CLÉMENT W. ROYER

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Associate professor in optimization and data science.

CURRENT POSITION

Université Paris Dauphine - PSL Faculty - Maître de conférences

- · 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

Member - Permanent

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

EDUCATION & PREVIOUS POSITIONS

University of Wisconsin-Madison Postdoctoral research associate

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

PhD in applied mathematics

Obtained November 4, 2016

- · 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 Additional programming skills Languages

Matlab, Python, C, C++. Fortran, Julia, Java, CamL. French (native), English (fluent), Portuguese (intermediate), Spanish (scholar)

November 2016-August 2019 Madison, WI, USA

UPS, University of Toulouse, France

Since September 1, 2019

Paris, France

2013-2016

Since September 1, 2019 Paris, France

SELECTED PUBLICATIONS

Publications in refereed journals

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

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

- Blackbox Optimization with a Novel Use of Subspaces, International Emerging Actions, CNRS, 2024-2026. Co-PI with Dr. Lindon Roberts (University of Sydney, Australia).
- · Optimization for high-performance artificial intelligence. PRAIRIE Springboard chair, 2021-2026.

Editorial service

- · Associate editor for the Journal of Optimization Theory and Applications (2022-).
- · Meritorious Service Award in 2022 and 2024 for reviewing in the journal Mathematical Programming.