assistants)  
Lecture notes: [link](#)
- 2015-19:** TA and computer lab for Numerical Analysis (Dauphine)
- 2012-13:** TA for the course “Compléments d’analyse et d’algèbre” (Sorbonne,  $\approx$  25 students)

#### 1st year undergraduate:

- 2012-14:** Analyse: fonctions de variable réelle (Sorbonne U.)

### Other miscellaneous service at Paris Dauphine:

- *Since April 2018:* **Elected member at the “Conseil de département MIDO”**, the Mathematics and Informatics Department Council of Paris Dauphine University.
- 2015 to 2018: Member of the Student Academic Review Committee (jury de passage) of second year students.
- 2018: Participation and organization of working groups to restructure all the courses related to algebra, analysis and numerical analysis at Paris Dauphine.
- 2015: Member of the Admission Panel for freshmen students (called “commission Boléro” at Dauphine).

## Invitations for research stays or visits

### Visiting positions ( $\geq$ 2 weeks):

- 2019:** Visiting Professor at the University of South Carolina (3 weeks)
- 2017:** Invited Professor at Bonn University (2 months)
- 2017:** Visiting scholar at the University of South Carolina (2 weeks)

## Short invited visits ( $\leq 1$ week)

University of South Carolina, RWTH Aachen ( $\times 4$  times), University of Stuttgart, Imperial College.

## Invitation with funded participation to research programs:

- 2020:** Semester program on Model and Dimension Reduction in Uncertain and Dynamic Systems at ICERM, Brown University of Cambridge (one week stay in June 2020, more info [here](#))
- 2019:** Semester program on Approximation, sampling and compression in data science at the University of Cambridge (one week stay in Febr. 2020, more info [here](#))
- 2018:** Semester program on Uncertainty Quantification at the University of Cambridge (scattered 4 week stay, more info [here](#))
- 2017:** Winter School on Numerical Analysis of Multiscale Problems at Bonn University (2 month stay, more info [here](#))

## List of talks and poster presentations

### Plenary talks

- 30-3/04/2020** SIGMA Workshop (Luminy, France). [\[cancelled due to pandemic\]](#)
- 17-21/06/2019** Workshop on Approximation, sampling, and compression in high dimensional problems (Cambridge, U.K.). Talk: *Optimal algorithms for state estimation using reduced models*.
- 10-13/04/2018** IV Conference on Model Order Reduction of Parametrized Systems – MoRePas (Nantes, France). Talk: *State estimation with reduced models and measurement data*

### Invited talks

- 15-19/06/2020** Foundations of Computational Mathematics (Vancouver, Canada). [\[cancelled due to pandemic\]](#)
- 02-05/06/2020** Workshop on Approximation of high-dimensional parametric PDEs in forward UQ (ESI, Vienna) [\[cancelled due to pandemic\]](#)
- 13-16/04/2020** Conference on Mathematical Modeling for Complex Systems (Marrakesh, Morocco). [\[cancelled due to pandemic\]](#)
- 20-22/11/2019** 5<sup>th</sup> International Workshop on Reduced Basis, POD and PGD Model Reduction Techniques – MorTech (Paris, France). Talk: Reconstruction of Blood Flows with Doppler ultrasound images
- 11-15/11/2019** INdAM workshop on Recent Advances on Kinetic Equations and Applications (U. La Sapienza, Rome, Italy). Talk: Solving neutron transport problems with certified error control.
- 25-27/10/2019** Workshop on Nonlinear Approximation (Univ. South Carolina, Columbia, USA). Talk: Solving the Neutron Transport Equation with Certified Error Control.
- 30/09-04/10/2019** European Numerical Mathematics and Advanced Applications Conference – Enumath (Egmond aan Zee, Netherlands). Talks:
  - Nonlinear model reduction on metric spaces.
  - Optimal Reduced Model Algorithms for State Estimation
- 26-30/08/2019** Multivariate Approximation and Interpolation with Applications – MAIA (ESI, Vienna, Austria). Talk: Optimal reduced model algorithms for data-based state estimation.
- 15-19/07/2019** International Congress on Industrial and Applied Mathematics – ICIAM (Valencia, Spain). Talk: Nonlinear model reduction on metric spaces.
- 18-21/06/2019** Conference on the Mathematics of Finite Elements and Applications – Mafelap (London, UK). Talk: An Adaptive Nested Source Term Iteration for Radiative Transfer Equations
- 20-22/03/2019** Data-Best (Paris, France). Talk: Optimal State Estimation Algorithms and Reconstruction of blood flows from Doppler images



- 01-05/10/2018** HCM Workshop: Analysis and Computation in High Dimensions (Bonn, Germany). Talk: *An Adaptive Nested Source Term Iteration for Radiative Transfer Equations*
- 23-27/04/2018** Workshop on Nonlinear Data: theory and algorithms (Oberwohlfach, Germany). Talk: *State estimation with reduced models and measurement data.*
- 05-09/03/2018** Workshop on Reducing Dimensions and costs for UQ in complex systems (Cambridge, UK). Talk: *Greedy algorithms for optimal measurement selection in state estimation using reduced models*
- 25/01/2018** ANR Ciné-Para Meeting Day. Parallelisation methods for complex kinetics (Paris XIII University, France). Talk: *A parareal in time scheme with improved scalability*
- 30/11/2017** Workshop on mathematical methods for neutronics – MaNu (Paris, UPMC-LJLL). Talk: *A posteriori estimation of the error of the neutron transport equation*
- 02-04/10/2017** Workshop on minimum residual and least-squares finite elements (Portland, Oregon, US). Talk: *An Adaptive Nested Source Term Iteration for Radiative Transfer Equations*
- 05-07/09/2017** XIV International Conference on Computational Plasticity – COMPLAS (Barcelona, Spain). Talk: *Approximation with noisy measurement data and reduced models*
- 18-21/07/2017** Workshop on Quantification of Uncertainty: Improving Efficiency and Technology – QUIET (Trieste, Italy). Talk: *Dictionary measurement selection for state estimation with reduced models.*
- 27/11-02/2016** Conference in honor of Yvon Maday's sixtieth birthday (Roscoff, France). Talk: *Para-GEIM or the incredible journey of doing parareal and GEIM with Yvon Maday.*
- 27/11-02/2016** Fifth Parallel-in-time Integration Workshop (Banff, Canada). Talk: *More on Fully Scalable Balanced Parareal Method*
- 18-23/09/2016** MAIA - Conference on Multivariate Approximation and Interpolation with Applications (Luminy, France). Talk: *Dictionary data assimilation and reconstruction with reduced models.*
- 22-25/05/2016** 15<sup>th</sup> International Conference on Approximation Theory (San Antonio, US). Talk: *Dictionary data assimilation for recovery problems.*
- 02-06/05/2016** Workshop on "Challenges in High-Dimensional Analysis and Computation" (San Servolo, Venice, Italy). Talk: *Dictionary data assimilation for recovery problems.*
- 12-16/04/2016** SIAM Conference on Parallel Processing (Paris, France). Talk: *Parareal in time and fixed-point schemes.*
- 13-18/03/2016** ALGORITMY - Conference on Scientific Computing (Vysoke Tatry, Podbanske, Slovakia). Talk: *Efficient numerical methods for solving PDEs from kinetic models.*
- 10-14/08/2015** 8<sup>th</sup> International Congress on Industrial and Applied Mathematics – ICIAM (Beijing, China). Talk: *Different approaches for the approximation with reduced basis.*
- 15-20/07/2014** 17th US. National Congress on Theoretical and Applied Mathematics – USNCTAM (Michigan, USA). Talk: *Improvement of cheap approximations by a post-processing/reduced basis rectification method.*
- 06-08/01/2014** Workshop on Model Order Reduction and Data (Sorbonne Université, Paris). Talk: *The GEIM to inter-play with data and numerical simulations for real-time decisions.*
- 26-30/08/2013** European Numerical Mathematics and Advanced Applications – ENUMATH (Lausanne, EPFL, Switzerland). Talk: *The Generalized Empirical Interpolation Method: Convergence rates and application to the Stokes problem.*
- 01-05/07/2013** 10th International Conference on Sampling Theory and Applications – SampTa (Bremen, Germany). Talk: *A priori convergence of the Generalized Empirical Interpolation Method.*
- 18-19/06/2013** Workshop on Innovative space-time-parallel methods: Analysis and Applications (Manchester, UK). Talk: *Acceleration of a time-dependent neutron transport solver by the parallelization of some of its variables.*
- 10-14/06/2013** Workshop on Model Reduction and Approximation for Complex Systems (Luminy-CIRM, France). Talk: *The Generalized Empirical Interpolation Method: Analysis of the conver-*

gence and application to data assimilation coupled with simulation

## Contributed talks

- 02-05/05/2018** VII Workshop on Parallel in Time Methods – PinT (Roscoff, France). Talk: *A scalable adaptive parareal in time algorithm with online stopping criterion*
- 25-29/09/2017** European Numerical Mathematics and Advanced Applications – ENUMATH (Voss, Norway). Talk: *A Discontinuous Petrov-Galerkin method for radiative transfer*.
- 07-10/11/2016** Conference on recent developments in numerical methods for Model Reduction (Paris, France). Talk: *Dictionary data assimilation and reconstruction with reduced models*
- 28/06-03/7/2015** 6<sup>th</sup> Jaén Conference on Approximation Theory (Jaén, Spain). Talk: *Approximation strategies to couple data assimilation with model-driven simulations*.
- 27-29/05/2015** Fourth Workshop on Parallel-in-Time Integration – PinT (Dresden, Germany). Talk: *Towards a Fully Scalable Balanced Parareal Method: application to Neutronics*.
- 23-27/07/2014** International Conference on Spectral and High Order Methods – ICOSAHOM (Salt Lake City, USA). Talk: *The GEIM to inter-play with data and numerical simulations for real-time decisions*.
- 27-31/10/2013** Joint International Conference on Supercomputing in Nuclear Applications and Monte Carlo – SNA-MC (Paris, France). Talk: *MINARET: Towards a time-dependent neutron transport parallel solver*.
- 25-29/06/2012** 21st International Congress on Domain Decomposition Methods – DD-21 (Rennes, France). Talk: *The parareal algorithm applied to neutron kinetics*.

## Invited seminars and working groups

- 18/06/2020** Online Seminar of the MaNu activity group. Talk: *Nonlinear reduced models for inverse problems*.
- 18/06/2020** Online Inria Seminar (Defi-Medisim-Poems teams). Talk: *Nonlinear reduced models for inverse problems*.
- 18/06/2020** Online Working Group at Dauphine on COVID-19. Talk: *Understanding the spatial propagation of the Covid-19 epidemic with mobility observations*.
- 05/01/2020** Seminar ANEDP at Lille University. Talk: *Solving the neutron transport equation with certified error control*
- 14/01/2020** Journée des 50 ans du Ceremade (U. Paris Dauphine, France). Talk: *State Estimation: Optimal Algorithms and Applications*
- 18/11/2019** Inria Seminar (Commedia Team). Talk: *Optimal State Estimation. Algorithms and applications to the reconstruction of biological flows*.
- 18/03/2019** One-day workshop of the Manon group (Paris, Sorbonne Université). Talk: *An Adaptive Source Term Iteration for the numerical solution of the radiative transfer equation*
- 20/02/2019** Seminar of the Inria research group MokaPlan (Paris Dauphine). Talk: *Nonlinear reduced models and state estimation*
- 13/11/2018** Annual Meeting of the Working Group AMORE – Advanced Model Order REduction (Paris, IHP). Talk: *Data-driven model selection*
- 19/04/2018** Applied and Computational Analysis Seminar Series (Cambridge, UK). Talk: *Numerical solution of the radiative transfer equation with a posteriori error bounds*
- 18/01/2018** SimTech Seminar on Model Reduction and Data Techniques for Surrogate Modelling (University of Stuttgart, Germany). Talk: *Greedy algorithms for optimal measurements selection in state estimation using reduced models*
- 12/12/2017** Lunch Seminar of the Center for Computational Engineering Science (Aachen, RWTH). Talk: *Greedy algorithms for optimal measurements selection in state estimation using reduced models*.
- 27/11/2017** Lecture for the working group “STAT-NUM” (Paris, Dauphine). Talk: *Reconstruction par*

*couplage de mesures bruitées et de modèles réduits*

- 16/06/2016** Séminaire CERMICS (Paris, École des Ponts). Talk: *Dictionary data assimilation on reduced basis spaces.*
- 03/12/2015** Séminaire SERMA (Paris, CEA Saclay, France). Talk: *Numerical schemes with tight a posteriori error bounds in kinetic models.*
- 10/11/2015** Seminar of the CEREMADE institue (Paris Dauphine University, France) Talk: *Numerical schemes with tight a posteriori error bounds in kinetic models.*
- 14/08/2014** Seminar of the Academy (Academy of Sciences of Beijing, China). Talk: *Towards a Fully Scalable Balanced Parareal Method: application to Neutronics.*
- 10/2014** IMI Seminar (University of South Carolina, USA). Talk: *The GEIM to inter-play with data and numerical simulations for real-time decisions.*
- 10/2014** Séminaire ARISTOTE ROM&ROC (Reduced Order Models and Reduction Of Complexity) (Paris, Ecole Polytechnique). Talk: *A coupled parareal reduced basis scheme.*
- 06/2014** IGPM Seminar (Aachen, RWTH, Germany). Talk: *The GEIM to inter-play with data and numerical simulations for real-time decisions.*
- 03/2014** Journées des thèses du DM2S (Paris, CEA Saclay).  
Talk: *Acceleration methods for neutron transport calculations and some contributions towards the real-time simulation of physical processes by coupling data assimilation with mathematical models.*
- 11/2013** Séminaire MANON (Paris, CEA Saclay). Talk: *About some challenges posed by neutron transport to the parareal in time algorithm.*
- 10/2013** Special session on Model Reduction Topics at LJLL (Paris, UPMC). Talk: *The Generalized Empirical Interpolation Method: an overview of the theory, applications and perspectives.*
- 04/2013** Journées Internes du LJLL (Paris, Paris Descartes University). Talk: *About some contributions for the improvement of nuclear safety calculations.*
- 04/2013** Séminaire MANON (Paris, UPMC). Talk: *About some contributions for the improvement of nuclear safety calculations.*
- 12/2012** Séminaire MACOE (Paris, CEA Saclay). Talk: *Parallelization of the time variable for the resolution of the kinetic neutron equations.*
- 09/2012** Séminaire SERMA (Paris, CEA Saclay). Talk: *A "Generalized Empirical Interpolation Method" with applications to statistical data mining.*
- 07/2012** Séminaire MANON (Paris, UPMC). Talk: *A "Generalized Empirical Interpolation Method" with applications to statistical data mining*

## Posters

- *Dictionary measurement selection for state estimation with reduced models* (with P. Binev, A. Cohen and J. Nichols). See poster [here](#).
  - Conference on the Foundations of Computational Mathematics (10-12/06/2017, Barcelona, Spain)
  - Aachen Conference on Computational Engineering Science (27-28/07/2017, Aachen, Germany)
- *An improved EIM for stability with respect to measurement noise: application to nuclear reactor physics calculations* (with J.P. Argaud, B. Bouriquet, H. Gong and Y. Maday)
  - Workshop on "Challenges in High-Dimensional Analysis and Computation" (02-06/05/2016, San Servolo, Venice, Italy)
- *The parareal algorithm applied to the kinetic neutron diffusion equation* (with J.J. Lautard and Y. Maday)
  - Workshop on Variational Models and Methods for Evolution (10-12/09/2012, Levico Terme, Italy)

## **Languages**

Spanish (native), French (bilingual), English (fluent), German (fluent).  
I also speak Python, C++ and Git with computers.