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1 Current position and experience

September 2019-	Maître de conférences (Associate professor, granted tenure in September 2020) *Université Paris-Dauphine* *Université PSL* *Paris, France* Faculty in the MIDO (Maths & Computer Science) department Researcher in the LAMSADE unit, within the MILES (Machine Intelligence and Learning Systems) team

1.1 Previous positions

November 2016-August 2019	Postdoctoral research associate in Optimization Data Science Hub *Wisconsin Institute for Discovery* *University of Wisconsin-Madison* *Madison, WI, USA* Principal Investigator: Stephen J. Wright.
October 2013-October 2016	Doctoral researcher in Applied Mathematics *Institut de Recherche en Informatique de Toulouse (IRIT)* *Toulouse, France.*
October 2013-September 2016	Teaching assistant under doctoral grant *École Nationale Supérieure d'Électrotechnique, d'Électronique, d'Informatique, d'Hydraulique et des Télécommunications* (ENSEEIHT) *Toulouse, France.*

1.2 Internships

February-April 2016	Visiting scholar *(Thesis Parts Appointment)* *Argonne National Laboratory* *Lemont, IL, USA* Supervised by Stefan Wild and Jeffrey Larson.
March-September 2013	Stochastic optimization on direct-search methods *Universidade de Coimbra, Coimbra, Portugal* *IRIT, Toulouse, France* 3rd-year ENSEEIHT internship.
January-March 2013	Improvement of the iterative resolution of the electromagnetic diffraction calculus with integral equations *LAboratoire PLAsma et Conversion d'Énergie (LAPLACE)* *Toulouse, France* 3rd-year ENSEEIHT "long project" Collaboration of Computer Science and Electronics departments.
June-August 2012	Study of the injectivity domain of the prolate ellipsoid *Institut de Mathématiques de Bourgogne, Dijon, France* 2nd-year ENSEEIHT internship.

2 Publications

Standard practice in my research area is to order the authors by alphabetical order. My name is underlined on every report or paper that would not conform to that rule.

2.1 Submitted preprints

1. A. S. Berahas, M. J. O'Neill and C. W. Royer, A line search framework with restarting for noisy optimization problems. Technical report, arXiv:2506.03358, June 2025.

2. E. Bergou, Y. Diouane, V. Kungurtsev and C. W. Royer, Direct-search methods for decentralized blackbox optimization. Technical report, arXiv:2504.04269, April 2025.

2.2 International journals

1. K. J. Dzahini, F. Rinaldi, C. W. Royer and D. Zeffiro, Direct-search methods in the year 2025: Theoretical guarantees and algorithmic paradigms. *EURO Journal on Computational Optimization*, 13:100110, 2025.

2. D. Cornaz, S. Kerleau and C. W. Royer, A characterization of positive spanning sets with ties to strongly connected digraphs. *Discrete Applied Mathematics*, 374:105-119, 2025.

3. F. Goyens and C. W. Royer, Riemannian trust-region methods for strict saddle functions with complexity guarantees. Available online in *Mathematical Programming*, October 2024. `https://doi.org/10.1007/s10107-024-02156-2`.

4. W. Hare, L. Roberts and C. W. Royer, Expected decrease for derivative-free algorithms using random subspaces. *Mathematics of Computation*, 94:277-304, 2025.

5. A. Onwunta and C. W. Royer, Complexity analysis of regularization methods for implicitly constrained least squares. *Journal of Scientific Computing*, 101:54, 2024.

6. C. W. Royer, O. Sohab and L. N. Vicente, Full-low evaluation methods for bound and linearly constrained derivative-free optimization. *Computational Optimization and Applications*, 89:279-315, 2024.

7. W. Hare, G. Jarry-Bolduc, S. Kerleau and C. W. Royer, Using orthogonally structured positive bases for constructing positive k-spanning sets with cosine measure guarantees. *Linear Algebra and its Applications*, 680:183-207, 2024.

8. L. Roberts and C. W. Royer, Direct search based on probabilistic descent in reduced spaces. *SIAM Journal on Optimization*, 33(4):3057-3082, 2023.

9. W. Hare and C. W. Royer, Detecting negative eigenvalues of exact and approximate Hessian matrices in optimization. *Optimization Letters*, 17:1739-1756, 2023.

10. R. Chan--Renous-Legoubin and C. W. Royer, A nonlinear conjugate gradient method with complexity guarantees and its application to nonconvex regression. *EURO Journal on Computational Optimization*, 10:100044, 2022.

11. E. Bergou, Y. Diouane, V. Kunc, V. Kungurtsev and C. W. Royer, A subsampling line-search method with second-order results. *INFORMS Journal on Optimization*, 4(4):403-425, 2022.

12. E. Bergou, Y. Diouane, V. Kungurtsev and C. W. Royer, A stochastic Levenberg-Marquardt method using random models with complexity results. *SIAM/ASA Journal on Uncertainty Quantification*, 10(1):507-536, 2022.

13. E. Bergou, Y. Diouane, V. Kungurtsev and C. W. Royer, A nonmonotone matrix-free algorithm for nonlinear equality-constrained least-squares problems. *SIAM Journal on Scientific Computing*, 43(5):S743-S766, 2021.

14. F. E. Curtis, D. P. Robinson, C. W. Royer and S. J. Wright, Trust-region Newton-CG with strong second-order complexity guarantees for nonconvex optimization. *SIAM Journal on Optimization*, 31(1):518-544, 2021.

15. C. W. Royer, M. O'Neill and S. J. Wright, A Newton-CG algorithm with complexity guarantees for unconstrained optimization. *Mathematical Programming*, 180:451-488, 2020 (published online in January 2019).

16. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang, Direct search based on probabilistic feasible descent for bound and linearly constrained problems. *Computational Optimization and Applications*, 72(3):525-559, 2019. *COAP Best paper prize for 2019.*

17. S. Gratton, C. W. Royer and L. N. Vicente, A decoupled first/second-order steps technique for nonconvex nonlinear unconstrained optimization with improved complexity bounds. *Mathematical Programming*, 179(1):195-222, 2020 (published online in September 2018).

18. C. W. Royer and S. J. Wright. Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization. *SIAM Journal on Optimization*, 28(2):1448-1477, 2018.

19. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang, Complexity and global rates of trust-region methods based on probabilistic models. *IMA Journal of Numerical Analysis*, 38(3):1579-1597, 2018 (published online August 2017).

20. S. Gratton, C. W. Royer and L. N. Vicente, A second-order globally convergent direct-search method and its worst-case complexity. *Optimization: A Journal of Mathematical Programming and Operations Research*, 65(6):1105-1128, 2016.

21. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang, Direct Search based on Probabilistic Descent. *SIAM Journal on Optimization*, 25(3):1515-1541, 2015.

2.3 Conference proceedings

1. L. Meunier, Y. Chevaleyre, J. Rapin, C. W. Royer and O. Teytaud, On averaging the best samples in evolutionary computation. In: Bäck T. et al. (eds) *Parallel Problem Solving from Nature - PPSN XVI*, Lecture Notes in Computer Science, 661–674, Springer, 2020.

2. J.-B. Caillau and C. W. Royer, On the injectivity and nonfocal domains of the ellipsoid of revolution, *Geometric Control Theory and sub-Riemannian Geometry*, 73-86, Springer-Verlag, 2014.

2.4 PhD thesis

1. C. W. Royer, *Derivative-Free Algorithms based on Probabilistic and Deterministic Properties: Complexity Analysis and Numerical Relevance*, University of Toulouse, November 2016.

3 Conference talks and seminars

3.1 Invited plenary talks and seminars

1. C. W. Royer, *A derivative-free algorithm for continuous submodular optimization*, COCANA Seminar Series, July 2025, University of British Columbia Okanagan (Kelowna, BC, Canada). Based on joint work with M. Kaspar. (Invited by W. Hare.)

2. C. W. Royer, *From nonconvex to strict saddle optimization*, MAIA (Mathematics, Artificial Intelligence and Applications) conference, February 2025 (Sousse, Tunisie). Based on joint work with F. Goyens. (Invited by the organizers.)

3. C. W. Royer, *Random subspace approaches in derivative-free optimization*, Journée Francilienne de Recherche Opérationnelle, November 2024 (Paris, France). Based on joint work with W. Hare and L. Roberts. (Invited by the organizers N. Benabbou, A. Maddaloni, D. Delle Donne and E. Lancini.)

4. C. W. Royer, *Random subspaces and expected decrease in derivative-free optimization*, Workshop on Bayesian optimization & related topics, June 2024 (Paris, France). Co-authors: W. Hare, L. Roberts. (Invited by the organizers J. Bect, C. Helbert and D. Sinoquet.)

5. C. W. Royer, *A Newton-type method for strict saddle functions*, ANITI-PRAIRIE workshop on Optimization and Artificial Intelligence, June 2023 (Toulouse, France). Co-author: F. Goyens. (Invited by F. Bach, J. B. Lasserre and G. Peyré.)

6. C. W. Royer, *Newton-type methods with complexity guarantees for nonconvex data science*, XLIM Seminar, Université de Limoges, Limoges, France, May 2023. Based on joint work with F. E. Curtis, F. Goyens, D. P. Robinson and S. J. Wright (Invited by S. Adly and T. Liard.)

7. C. W. Royer, *Derivative-free optimization for modern blackbox problems*, Électricité de France (EDF) invited talk, April 2023, Puteaux (France). (Invited by A. Bercegol.)

8. C. W. Royer, *Newton-type methods with complexity guarantees for nonconvex data science*, CAS Seminar, Mines Paris-PSL, Paris, France, February 2023. Based on joint work with F. E. Curtis, F. Goyens, D. P. Robinson and S. J. Wright (Invited by F. Pacaud.)

9. C. W. Royer, *Algorithms and application for special classes of nonlinear least squares problems 2023*, 12th US-Mexico workshop on optimization and its applications, Huatulco (Oaxaca, Mexico), January 2023. Based on joint work with A. Allauzen, E. Bergou, Y. Diouane, V. Kungurtsev and I. S. Legheraba. (Invited by J. Linderoth, J. Nocedal and K. Scheinberg.)

10. C. W. Royer, *Optimization methods for highly nonconvex data science tasks*, *Fast optimization methods in the big data era* workshop, Institute for Mathematical Sciences, Singapore, December 2022. Based on joint work with A. Allauzen, R. Chan–Renous-Legoubin and I. S. Legheraba. (Invited by K.-C. Toh, D. Sun and S. J. Wright, remote talk.)

11. C. W. Royer, *Numerical optimization with complexity guarantees for nonconvex data science*, Data Science seminar, Johns Hopkins University, Baltimore (MD, USA), March 2022. Based on joint works with R. Chan–Renous-Legoubin, F. E. Curtis, D. P. Robinson and S. J. Wright. (Invited by Christian Kümmerle in the department of Applied Mathematics and Statistics.)

12. C. W. Royer, *Optimization without derivatives in larger dimensions and across networks*, Michigan Institute of Data Science (MIDAS) seminar, University of Michigan, Ann Arbor (MI, USA), March 2022. Based on joint works with L. Roberts, E. Bergou, Y. Diouane and V. Kungurtsev. (Invited by Albert Berahas in the department of Industrial and Operations Engineering.)

13. C. W. Royer, *Optimization without derivatives in larger dimensions and across networks*, Lehigh Industrial and Systems Engineering Seminar Series, Lehigh University, Bethlehem (PA, USA), March 2022. Based on joint works with L. Roberts, E. Bergou, Y. Diouane and V. Kungurtsev. (Invited by the Industrial and Systems Engineering department.)

14. C. W. Royer, *Newton-Krylov techniques for nonconvex optimization*, Computational Maths Seminar (online), Australian National University, Canberra, Australia, October 2021. (Invited by Lindon Roberts.)

15. C. W. Royer, *Conjugate gradient techniques for nonconvex optimization*, ICML 2021 Workshop "Beyond first-order methods in machine learning systems", held virtually. (Plenary speaker, invited by the organizers.)

16. C. W. Royer, *Convergence rates of stochastic derivative-free optimization methods based on probabilistic properties*, Derivative-Free Optimization Symposium, Kelowna (BC, Canada), initially planned in August 2020 **(postponed to 2022 due to the pandemic)**. (Invited by the organizers.)

17. C. W. Royer, *Probabilistic properties in numerical optimization: Theoretical analysis and numerical relevance*, LAMSADE Seminar Series, Université Paris-Dauphine (Paris, France), May 2019. (Invited by Florian Yger and Jérôme Monnot.)

18. C. W. Royer, *Nonconvex optimization via Newton-CG methods with complexity guarantees*, Lehigh Industrial and Systems Engineering Seminar Series, Lehigh University, Bethlehem (PA, USA), March 2019. Based on joint works with M. O'Neill and S. J. Wright. (Invited by the Industrial and Systems Engineering department.)

19. C. W. Royer, *Nonconvex optimization with complexity guarantees: a Newton-CG approach*, APO seminar, Toulouse (France), January 2019. Based on joint works with M. O'Neill and S. J. Wright. (Invited by Serge Gratton.)

20. C. W. Royer, *Newton-Conjugate Gradient methods with complexity guarantees for nonconvex optimization*, Department of Mathematics and Industrial Engineering, École Polytechnique de Montréal, Montréal (QC, Canada), October 2018. (Invited by the department.)

21. C. W. Royer, *Probabilistic Analysis of Derivative-Free Methods*, *LANS* seminar, Argonne National Laboratory, Lemont (IL, USA), April 2016. Based on joint works with S. Gratton, L. N. Vicente, Z. Zhang. (Invited by Stefan Wild.)

22. C. W. Royer, *Probabilistic Analysis of Derivative-Free Methods*, *WID-DOW* seminar, University of Wisconsin-Madison, Madison (WI, USA), April 2016. Based on joint works with S. Gratton, L. N. Vicente, Z. Zhang. (Invited by Stephen J. Wright.)

3.2 Invited session/minisymposia talks

1. C. W. Royer, *A derivative-free algorithm for continuous submodular optimization*, International Conference on Continuous Optimization, Los Angeles (CA, USA), July 2025. Co-author: M. Kaspar. (Invited by A. L. Custódio and G. Liuzzi.)

2. C. W. Royer, *The impact of landscape on optimization algorithms*, Portuguese-American Optimization Workshop (PAOW), Horta (Portugal), June 2025. Based on joint works with F. Goyens and I. Waldspurger.

3. C. W. Royer, *Expected decrease for derivative-free algorithms using random subspaces*, 25th International Symposium on Mathematical Programming (ISMP), Montréal (QC, Canada), July 2024. Co-authors: W. Hare, L. Roberts. (Filling in for W. Hare, invited by A. L. Custódio, F. Rinaldi and S. Wild).

4. C. W. Royer, *Full-low evaluation methods for bound and linearly constrained derivative-free optimization*, 25th International Symposium on Mathematical Programming (ISMP), Montréal (QC, Canada), July 2024. Co-authors: O. Sohab, L. N. Vicente. (Invited by A. L. Custódio, F. Rinaldi and S. Wild).

5. C. W. Royer, *A derivative-free algorithm resilient to straggler function evaluations*, 2nd Derivative-Free Optimization Symposium, Padova (Italy), June 2024. Based on joint works with W. Hare, G. Jarry-Bolduc and S. Kerleau. (Invited by the organizers A. L. Custódio, S. Le Digabel, G. Liuzzi, M. Porcelli and F. Rinaldi.)

6. C. W. Royer, *Minimum eigenvalues routines and nonconvex optimization*, SIAM Conference on Applied Linear Algebra (LA24), Paris (France), May 2024. Based on joint works with F. E. Curtis, M. O'Neill, D. P. Robinson and S. J. Wright. (In a mini-symposium organized for the conference.)

7. C. W. Royer, *A Newton-type method for strict saddle functions on manifolds*, Mokdauphine seminar (Paris, France), , December 2023. Co-author: F.Goyens. (Invited by the MOKAPLAN team from INRIA).

8. C. W. Royer, *A Newton-type method for strict saddle functions*, Foundations of Computational Mathematics (FoCM 2023), Paris (France), June 2023. Co-author: F. Goyens. (In a workshop organized by Z. Lu, S. J. Wright and J. Ye.)

9. C. W. Royer, *Direct search based on probabilistic descent in reduced spaces*, SIAM Conference on Optimization (OP23), Seattle (Washington, USA), May-June 2023. Co-author: L. Roberts. (In a mini-symposium co-organized with W. Hare, S. Le Digabel and L. Roberts.)

10. C. W. Royer, *Stochastic blackbox optimization methods in the presence of dynamical constraints*, SIAM Conference on Computational Science and Engineering (CSE23), Amsterdam (Netherlands), February-March 2023. (Invited by K. J. Dzahini and M. Menickelly.)

11. C. W. Royer, *Algorithms and Application for Special Classes of Nonlinear Least Squares Problems 2023*, 12th US/Mexico workshop on Optimization and its Applications, Huatulco (Oaxaca, Mexico), January 2023. (Invited by the organizers J. Linderoth, J. Nocedal and K. Scheinberg.)

12. C. W. Royer, *Conjugate gradient methods for nonconvex optimization*, INFORMS Optimization Society meeting, Greenville, SC, USA, March 2022. (Invited by B. Zhou and A. Berahas).

13. C. W. Royer, *Newton-type methods with complexity guarantees*, INFORMS Annual Meeting, Anaheim, CA, USA (Hybrid format), October 2021. (Invited by B. Zhou).

14. C. W. Royer, *Trust-region Newton-CG with strong second-order complexity guarantees for nonconvex optimization*, SIAM Conference on Optimization (OP21), **initially planned**

in Spokane (WA, USA), moved online due to the pandemic, July 2021. Co-authors : F. E. Curtis, D. P. Robinson and S. J. Wright. (Invited by A. Berahas and R. Bollapragada.)

15. C. W. Royer, *A study of direct-search methods based on probabilistic properties*, 31st European Conference on Operational Research, Athens, Greece (Hybrid format), July 2021. (Invited as session organizer by A. L. Custódio.)

16. C. W. Royer, *A stochastic Levenberg-Marquardt method using random models*, 18th Workshop on Advances in Continuous Optimization (EUROPT), Toulouse (France), July 2021 **(held virtually due to the pandemic)**. Co-authors: E. Bergou, Y. Diouane and V. Kungurtsev. (Invited by S. Le Digabel and Y. Diouane.)

17. C. W. Royer, *Newton-type methods with complexity guarantees for nonconvex optimization*, LAMSADE Annual meeting, Université Paris Dauphine-PSL, May 2021. Based on joint works with M. O'Neill and S. J. Wright.

18. C. W. Royer, *Newton-Conjugate Gradient methods with complexity guarantees*, SIAM Conference on Applied Linear Algebra, May 2021. **(Initially planned in New Orleans, LA, USA, moved online due to the pandemic).** Based on joint works with M. O'Neill and S. J. Wright. (In a mini-symposium co-organized with E. Riccietti.)

19. C. W. Royer, *A stochastic Levenberg-Marquardt Methods for Noisy Derivative-Free Optimization with Complexity Results and Application to Data Assimilation*, SIAM Conference on Computational Science and Engineering (CSE21), March 2021. **(Initially planned in Forth Worth, TX, USA, moved online due to the pandemic).** Co-authors: E. Bergou, Y. Diouane and V. Kungurtsev. (Invited by J. Mueller and C. Shoemaker.)

20. C. W. Royer, *A decentralized derivative-free optimization method*, Optimization 2020, Aveiro (Portugal), initially planned in July 2020 **(cancelled due to the pandemic)**. Co-authors : E. Bergou, Y. Diouane and V. Kungurtsev. (Invited by G. Liuzzi.)

21. C. W. Royer, *Newton-Conjugate Gradient methods with complexity guarantees*, IMA Conference on Numerical Linear Algebra and Optimization, originally planned in June 2020 **(delayed to 2022 due to the Covid-19 situation)**. Based on joint works with F. E. Curtis, M. O'Neill, D. P. Robinson and S. J. Wright. (In a mini-symposium co-organized with E. Riccietti.)

22. C. W. Royer, *A decoupled first/second-order steps technique and its application to nonconvex derivative-free optimization*, International Conference on Continuous Optimization, Berlin (Germany), August 2019. Based on a joint work with S. Gratton and L. N. Vicente. (Invited by A. L. Custódio and F. Rinaldi.)

23. C. W. Royer, *Complexity guarantees for practical second-order algorithms*, International Conference on Continuous Optimization, Berlin (Germany), August 2019. Based on a joint works with M. O'Neill and S. J. Wright. (Replacing S. J. Wright, invited by A. Berahas.)

24. C. W. Royer, *Stochastic optimization with probabilistic properties: A case study for optimization under uncertainty?*, MACSER Optimization under Uncertainty Seminar, Madison (Wisconsin, USA), June 2019. (Invited by R. Kannan.)

25. C. W. Royer, *A stochastic Levenberg-Marquardt method using random models with application to data assimilation*, SIAM Computational Science and Engineering conference, Spokane (WA, USA), February-March 2019. Based on joint work with E. Bergou, Y. Diouane and V. Kungurtsev. (Invited by M. Menickelly and J. Mueller.)

26. C. W. Royer, *Using models in allocating and partitioning algorithms*, Conference *ISMP 2018*, Bordeaux (France), July 2018. Co-authors: J. Larson, S. M. Wild. (Invited by Y. Diouane and S. Wild).

27. C. W. Royer, *Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization*, 2018 INFORMS Optimization Conference, Denver (CO, USA), March 2018. Co-author: S. J. Wright. (Invited by A. Mokhtari, S. Paternain and A. Ribeiro in a session "Nonconvex optimization").

28. C. W. Royer, *Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization*, Workshop "Beyond convexity: Emerging Challenges in Data Science", Oaxaca (Mexico), October 2017. Co-author: S. J. Wright. (Invited by the organizers T. Kolda, R. Nowak, R. Willett and S. Wright).

29. C. W. Royer, *Including inexact second-order aspects in first-order methods for nonconvex optimization*, Optimization 2017, Lisbon (Portugal). Co-author: S. J. Wright. (Invited as session organizer by L. N. Vicente.)

30. C. W. Royer, *Direct search based on probabilistic feasible descent for bound and linearly constrained problems*, SIAM Conference on Optimization, Vancouver (Canada), May 2017. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang. (Invited in the mini-symposia "Derivative-free optimization" chaired by Stefan Wild and Sébastien Le Digabel.)

31. C. W. Royer, *Direct Search using Probabilistic Descent*, Conference *ISMP 2015*, Pittsburgh (PA, USA), July 2015. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang. (Invited by Zaikun Zhang.)

32. C. W. Royer, *Direct Search using Probabilistic Descent*, Conference *Optimization 2014*, Guimarães (Portugal). Co-authors: S. Gratton, L. N. Vicente, Z. Zhang. (Invited by Serge Gratton.)

3.3 Contributed talks

1. C. W. Royer, *Positive spanning sets and resilient derivative-free optimization*, MOPTA 2025, São Miguel (Portugal), June 2025. Based on joint works with W. Hare, G. Jarry-Bolduc and S. Kerleau.

2. C. W. Royer, *Random subspaces and expected decrease in derivative-free optimization*, SMAI-MODE Days, Lyon (France), March 2024. Co-authors: W. Hare, L. Roberts.

3. C. W. Royer, *Long-term office space reallocation: A case study*, ROADEF 2024, Amiens (France), March 2024. Based on a collaboration with S. Airiau, L. Galand, J. Lang and S. Toubaline.

4. C. W. Royer, *Complexity analysis of regularization methods for implicitly constrained least squares*, PGMO Days 2023, EDF Lab, Palaiseau (France), November 2023. Co-author: A. Onwunta.

5. C. W. Royer, *Stochastic blackbox methods in the presence of dynamics constraints*, PGMO Days 2022, EDF Lab, Palaiseau (France), December 2022.

6. C. W. Royer, *Modern optimization tools (for naval engineering?)*, École Navale, Lanzéoc, France, October 2021.

7. C. W. Royer, *A stochastic Levenberg-Marquardt method using random models*, SMAI-MODE Days 2020, EDF Lab, Palaiseau (France), initially planned for March 2020 **(postponed to September 2020 due to the pandemic)**. Co-authors: E. Bergou, Y. Diouane, V. Kungurtsev.

8. C. W. Royer, *Newton-Conjugate Gradient methods with complexity guarantees*, PGMO Days 2019, EDF Lab, Palaiseau (France), December 2019. Co-authors: M. O'Neill, S. J. Wright.

9. C. W. Royer, *A decoupled first/second-order steps technique for nonconvex optimization*, MOPTA 2019, Bethlehem (Pennsylvania, USA), August 2019. Co-authors: S. Gratton, L. N. Vicente.

10. C. W. Royer, *Nonconvex optimization despite expensive, inexact or unavailable values*, SILO Seminar, University of Wisconsin-Madison, Madison (Wisconsin, USA), August 2019.

11. C. W. Royer, *Handling bad outcomes in derivative-free optimization with probabilistic properties* (Poster), ICERM Workshop on Mathematical Optimization of Systems Impacted by Rare, High-Impact Random Events, Providence (Rhode Island, USA), June 2019.

12. C. W. Royer, *Complexity guarantees and numerical behavior of Newton-type methods for smooth nonconvex optimization*, IMA Conference on Numerical Linear Algebra and Optimization, Birmingham (UK), June 2018. Co-authors: M. O'Neill, S. J. Wright.

13. C. W. Royer, *Numerical Optimization with Complexity Guarantees* (Poster), Autumn School on Optimization in Machine Learning and Data Science, Trier (Germany), August 2017.

14. C. W. Royer, *Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization*, MOPTA 2017, Bethlehem (Pennsylvania, USA), August 2017. Co-author: S. J. Wright.

15. C. W. Royer, *Complexity and Global Rates of Optimization Methods based on Probabilistic Properties* (Poster), ACNTW Workshop, Chicago (Illinois, USA), May 2017. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.

16. C. W. Royer, *Probabilistic Feasible Descent Techniques for Derivative-Free Linearly Constrained Optimization*, 14th EUROPT Workshop, Warsaw (Poland), July 2016. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.

17. C. W. Royer, *Second-Order Convergence in Direct-Search Methods*, CIMI Workshop on Optimization with Application to Machine Learning & Data Assimilation, Toulouse, January 2016. Co-authors: S. Gratton, L. N. Vicente.

18. C. W. Royer, *Form First to Second-Order Quality Measures in Direct-Search Methods*, Days of the GDR MOA (CNRS), Dijon, France, December 2015. Co-authors: S. Gratton, L. N. Vicente.

19. C. W. Royer, *Form First to Second-Order Quality Measures in Direct-Search Methods*, APO PhD students day, Toulouse, November 2015. Co-authors: S. Gratton, L. N. Vicente.

20. C. W. Royer, *Form First to Second-Order Quality Measures in Direct-Search Methods*, 13th EUROPT Workshop, Edinburgh (UK), July 2015. Co-authors: S. Gratton, L. N. Vicente.

21. C. W. Royer, *Direct Search using Probabilistic Descent* (Poster), Workshop *Convex Optimization and Beyond*, Edinburgh (UK), 2014. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.

22. C. W. Royer, *Direct Search using Probabilistic Descent*, APO PhD students day, Toulouse, 2013 and 2014. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.

23. C. W. Royer, *Direct Search using Probabilistic Descent*, International Conference on Continuous Optimization, Lisbon (Portugal), 2013. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.

4 Funding and Awards

4.1 Funded projects

- *COMPROMIS*, part of the *Cybersécurité* PEPR project funded by ANR (French Research Agency), member of the Université Paris Dauphine-PSL team (Coordinator: Teddy Furon). Involved through the PhD thesis of Bastien Cavarretta.

- *PDE-AI*, PEPR project funded by ANR (French Research Agency), member of the Université Paris Dauphine-PSL team (Coordinator: Antonin Chambolle). Involved through the postdoctoral contract of Annette Dumas and a PhD thesis (co-supervised with Antonin Chambolle).

- *BONUS: Blackbox Optimization with a Novel Use of Subspaces*, International Emerging Actions from CNRS, France, awarded in January 2024. Co-principal investigator with Dr. Lindon Roberts (University of Sydney, Australia). Budget: 14000 €. Duration: January 2024-December 2025.

- *OCEAN: Complexity guarantees for efficient PDE-constrained nonconvex optimization*, PGMO Young Researcher grant, awarded in July 2022. Principal investigator. Budget: 5000 €. Duration: October 2022-October 2023.

- *ALIAS: Adaptive, Local and Innovative Algorithms for Stochastic Optimization.* Thomas Jefferson Fund, FACE Foundation, awarded in July 2022. Co-PI with Dr. Albert Berahas (University of Michigan, MI, USA). Budget: $20000. Duration: September 2022-September 2024.

- *Improving optimization algorithms through advanced eigenvalue approximation.* France Canada Research Fund project, awarded in May 2022. Co-PI with Pr. Warren Hare (University of British Columbia, BC, Canada). Budget: CAN$13000. Duration: 2022-2023.

- *GASCON: Towards new complexity analyzes in nonconvex optimization.* Start-up project for newly recruited researchers and professors, INS2I, CNRS, France. Principal Investigator. Budget: 5000 €. Duration: February-December 2020, renewed for February-December 2021.

4.2 Funded positions

- PRAIRIE Springboard chair in optimization (2021-2026) funded through the French government. Allows for a reduced teaching load as well as a funded postdoctoral or doctoral position, in addition to 36000 €for operating costs. Originally planned for three years

(2021-2024), extended in January 2024 through 2026 with additional funding for a postdoctoral or doctoral position.

- Postdoctoral position at the University of Wisconsin-Madison (2016-2019) partially funded through the DARPA-Lagrange project *Nonconvex Matrix Optimization: Geometry, Algorithms and Distributed Implementations*. Funding source: United States Department of Defense.

- Postdoctoral position at the University of Wisconsin-Madison (2016-2019) partially funded through the *MACSER: Multifaceted Mathematics for Rare, High-Impact Events in Complex Energy and Environment Systems* project, and its predecessor *M2ACS: Multifaceted Mathematics for Complex Energy Systems*. Funding source: United States Department of Energy.

- Teaching assistant fellowship (2013-2016) at the National Polytechnical Institute of Toulouse, France. Funding source: French Ministry of Higher Education and Research, through the Excellence Laboratory CIMI (International Center of Mathematics and Computer Science in Toulouse).

- *Doctoral fellowship "president quota":* selective three-year thesis funding (2013-2016) from Université Toulouse III Paul Sabatier provided by its presidency. Funding source: French Ministry of Higher Education and Research.

4.3 Awards and financial support

- Recipient of the *2024 Meritorious Service Award* delivered by the journal *Mathematical Programming* for outstanding contributions as a reviewer.

- Recipient of the *2022 Meritorious Service Award* delivered by the journal *Mathematical Programming* for outstanding contributions as a reviewer.

- *COAP Best Paper prize 2019* for the paper *Direct search based on probabilistic feasible descent for bound and linearly constrained problems* published in the journal *Computational Optimization and Applications*.

- Support from ICERM (The Institute for Computational and Experimental Research in Mathematics, USA) to attend the workshop *Mathematical Optimization of Systems Impacted by Rare, High-Impact Random Events*, June 2019. Funding source: National Science Foundation through ICERM.

- *Best Poster Award :* delivered during the ALOP Autumn School of Trier University, August 2017. Travel support received from the Research Training Group ALOP.

- *Early Career Travel Award:* delivered by the Society of Industrial and Applied Mathematics (SIAM) to attend the SIAM Conference on Optimization, May 2017. Funding source: National Science Foundation through SIAM.

5 Additional research activities

5.1 Session organizing

- Session organizer (6 speakers) with Florentin Goyens for the 2025 *International Conference on Continuous Optimization* (ICCOPT), Los Angeles, CA, USA, in July 2025.
  Topics: Matrix manifold optimization, nonconvex optimization and semidefinite programs.

- Mini-symposium organizer (4 speakers) for the 2024 edition of the *SIAM Conference on Applied Linear Algebra*, held in Paris, France, in May 2024.
  Topic: Negative eigenvalues and nonconvex optimization.

- Mini-symposia organizer (22 speakers) with Warren Hare, Sébastien Le Digabel and Lindon Roberts for the 2023 edition of the *SIAM Conference on Optimization*, held in Seattle, WA, USA, in May 2023.
  Topic: Advances in derivative-free optimization.

- Session organizer (3 speakers) for the 2022 PGMO Days, held in Palaiseau, France, in December 2022.
  Topic: Optimization for engineering and scientific computing.

- Session organizer (7 speakers) for the 31st European Conference on Operational Research (EURO), initially planned in Athens, Greece, in July 2021. **Moved online due to the pandemic.**
  Topics: Derivative-free optimization.

- Mini-symposium organizer (4 speakers) with Elisa Riccietti for the 2021 edition of the *SIAM Conference on Applied Linear Algebra*, initially planned in New Orleans, LA, USA, in May 2021. **Moved online due to the pandemic.**
  Topic: Krylov methods in nonlinear optimization.

- Session organizer (3 speakers) for the *ISMP 2018* conference held in Bordeaux, France.
  Topic: Mixed-integer derivative-free optimization.

- Sessions organizer (6 speakers) for the *Optimization 2017* conference in Lisbon, Portugal.
  Topics: randomized methods, first-order algorithms with applications.

5.2 Editorial service

- Associate editor of *Journal of Optimization Theory and Applications* (2022-).

5.3 Reviewing

International journals:

- *SIAM Journal on Optimization* (18);
- *Computational Optimization and Applications* (7);
- *Mathematical Programming* (6);
- *Journal of Optimization Theory and Applications* (5);
- *Optimization Methods and Software* (5);
- *Optimization and Engineering* (3);
- *IMA Journal on Numerical Analysis* (2);
- *Journal of Global Optimization* (2);
- *Journal of Scientific Computing* (2);

- *Mathematics of Operations Research* (2);
- *Numerical Algorithms* (2);
- *Optimization Letters* (2);
- *Applied Numerical Mathematics* (1);
- *ESAIM: Mathematical Modelling and Numerical Analysis* (1);
- *Journal of Machine Learning Research* (1);
- *Journal of Mathematical Imaging and Vision* (1);
- *Numerische Mathematik* (1).

International conferences:

- *International Conference on Machine Learning* (ICML), 2019 (top 5% of reviewers) and 2020.
- *Conference on Learning Theory* (COLT), 2018.
- *Neural Information Processing Systems* (NeurIPS), 2018 (top 30% of reviewers).

5.4 Expertise

- Member of a Data Science and AI panel for the *Academy of Finland*, Finland, in 2021.
- Expert for the *Fonds de recherche Nature et technologies*, Québec, Canada in 2019.

5.5 PhD student and defence committees

- Reviewer for the PhD thesis of Filippo Marini at Università di Bologna (Italy), March 2025.
- Reviewer for the PhD thesis of Andrea Brilli at Università degli studi di Roma "La Sapienza" (Italy), December 2024.
- External member for the PhD thesis of Pierre-Yves Bouchet, defended December 15, 2023 at École Polytechnique de Montréal (Québec, Canada).
- Committee member for the PhD thesis of Valentin Durante, defended December 15, 2023 at Université de Toulouse (France).
- Committee member for the PhD thesis of Damiano Zeffiro, defended March 14, 2023 at the University of Padova (Italy). This committee also awarded the theses of Giovanni Fusco and Yukihide Nakada.
- Committee member for the PhD thesis of Oumaima Sohab at Lehigh University (Pennsylvania, United States of America).

5.6 Hiring committees

- Hiring committee member for a *maître de conférences* position at INSA Lyon (2025).
- Hiring committee member for a *maître de conférences* position at Université Paris Dauphine-PSL (2025).
- Hiring committee member for a *maître de conférences* position at École Navale (2023).

5.7 Other committees

- Member of the LAMSADE council (March 2024-).
- Committee member for the best student paper prize at the ROADEF 2024 conference (French Operations Research society).
- Member of the Faculty Senate at Université PSL (January 2022-).
- Member of the Recruiting Commission at LAMSADE (January 2021-).

6 Supervision

6.1 Postdoctoral researcher

- Annette Dumas, started October 2024, co-supervised with Irène Waldspurger (Funding: France 2030 support via the PDE-AI PEPR program).
- Florentin Goyens, January 2022-July 2024 (Funding: French research agency via the PRAIRIE institute).

6.2 Graduate students

- Bastien Cavarretta: PhD thesis at Université Paris Dauphine-PSL (Funding: France 2030 support via the COMPROMIS PEPR program), started October 2024. Co-supervised with Jamal Atif and Florian Yger.
- Sébastien Kerleau: PhD thesis at Université Paris Dauphine-PSL (Funding: Doctoral school SDOSE, French government scholarship), started October 2021, expected completion in Fall 2025. Co-supervised with Denis Cornaz.
- Iskander Sabri Legheraba: PhD thesis at Université Paris Dauphine-PSL (Funding: École Normale Supérieure fellowship), started September 2020, expected completion in Fall 2025. Co-supervised with Yann Chevaleyre.

6.3 Master students

- Gaetano Agazzotti (Université Paris Saclay): Master thesis from April 2025 to August 2025. Co-supervised with Antonin Chambolle.
- Marc Kaspar (Université Paris Dauphine-PSL): Master thesis from June 2024 to September 2024.
- Bastien Cavarretta (Université Paris Saclay): Master thesis from April 2024 to August 2024. Co-supervised with Florian Yger.
- Eloi Martin (Université Paris Dauphine-PSL): Master thesis from April 2024 to August 2024. Co-supervised with Antonin Chambolle.
- Christian Kayo (Université Paris Dauphine-PSL): Master thesis from April 2023 to September 2023.
- Luca Solbiati (Université Paris Dauphine-PSL & Università degli Studi di Padova): Master thesis from April 2022 to September 2022.

- Thomas Georges (Université Paris Dauphine-PSL): Master internship from June to September 2021.
- Rémi Chan–Renous-Legoubin (Université Paris Dauphine-PSL): Master internship from April to July 2021.
- Sébastien Kerleau (Université Paris Dauphine-PSL): Master thesis from April to September 2021. Co-supervised with Denis Cornaz.
- Iskander Sabri Legheraba (ENS Paris-Saclay): Master thesis from April to August 2020. Co-supervised with Alexandre Allauzen.

7 Teaching activities

7.1 Lectures and summer schools

- *Complexity in continuous optimization*: six lectures for Dauphine's PhD program on computer science, February-March 2025, Paris, France.
- *Optimization for machine learning*: six lectures/labs in the CIMPA school *Control, Optimization, and Model Reduction in Machine Learning*, February 2025, Hammamet, Tunisia.
- *Smooth nonconvex optimization*, *Convex optimization*, *Derivative-free and hyperparameter optimization*: three lectures for the *AI Project Manager* certificate of Université PSL, delivered to professionals from the car industry (October 2023, October 2022 and November 2021), Paris, France.
- *Derivative-free optimization*: Lecture in the *Machine Learning and AI for Economics and Finance* PSL Summer School, June 2021, Paris, France.

7.2 Dauphine-PSL

Since 2019, I am a faculty member in the Mathematics and Computer Science department of Université Paris-Dauphine, a member of Université PSL. I am mostly involved in Master programs, both research-oriented and part-time (*apprentissage*). Some of these programs involve multiple entities within PSL (Dauphine, ENS, Mines ParisTech, etc).

Current courses

2024-2025	***Machine learning for optimization*** In charge of the course *M2 MODO (Master level)*
2023-2025	***Stochastic programming*** In charge of the course *M2 MODO (Master level)*
2024-2025	***Linear Algebra and Applications to Data Science*** *L2 IASO (Bachelor level)*
2020-2021;2023-2025	***Mathematics for Data Sciences*** In charge of the course *M1 IDD (Bachelor/Master level)*
2021-2025	***Optimization for data and decision sciences*** In charge of the course *M2 MIAGE ID (Master level)*
2019-2025	***Optimization for Machine Learning*** In charge of the course *M2 IASD Apprentissage (Master level)*
2020-2025	***Optimization for Machine Learning*** In charge of the course *M2 MIAGE ID Apprentissage (Master level)*
2019-2025	***Optimization for Machine Learning*** In charge of lab sessions (2024-2025) Lecturer on regularized, constrained and distributed optimization (2022-2025) Lecturer on stochastic gradient methods (2020-2025) Lecturer on gradient descent and nonconvex optimization (2021-2022) Lecturer on constrained optimization and second-order methods (2019-2020) *M2 IASD (Master level, computer science)* *M2 MASH (Master level, mathematics)*
2019-2021/2024-2025	***Fundamentals of Machine Learning*** In charge of the course (lectures + lab sessions) *L3 IM2D (Bachelor level)*

Past courses

2023-2024	***Computational methods in Optimization*** In charge of the course *M1 IDD (Bachelor/Master level)*
2022-2023	**Optimization in Finance** In charge of the course *M2 MIAGE IF (Master level)*
2019-2022	***Optimization for Machine Learning*** 2021-2022: In charge of the course and the lectures 2019-2021: In charge of the course (lectures+lab sessions) *M2 Big Data, Dauphine Tunis campus (Master level)*
2019-2020	**C++** In charge of the course and the lecture sessions *M1 Applied Mathematics (Bachelor/Master level)*

7.3 ENSEEIHT

From 2013 to 2016, I was a teaching assistant at the French engineering school ENSEEIHT, in the Computer Science and Applied Mathematics (IMA in French) department.

Fall Semesters	
2013-2015	***Parallel programming with OpenMP*** (Practical in C)
2013-2015	***Numerical Optimization*** (Practical, Matlab project) 2^{nd} *year IMA (Master level)*
2013-2014	***Linear algebra*** (Practical, Introduction to Matlab)
2015	***Hilbertian analysis*** (Practical, Introduction to Matlab)
2015	***Analysis tutorials*** 1^{rst} *year IMA (Bachelor level)*
Spring Semesters	
2014-2016	***PDE Discretization Techniques*** (Pratical, Matlab project)
2014-2016	***Krylov space methods*** (Pratical, Matlab project) 2^{nd} *year IMA (Master level)*
2014-2015	***Differential calculus*** (Tutorials) 1^{st} *year IMA (Master level)*

8 Research education and training

July 2018	TRIPODS Summer School "Fundamentals in Data Analysis" *Wisconsin Institute for Discovery, Madison (WI, USA)* A week of courses and hands-on sessions covering a range of techniques used in modern data science: - Randomized numerical linear algebra *M. Mahoney (UC Berkeley, USA)* - High-dimensional statistics *P. Loh, A. Zhang (Univ. Wisconsin-Madison, USA)* - Interactive Machine Learning *R. Nowak (Univ. Wisconsin-Madison, USA)* - Graphs and Networks *S. Roch (Univ. Wisconsin-Madison, USA)* - Continuous Optimization *D. Drusvyatskiy, M. Fazel (Univ. Washington, Seattle, USA)* *S. Wright (Univ. Wisconsin-Madison, USA)* - Deep Learning *Z. Harchaoui (Univ. Washington, Seattle, USA)*
August 2017	Autumn school on Optimization in Machine Learning and Data Science *ALOP Group, Trier Universität, Germany* Three series of lectures with practical sessions: - Fundamental algorithmic approaches relevant to data analysis *S. Wright (Univ. Wisconsin-Madison, USA)* - Optimization approaches for fitting the canonical tensor decomposition *T. Kolda (Sandia National Labs., USA)* - High performance simplex methods *J. Hall (Univ. Edinburgh, UK)*
September 2015	Summer school on machine learning and applications *CIMI, University of Toulouse, France* One week course divided in four units: - Reinforcement Learning *B. Scherrer/A. Lazaric (INRIA, France)* - Optimization methods for machine learning *P. Richtárik (Univ. Edinburgh, UK)* - Information Retrieval *M. Melucci (Univ. Padua, Italy)* - Dictionary Learning *J. Mairal (INRIA, France)* Two workshops on Optimization for Machine Learning and Sequential Learning.

May 2015	Course on numerical optimization and applications *XLIM, University of Limoges, France* Three short doctoral courses: - Bundle methods for nonsmooth optimization *D. Noll, (IMT, France)* - Complementarity problems and applications *M. Haddou (INSA Rennes, France)* - Nonsmooth, nonconvex optimization *M. Overton (Courant Institute, NY, USA)*
December 2014	Introduction to probabilistic constraints *Institute of Mathematics of Toulouse, France* Seminar and short course Lecturer: René Henrion (Weierstrass Institute, Germany)
June 2014	NATCOR Convex Optimization Course *The University of Edinburgh, Edinburgh, UK* PhD Student Course Main lecturers: J. Hall, J. Gondzio, P. Richtárik.
April 2014	Uncertainty Quantification : Theory and Applications to Algorithms, Computational Fluid Dynamics and Geosciences *CERFACS, Toulouse, France* CERFACS training course Lecturers: P. Sagaut, P. Congedo, V. Mallet.
July 2013	PDE-Constrained Optimization Sparse Optimization and Applications to Image Processing *Universidade Nova de Lisboa, Lisbon, Portugal* Summer schools of the conference ICCOPT 2013 Lecturers: S. Wright, M. Figueiredo, C. Meyer, M. Ulbrich.

9 Education

2013-2016	PhD in applied mathematics Topic: *Probabilistic properties and complexity analysis in derivative-free optimization* Supervisors: Serge Gratton (Univ. Toulouse) and Luis Nunes Vicente (Univ. Coimbra, Portugal) *Defended on November 4, 2016.* IRIT (Institute for Research in Computer Science of Toulouse) Toulouse, France
2012-2013	Master Degree in Computer Science *Minor: Distributed Systems and Critical Software* INPT (National Polytechnical Institute of Toulouse) Toulouse, France
2010-2013	Engineer Degree in Computer Science and Applied Mathematics *Department: Computer Science and Applied Mathematics (IMA)* *Minor: Scientific Computing* ENSEEIHT (National Engineering School of Electrotechnics, Electronics, Computer Science, Hydraulics and Telecommunications) Toulouse, France

10 Programming skills

Imperative programming	C, Fortran
Object-oriented programming	Java, C++, Python
Functional programming	CamL
Mathematical computations	Matlab, Julia, R, Maple

11 Languages

French	Mother tongue
English	Fluent *I lived and worked in the United States (Illinois+Wisconsin) for three years.*
Portuguese	Intermediate level, good written understanding *I spent three months in Coimbra (Portugal) for an internship.*
Spanish	Scholar, basics in understanding and communication