

CLÉMENT W. ROYER

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Associate professor in optimization and data science.

CURRENT POSITION

Université Paris Dauphine - PSL

Since September 1, 2019

Faculty - Maître de conférences

Paris, France

- Lecturer within the Mathematics and Computer Sciences (*MIDO*) department, mostly in artificial intelligence and data science tracks;
- Main courses: *Linear Algebra and Applications* (Bachelor), *Mathematics for Data Science* (Master, in English), *Optimization for Machine Learning* (Master, in English).

LAMSADE Institute

Since September 1, 2019

Member - Permanent

Paris, France

- At the interface of the *Combinatorial optimization, algorithms* and *Data sciences* axes;
- Current research group: *Annette Dumas* (postdoc); *Bastien Cavarretta* (PhD student); *Sébastien Kerleau* (PhD student); *Iskander Sabri Legheraba* (PhD student).

EDUCATION & PREVIOUS POSITIONS

University of Wisconsin-Madison

November 2016-August 2019

Postdoctoral research associate

Madison, WI, USA

- In the group of Stephen J. Wright, part of the *Data Science Hub*.

PhD in applied mathematics

2013-2016

Obtained November 4, 2016

UPS, University of Toulouse, France

- Parallel Algorithms and Optimization team, IRIT (Institute for Research in Computer Science of Toulouse).
- Co-advised by Serge Gratton (Univ. Toulouse) and Luís Nunes Vicente (Univ. Coimbra, Portugal).

SKILLS

Main programming experience

Matlab, C++, Python, C.

Additional programming skills

Fortran, Julia, Java, CamL.

Languages

French (native), English (fluent),
Portuguese (intermediate), Spanish (scholar)

SELECTED PUBLICATIONS

Recent submissions

- **A characterization of positive spanning sets with ties to strongly connected digraphs**, D. Cornaz, S. Kerleau and C. W. Royer. Technical report arXiv:2411.08994, November 2024.

Publications in refereed journals

Except in one case identified below, authors are always listed by alphabetical order.

- **Riemannian trust-region methods for strict saddle functions with complexity guarantees**, F. Goyens and C. W. Royer. Accepted in *Mathematical Programming*, 2024.
- **Expected decrease for derivative-free algorithms using random subspaces**, W. Hare, L. Roberts and C. W. Royer. *Mathematics of Computation*, 94:277-304, 2025.
- **Complexity analysis of regularization methods for implicitly constrained least squares**, A. Onwunta and C. W. Royer. *Journal of Scientific Computing*, 101:54, 2024.
- **Full-low evaluation methods for bound and linearly constrained derivative-free optimization**, C. W. Royer, O. Sohab and L. N. Vicente. *Computational Optimization and Applications*, 89:279-315, 2024.
- **Using orthogonally structured positive bases for constructing positive k -spanning sets with cosine measure guarantees**, W. Hare, G. Jarry-Bolduc, S. Kerleau and C. W. Royer. *Linear Algebra and Applications*, 680:183-207, 2024.
- **Direct search based on probabilistic descent in reduced spaces**, L. Roberts and C. W. Royer. *SIAM Journal on Optimization*, 33(4):3057-3082, 2023.
- **A nonlinear conjugate gradient method with complexity guarantees and its application to nonconvex regression**, R. Chan--Renous-Legoubin and C. W. Royer. *EURO Journal on Computational Optimization*, 10:100044, 2022.
- **A stochastic Levenberg-Marquardt method using random models with complexity results**, E. Bergou, Y. Diouane, V. Kungurtsev and C. W. Royer, *SIAM/ASA Journal on Uncertainty Quantification*, 10(1):507-536, 2022.
- **Trust-region Newton-CG with strong second-order complexity guarantees for nonconvex optimization**, F. E. Curtis, D. P. Robinson, C. W. Royer, and S. J. Wright, *SIAM Journal on Optimization*, 31(1):518-544, 2021.
- **A Newton-CG algorithm with complexity guarantees for smooth unconstrained optimization**. C. W. Royer, M. O'Neill and S. J. Wright. *Mathematical Programming*, 180:451-488, 2020.
- **Direct search based on probabilistic feasible descent for bound and linearly constrained problems**. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang. *Computational Optimization and Applications*, 72(3):525-559, 2019 (COAP Best Paper prize in 2019).
- **Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization**. C. W. Royer and S. J. Wright. *SIAM Journal on Optimization*, 28(2):1448-1477, 2018.

RESEARCH RESPONSIBILITIES

Main research projects

- *Adaptive, Local and Innovative Algorithms for Stochastic Optimization*. Thomas Jefferson Fund, FACE Foundation, 2022-2024. Co-PI with Dr. Albert Berahas (University of Michigan, MI, USA).
- *Optimization for high-performance artificial intelligence*. PRAIRIE Springboard chair, 2021-2024.

Editorial service

- Associate editor for the *Journal of Optimization Theory and Applications* (2022-).
- *Meritorious Service Award* in 2022 for reviewing in the journal *Mathematical Programming*.