

# Jeffrey Larson

Argonne National Laboratory  
Mathematics and Computer Science Division  
9700 S. Cass Ave., Lemont, IL 60439

Phone: (630) 252-3221  
Email: [jmlarson@anl.gov](mailto:jmlarson@anl.gov)  
Homepage: [jmlarson1.github.io/](https://jmlarson1.github.io/)

## Education

2012	Ph.D. Applied Mathematics, University of Colorado Denver Thesis: Derivative-Free Optimization of Noisy Functions Advisor: Stephen C. Billups
2008	M.S. Applied Mathematics, University of Colorado Denver
2005	B.A. Mathematics (with honors), Carroll College, Helena, MT

## Research Experience

2020–Present	Computational Mathematician - Argonne National Laboratory
2016–2020	Assistant Computational Mathematician Developing algorithms, software, theory, and models for optimizing DOE-relevant applications including quantum computing, particle accelerator design, high-performance computing, concentrated solar power, and vehicle routing.
2014–2016	Postdoctoral Appointee - Argonne National Laboratory Developed parallel, multistart numerical optimization algorithms for high-performance computers. Responsibilities included supervising students and assisting in grant writing.
2012–2014	Postdoctoral Researcher - KTH Royal Institute of Technology, Sweden Responsibilities included scientific research, teaching graduate courses, advising graduate and undergraduate students, and assisting in grant writing.
Spring 2011	Research Assistant - Argonne National Laboratory Researched termination of algorithms for optimizing noisy, computationally expensive functions. Produced solver-independent, nonintrusive tests for determining when to stop an algorithm.
2008	Research Assistant - Radiation Oncology, CU Anschutz Medical Campus Designed and solved a mathematical model to determine the optimal wall composition to sufficiently shield radiation therapists.

## Awards

UChicago Argonne Board of Governors Awards for Excellence in Diversity and Inclusion, 2021  
Best Student Paper at the IEEE High Performance Extreme Computing Conference for “Multistart Methods for Quantum Approximate Optimization,” September 2019  
Pacesetter Award for Service as Co-Chair of Argonne’s ACT-SO High School Research Program, August 2017  
Best Poster at the National Postdoctoral Association Annual Meeting for “Postdocs as Leaders and Mentors at the Diversity and Inclusion and STEM Education Nexus,” March 2017  
CU Denver College of Liberal Arts and Sciences Outstanding Ph.D. Student, Fall 2012  
Lynn Bateman Memorial Fellowship, AY 2010–2011 (declined) and AY 2011–2012  
CU Denver College of Liberal Arts and Sciences Outstanding Master’s Student, Fall 2008  
NSF GK-12 Mathematics Fellowship, 2009–2010  
NSF GK-12 Science Fellowship, 2008–2009

## Research and Outreach Coverage

[DOE Awards Argonne \\$4.15M for Research in Quantum Computing and Networking](#). Argonne Press Release. September 19, 2019

[Entanglements](#). Argonne Mathematics and Computer Science Division Science Highlights. May 30, 2017

[Optimizing a Function When Noise is Present](#). Argonne Mathematics and Computer Science Division Science Highlights. March 9, 2016

[Coordinating the Platooning of Heavy-Duty Vehicles](#). Argonne Mathematics and Computer Science Division Science Highlights. January 9, 2015

[Math on My Mind Equates to More Learning in Denver Area Schools](#). Pinnacle - University of Colorado Denver Alumni Magazine. May 8, 2012

[Water Balloon Experiment](#). Denver 9NEWS. May 8, 2009

[Science and Math](#). Denver 9NEWS. October 20, 2008

## Publications

### Refereed Journal Articles and Book Chapters

C. Kirches, J. Larson, S. Leyffer, and P. Manns. Sequential linearization method for bound-constrained mathematical programs with complementarity constraints. To appear in: *SIAM Journal on Optimization*, 2021. <https://arxiv.org/abs/2009.14047>

J. Larson, M. Menickelly, and B. Zhou. Manifold sampling for optimizing nonsmooth nonconvex compositions. *SIAM Journal on Optimization* 31(4), 2021, pp. 2638–2664. [10.1137/20M1378089](https://doi.org/10.1137/20M1378089)

S. Hudson, J. Larson, J.-L. Navarro, and S. M. Wild. libEnsemble: A library to coordinate the concurrent evaluation of dynamic ensembles of calculations. *IEEE Transactions on Parallel and Distributed Systems* 33(4), 2022, pp. 977–988. [10.1109/TPDS.2021.3082815](https://doi.org/10.1109/TPDS.2021.3082815)

F. Luo and J. Larson. A repeated route-then-schedule approach to coordinated vehicle platooning: Algorithms, valid inequalities and computation. To appear in: *Operations Research*, 2021. [10.1287/opre.2021.2126](https://doi.org/10.1287/opre.2021.2126)

J. Larson, S. Leyffer, P. Palkar, and S. M. Wild. A method for convex black-box integer global optimization. *Journal of Global Optimization* 80(2), 2021, pp. 439–477. [10.1007/s10898-020-00978-w](https://doi.org/10.1007/s10898-020-00978-w)

R. Shepard, S. R. Brozell, J. Larson, P. Hovland, and S. Leyffer. Wave function analysis with a maximum flow algorithm. *Molecular Physics* 119(13), 2021, e1861351. [10.1080/00268976.2020.1861351](https://doi.org/10.1080/00268976.2020.1861351)

T. Cokyasar and J. Larson. Optimal assignment for the single-household shared autonomous vehicle problem. *Transportation Research Part B: Methodological* 141, 2020, pp. 98–115. [10.1016/j.trb.2020.09.003](https://doi.org/10.1016/j.trb.2020.09.003)

J. Larson, M. Menickelly, and S. M. Wild. Derivative-free optimization methods. *Acta Numerica* 28, 2019, pp. 287–404. [10.1017/s0962492919000060](https://doi.org/10.1017/s0962492919000060)

K. A. Khan, J. Larson, and S. M. Wild. Manifold sampling for optimization of nonconvex functions that are piecewise linear compositions of smooth components. *SIAM Journal on Optimization* 28(4), 2018, pp. 3001–3024. [10.1137/17m114741x](https://doi.org/10.1137/17m114741x)

J. Larson and S. M. Wild. Asynchronously parallel optimization solver for finding multiple minima. *Mathematical Programming Computation* 10(3), 2018, pp. 303–332. [10.1007/s12532-017-0131-4](https://doi.org/10.1007/s12532-017-0131-4)

F. Luo, J. Larson, and T. Munson. Coordinated platooning with multiple speeds. *Transportation Research Part C: Emerging Technologies* 90, 2018, pp. 213–225. [10.1016/j.trc.2018.02.011](https://doi.org/10.1016/j.trc.2018.02.011)

V. Sokolov, J. Larson, T. Munson, J. Auld, and D. Karbowski. Maximization of platoon formation through centralized routing and departure time coordination. *Transportation Research Record: Journal of the Transportation Research Board* 2667(1), 2017, pp. 10–16. [10.3141/2667-02](https://doi.org/10.3141/2667-02)

M. Carlsson, M. Johansson, and J. Larson. Scheduling double round-robin tournaments with divisional play using constraint programming. *European Journal of Operational Research* 259(3), 2017, pp. 1180–1190. [10.1016/j.ejor.2016.11.033](https://doi.org/10.1016/j.ejor.2016.11.033)

- J. Larson, M. Menickelly, and S. M. Wild. Manifold sampling for  $\ell_1$  nonconvex optimization. *SIAM Journal on Optimization* 26(4), 2016, pp. 2540–2563. [10.1137/15M1042097](https://doi.org/10.1137/15M1042097)
- M. Otten, J. Larson, M. Min, S. M. Wild, M. Pelton, and S. K. Gray. Origins and optimization of entanglement in plasmonically coupled quantum dots. *Physical Review A* 94(2), 2016, p. 022312. [10.1103/PhysRevA.94.022312](https://doi.org/10.1103/PhysRevA.94.022312)
- J. Larson and S. C. Billups. Stochastic derivative-free optimization using a trust region framework. *Computational Optimization and Applications* 64(3), 2016, pp. 619–645. [10.1007/s10589-016-9827-z](https://doi.org/10.1007/s10589-016-9827-z)
- J. Larson and S. M. Wild. A batch, derivative-free algorithm for finding multiple local minima. *Optimization and Engineering* 17(1), 2016, pp. 205–228. [10.1007/s11081-015-9289-7](https://doi.org/10.1007/s11081-015-9289-7)
- E. Larsson, G. Sennton, and J. Larson. The vehicle platooning problem: Computational complexity and heuristics. *Transportation Research Part C* 60, 2015, pp. 258–277. [10.1016/j.trc.2015.08.019](https://doi.org/10.1016/j.trc.2015.08.019)
- J. Larson, K.-Y. Liang, and K. H. Johansson. A distributed framework for coordinated heavy-duty vehicle platooning. *IEEE Transactions on Intelligent Transportation Systems* 16(1), 2015, pp. 419–429. [10.1109/TITS.2014.2320133](https://doi.org/10.1109/TITS.2014.2320133)
- J. Larson, M. Johansson, and M. Carlsson. An integrated constraint programming approach to scheduling sports leagues with divisional and round-robin tournaments. H. Simonis (Ed.), *Integration of AI and OR Techniques in Constraint Programming*. Vol. 8451. Lecture Notes in Computer Science. Springer International Publishing, 2014, pp. 144–158. [10.1007/978-3-319-07046-9\\_11](https://doi.org/10.1007/978-3-319-07046-9_11)
- J. Larson and M. Johansson. Constructing schedules for sports leagues with divisional and round-robin tournaments. *Journal of Quantitative Analysis in Sports* 10(2), 2014, pp. 119–129. [10.1515/jqas-2013-0090](https://doi.org/10.1515/jqas-2013-0090)
- S. C. Billups, J. Larson, and P. Graf. Derivative-free optimization of expensive functions with computational error using weighted regression. *SIAM Journal on Optimization* 23(1), 2013, pp. 27–53. [10.1137/100814688](https://doi.org/10.1137/100814688)
- J. Larson and S. M. Wild. Non-intrusive termination of noisy optimization. *Optimization Methods and Software* 28(5), 2013, pp. 993–1011. [10.1080/10556788.2012.656116](https://doi.org/10.1080/10556788.2012.656116)
- J. Larson and F. Newman. An implementation of scatter search to train neural networks for brain lesion recognition. *Involve, a Journal of Mathematics* 4(3), 2011, pp. 203–211. [10.2140/involve.2011.4.203](https://doi.org/10.2140/involve.2011.4.203)

## Refereed Proceedings

- W. Tang, T. Tomesh, M. Suchara, J. Larson, and M. Martonosi. CutQC: Using small quantum computers for large quantum circuit evaluations. *Proceedings of the ACM International Conference on Architectural Support for Programming Languages and Operating Systems*. 2021, pp. 473–486. [10.1145/3445814.3446758](https://doi.org/10.1145/3445814.3446758)
- T. H. Chang, J. Larson, and L. T. Watson. Multiobjective optimization of the variability of the high-performance LINPACK solver. *Proceedings of the Winter Simulation Conference*. 2020, pp. 3081–3092. [10.1109/wsc48552.2020.9383875](https://doi.org/10.1109/wsc48552.2020.9383875)
- T. H. Chang, J. Larson, L. T. Watson, and T. C. H. Lux. Managing computationally expensive blackbox multiobjective optimization problems with libEnsemble. *Proceedings of the Spring Simulation Conference*. 2020. [10.22360/springsim.2020.hpc.001](https://doi.org/10.22360/springsim.2020.hpc.001)
- R. Shaydulin, I. Safro, and J. Larson. Multistart methods for quantum approximate optimization. *Proceedings of the IEEE High Performance Extreme Computing Conference*. **Best Student Paper**. 2019. [10.1109/hpec.2019.8916288](https://doi.org/10.1109/hpec.2019.8916288)
- M. Javanmardi, E. S. Islam, J. Auld, and J. Larson. A case study analysis of energy consumption potential of coordinated platooning in urban networks. *Proceedings of the Transportation Research Record Annual Meeting*, 2019. <https://anl.app.box.com/s/vtxnuqhgfzblcqj2jmq7u879negxi8>
- N. Neveu, J. Larson, J. G. Power, and L. Spentzouris. Photoinjector optimization using a derivative-free, model-based trust-region algorithm for the Argonne Wakefield Accelerator. *Journal of Physics: Conference Series* 874, 2017, p. 012062. [10.1088/1742-6596/874/1/012062](https://doi.org/10.1088/1742-6596/874/1/012062)
- J. Larson, T. Munson, and V. Sokolov. Coordinated platoon routing in a metropolitan network. A. H. Gebremedhin, E. G. Boman, and B. Ucar (Eds.), *Proceedings of the SIAM Workshop on Combinatorial Scientific Computing*. 2016, pp. 73–82. [10.1137/1.9781611974690.ch8](https://doi.org/10.1137/1.9781611974690.ch8)

J. Larson, C. Kammer, K.-Y. Liang, and K. H. Johansson. Coordinated route optimization for heavy-duty vehicle platoons. A. Hegyi and B. D. Schutter (Eds.), *Proceedings of the 16th International IEEE Conference on Intelligent Transportation Systems*. 2014, pp. 1196–1202. [10.1109/ITSC.2013.6728395](https://doi.org/10.1109/ITSC.2013.6728395)

J. Larson and M. Johansson. Scheduling a sports league with divisional and round-robin play. D. Goossens, F. Spieksma, and P. Scarf (Eds.), *Proceedings of the 4th International Conference on Mathematics in Sport*. KULeuven, Faculty of Business and Economics, 2013, pp. 180–192. <http://www.mathsportinternational.com/MathSport2013Proceedings.pdf>

## White Papers and Reports

S. A. Renganathan, J. Larson, and S. M. Wild. Recursive two-step lookahead expected payoff for time-dependent Bayesian optimization. 2020. <https://arxiv.org/abs/2006.08037>

Y. Alexeev, J. Larson, S. Leyffer, and R. Shaydulin. Solving combinatorial optimization problems on quantum computers. *SIAM News* July/August, 2020. <https://sinews.siam.org/Details-Page/solving-combinatorial-optimization-problems-on-quantum-computers>

W. Di, J. Larson, S. Leyffer, and S. M. Wild. AI for an integrated and accelerated scientific method. *Argonne 2050*, 2020

N. Neveu, S. Hudson, J. Larson, and L. Spentzouris. Comparison of model-based and heuristic optimization algorithms applied to photoinjectors using libEnsemble. *Proceedings of the 13th International Computational Accelerator Physics Conference*. 2019, pp. 22–24. [10.18429/JACoW-ICAP2018-SAPAF03](https://doi.org/10.18429/JACoW-ICAP2018-SAPAF03)

M. Suchara, Y. Alexeev, F. Chong, H. Finkel, H. Hoffmann, J. Larson, J. Osborn, and G. Smith. Hybrid quantum-classical computing architectures. *3rd International Workshop on Post Moore’s Era Supercomputing*, 2018. <http://www.mcs.anl.gov/~jlarson/reports/post-moore-workshop.pdf>

P. Balaprakash, J. Larson, and S. Leyffer. Optimization models and paradigms for machine learning. *SciML: ASCR Scientific Machine Learning Workshop*, 2018

P. Balaprakash, J. Larson, and S. Leyffer. Exploration vs. exploitation: Mathematical performance guarantees. *SciML: ASCR Scientific Machine Learning Workshop*, 2018

P. Balaprakash, J. Larson, V. Vishwanath, and S. M. Wild. Derivative-free mixed-integer optimization for automated predictive modeling using machine learning. *SciML: ASCR Scientific Machine Learning Workshop*, 2018

N. Neveu, J. Larson, J. Power, and L. Spentzouris. Photoinjector optimization studies at the AWA. *Proceedings of the 9th International Particle Accelerator Conference*. 2018, pp. 4169–4171. [10.18429/JACoW-IPAC2018-THPMF049](https://doi.org/10.18429/JACoW-IPAC2018-THPMF049)

A. Buluç, W. de Jong, L. Lin, J. Larson, and S. M. Wild. The role of applied mathematics in quantum computing: Old can be new again? *ASCR Applied Math Meeting White Paper*, 2017. [10.6084/m9.figshare.5324869.v1](https://doi.org/10.6084/m9.figshare.5324869.v1)

J. Larson and S. M. Wild. Optimizing stochastic simulations. *ASCR Applied Math Meeting White Paper*, 2017. [10.6084/m9.figshare.5328718](https://doi.org/10.6084/m9.figshare.5328718)

J. Larson, M. S. Jacobson, K. M. Den Ouden, and C. G. Basile. To infinity...and beyond. *Mathematics Teaching in the Middle School* 17(6), 2012, pp. 346–351. [10.5951/mathteacmidscho.17.6.0346](https://doi.org/10.5951/mathteacmidscho.17.6.0346)

## Submissions (full text available)

P. Jaiswal and J. Larson. Multistart algorithm for identifying all optima of nonconvex stochastic functions. *Under review*, 2021. <https://arxiv.org/abs/2108.13504>

J. S. Eldred, J. Larson, M. Padidar, E. Stern, and S. M. Wild. Derivative-free optimization of a rapid-cycling synchrotron. *Under review*, 2021. <https://arxiv.org/abs/2108.04774>

T. Cokyasar, J. Larson, and M. Stinson. Solving massive-scale service-time-constrained capacitated vehicle routing problems. *Under review*, 2021

E. Smith, M. G. Davis, J. Larson, E. Younis, W. Lavrijsen, and C. Iancu. LEAP: Scaling numerical optimization based synthesis using an incremental approach. *Under review*, 2021. <https://arxiv.org/abs/2106.11246>

A. Renganathan, J. Larson, and S. M. Wild. Lookahead acquisition functions for finite-horizon time-dependent Bayesian optimization and application to quantum optimal control. *Under review*, 2021. <https://arxiv.org/abs/2105.09824>

T. H. Chang, L. T. Watson, J. Larson, N. Neveu, W. I. Thacker, S. Deshpande, and T. C. H. Lux. Algorithm XXXX: VTMOPT: Solver for blackbox multiobjective optimization problems. *Under review*, 2021

## Public Software

S. Hudson, J. Larson, S. M. Wild, D. Bindel, and J.-L. Navarro. *libEnsemble Users Manual*. Tech. rep. Revision 0.7.2. Argonne National Laboratory, 2021. <https://buildmedia.readthedocs.org/media/pdf/libensemble/latest/libensemble.pdf>

W. Lavrijsen, A. Tudor, J. Larson, K. J. Sung, L. Linder, J. Mueller, J. R. McClean, R. Babbush, M. Urbanek, C. Iancu, and W. A. de Jong. SKQuant-Opt: Optimizers for noisy intermediate-scale quantum devices, 2019. <http://scikit-quant.org>

J. Martinek, M. Wagner, A. Zolan, M. Boyd, A. Newman, D. Morton, S. Leyffer, and J. Larson. Design, analysis, and operations toolkit (DAO-Tk), 2019. [10.11578/dc.20190513.3](https://doi.org/10.11578/dc.20190513.3)

## Funded Proposals

### External Funding

*Autonomous Optimization of the Secondary Beam Production and Delivery at the ATLAS In-Flight Facility*

PI: Hoffman (ANL)      Role: MCS Lead

Data Analytics for Autonomous Optimization and Control of Accelerators and Detectors (DE-FOA-0002490)

Awarded: \$750k (2022–2023)

*Q-NEXT: Next Generation Quantum Science and Engineering*

PI: Awschalom (ANL)      Role: Senior personnel

National Quantum Information Science Research Centers (DE-FOA-0002253)

Participants: ANL, SLAC, PNNL, Caltech, Cornell, Northwestern, Penn State, Stanford, UCSB, UChicago, UIUC, UMN, UW-M Amazon, Applied Materials, Boeing, HRL Laboratories, IBM, Intel, Microsoft, Quantum Opus

Awarded: \$115M, \$7M to CELS (2021–2025)

*Frameworks, Algorithms and Scalable Technologies for Mathematics (FASTMath) SciDAC Institute*

PI: Ng (LBNL)      ANL Lead: Munson      Role: Senior personnel

Scientific Discovery Through Advanced Computing (SciDAC) Institutes (LAB 20-2223)

Partners: ANL, LBNL, LLNL, ORNL, SNL, MPI, RPI, SMU, UC-Boulder, USC

Awarded: \$28.75M, \$4.055M to ANL (2021–2025)

*Fundamental Algorithmic Research for Quantum Computing (FAR-QC)*

PI: Parekh (SNL)      Role: ANL Lead

ASCR Accelerated Research in Quantum Computing (LAB 19-2081)

Partners: SNL, ORNL, LBNL, LANL, ANL, UMD, Caltech, Dartmouth, USC, UNM, Microsoft, CWI, UPB

Awarded: \$19.5M, \$1.3M to ANL (2019–2024)

*Community Project for Accelerator Science and Simulation 4 (ComPASS4)*

PI: Amundson (FNAL)      ANL Lead: Wild      Role: Senior personnel

HEP/ASCR SciDAC (LAB 17-1697)

Partners: FNAL, LBNL, UCLA, ANL

Awarded: \$8M, \$2M to ANL (2017–2022)

*Quantum Algorithms, Mathematics and Compilation Tools for Chemical Sciences*

PI: de Jong (LBNL)      ANL Lead: Wild      Role: Senior personnel

ASCR Quantum Algorithm Teams (LAB 17-1758)

Partners: LBNL, Harvard, UC-Berkeley, ANL

Awarded: \$4.5M, \$625K to ANL (2017–2020)



*Systems and Modeling for Accelerated Research in Transportation (SMART) Mobility Laboratory Consortium*  
ANL Lead: Rousseau (ES)      Role: Senior personnel  
VTO Energy Efficient Mobility Systems Program  
Partners: ANL, INL, ORNL, NREL, LBNL  
Awarded: \$15M, \$6M to ANL (2016–2019)

*Preparing PETSc/TAO for Exascale*  
PI: Smith (ANL)      Role: Senior personnel  
ECP Software Technologies  
Partners: ANL, UC-Boulder, U. Buffalo, TU Wien  
Awarded: \$5.6M to ANL (2016–2019)

*COMPANION: Cooperative Dynamic Formation of Platoons for Safe and Energy-optimized Goods Transportation*  
PI: Sandberg (Scania)      KTH Lead: Johansson      Role: Co-PI  
European Commission Seventh Framework Programme: ICT.2013.6.5 Co-operative mobility  
Partners: Scania CV AB, Volkswagen, KTH, OFFIS E.V, IDIADA, S&T AS, Transportes Cerezuela  
Awarded: €3M (2013–2016)

## Research Presentations

### Invited Conference, Workshop, and Symposium Presentations

- Composite Nonsmooth Optimization. [SIAM Conference on Optimization](#). Virtual. July 23, 2021
- Optimization for Quantum Information Science Problems. [SIAM Conference on Computational Science and Engineering](#). Virtual. March 3, 2021
- libEnsemble: A Python Library to Coordinate the Concurrent Evaluation of Dynamic Ensembles of Calculations. [SIAM Annual Meeting](#). Virtual. July 14, 2020
- Manifold Sampling for Composite Nonconvex Nonsmooth Optimization. [International Conference on Continuous Optimization](#). Berlin, Germany. August 5, 2019
- A Method for Convex Black-Box Integer Global Optimization. [International Congress on Industrial and Applied Mathematics](#). Valencia, Spain. July 15, 2019
- Derivative-Free Optimization of Composite Functions. [CORS Annual Meeting](#). Saskatchewan, Canada. May 29, 2019
- libEnsemble: A Library for Managing Ensembles of Calculations. [SIAM Annual Meeting](#). Portland, OR. July 13, 2018
- Manifold Sampling for Nonconvex Optimization of Piecewise Linear Compositions. [International Symposium on Mathematical Programming](#). Bordeaux, France. July 4, 2018
- A Globally Convergent Cutting-Plane Method for Simulation-Based Optimization with Integer Constraints. [Copper Mountain Conference On Iterative Methods](#). Copper Mountain, CO. March 26, 2018
- Nonsmooth Optimization via Manifold Sampling. [INFORMS Optimization Society Conference](#). Denver, CO. March 23, 2018
- Manifold Sampling for Piecewise Linear Nonconvex Optimization. [SIAM Conference on Optimization](#). Vancouver, Canada. May 24, 2017
- Minimizing Collective Fuel Use by the Centralized Coordination of Vehicle Platoons. [IMA Smart Urban Transportation Forum](#). Minneapolis, MN. May 15, 2017
- Optimizing the Design of Concentrated Solar Power Plants. [SIAM Conference on Computational Science and Engineering](#). Atlanta, GA. March 2, 2017
- Coordinated Platoon Routing in a Metropolitan Network. [SIAM Workshop on Combinatorial Scientific Computing](#). Albuquerque, NM. October 10, 2016
- Asynchronously Parallel Optimization Solver for Finding Multiple Minima. [International Conference on Continuous Optimization](#). Tokyo, Japan. August 10, 2016

Manifold Sampling for Nonconvex Piecewise Continuously Differentiable Functions. [SIAM Annual Meeting](#). Boston, MA. July 12, 2016

Using Concurrent Function Evaluations to Identify Local Minima of a Derivative-Free Optimization Problem. [International Congress on Industrial and Applied Mathematics](#). Beijing, China. August 12, 2015

A Model-Based Trust Region Method for Stochastic Derivative-Free Optimization. [I-Sim Workshop: At the Interface of Simulation and Optimization](#). Purdue University. July 26, 2015

Locating All Minima of a Smooth Function without Access to Its Derivatives. [International Symposium on Mathematical Programming](#). Pittsburgh, PA. July 16, 2015

Finding Multiple Optima of Particle Accelerator Simulations. [CORS/INFORMS International Conference](#). Montreal, Canada. June 14, 2015

Multi-Start, Model-Based Derivative-Free Optimization. [4th International Conference on Engineering Optimization](#). Lisbon, Portugal. September 10, 2014

Coordinated Route Optimization for Heavy-Duty Vehicle Platoons. [16th International IEEE Annual Conference on Intelligent Transportation Systems](#). The Hague, Netherlands. October 8, 2013

Stochastic Derivative-Free Optimization Using a Trust Region Framework. [International Conference on Continuous Optimization](#). Lisbon, Portugal. July 29, 2013

Non-Intrusive Termination of Noisy Derivative-Free Optimization. [INFORMS Annual Meeting](#). Charlotte, NC. November 15, 2011

Exploiting Uncertainty Quantification in Derivative-Free Optimization. [SIAM Conference on Computational Science and Engineering](#). Reno, NV. March 1, 2011

## Seminars and Colloquia

Numerical Optimization Algorithms and Models for Problems in Quantum Information Science. [Northwestern Industrial Engineering and Management Sciences Seminar](#). Virtual. April 6, 2021

A Collection of Optimization Problems Arising in Quantum Information Sciences. [Purdue Industrial Mathematics and Statistics Seminar](#). Virtual. February 17, 2021

Optimization for Quantum Information Science Problems. [FAR-QC Optimization Seminar](#). Virtual. September 30, 2020

Exploiting Problem-Specific Knowledge and Computational Resources in Derivative-Free Optimization. [CO-CANA Seminar Series](#). University of British Columbia - Okanagan. February 21, 2019

Numerical Optimization of Computationally Expensive Functions at Argonne National Laboratory. [Center for Interdisciplinary Scientific Computation Seminar](#). Illinois Institute of Technology. October 29, 2018

Finding High-Quality Local Minima in Derivative-Free Optimization. [Industrial and Systems Engineering Seminar](#). Lehigh University. October 20, 2015

Exploiting Problem-Specific Knowledge and Computational Resources in Derivative-Free Optimization. [Data Science Seminar](#). Illinois Institute of Technology. September 8, 2015

Designing Particle Accelerators Using Derivative-Free Optimization. [Mathematics and Statistics Seminar](#). Wake Forest University. February 6, 2015

Heavy-Duty Vehicle Platooning and Scheduling Swedish Handball. [Operations Research Seminar](#). North Carolina State University. February 18, 2014

Towards Distributed Multi-agent Optimization in a Stochastic Derivative-Free Setting. [Operations Research Seminar](#). North Carolina State University. February 17, 2014

Optimal Tiled QR Factorization. [NetCon Workshop](#). Stockholm, Sweden. January 9, 2014

Constructing Schedules for Sports Leagues with Divisional and Round-Robin Tournament Play. [Swedish Institute of Computer Science Seminar](#). Stockholm, Sweden. October 29, 2013

Optimization of Heavy-Duty Vehicle Routes to Facilitate Platooning. [KTH NetCon Seminar](#). Stockholm, Sweden. May 27, 2013

Noisy Derivative-Free Optimization. [KTH Optimization and Systems Theory Seminar](#). Stockholm, Sweden. September 28, 2012

Derivative-Free Optimization Using a Trust Region Framework. [Institute of Computational Mathematics and Scientific/Engineering Computing](#). Chinese Academy of Sciences. Beijing, China. September 28, 2010

The Integer Linear Complementarity Problem. [East China University of Science and Technology Mathematics Seminar](#). Shanghai, China. June 14, 2009

## Posters and Other Presentations

Optimization for Quantum Systems (Poster). [Chicago Quantum Exchange Member and Partner Workshop](#). University of Chicago. October 24, 2019

Optimization for Quantum Systems. [Computational Research Leadership Council](#). Argonne, IL. September 5, 2019

libEnsemble: A Library for the Concurrent Evaluation of Ensembles of Computations (Poster). [Exascale Computing Project Annual Meeting](#). Houston, TX. January 16, 2019

Coordinated Vehicle Platooning with Multiple Speeds. [LDRD Series](#). Argonne National Laboratory. November 13, 2018

Stochastic Optimization for Optimal Design and Operation of Quantum Devices, Algorithms, and Simulations. [Materials and Chemistry Initiative Quantum Information Town Hall](#). Argonne National Laboratory. November 20, 2017

Derivative-Free Optimization. [Guest Lecture in Optimization and Simulation Methods for Analytics, Time Series Analysis, and Forecasting](#). University of Chicago Graham School. March 9, 2016

Asynchronously Parallel Optimization Solver for Finding Multiple Minima (Poster). [Workshop on Nonlinear Optimization Algorithms and Industrial Applications](#). Fields Institute for Research in Mathematics, Toronto, Canada. June 2, 2016

Finding Multiple Local Minima for Computationally Expensive Simulations (Poster). [ACNW Optimization Workshop](#). Northwestern University. June 8, 2015

Global Derivative-Free Optimization. [Chicago-area SIAM Student Chapters Meeting](#). Argonne National Laboratory. April 10, 2015

Derivative-Free Multi-Agent Optimization. [SIAM Conference on Optimization](#). San Diego, CA. May 19, 2014

Large-Scale Coordinated Platooning of Heavy-Duty Vehicles. [Joint Mathematics Meetings](#). Baltimore, MD. January 17, 2014

Optimization of Pool and Tournament Play in the Top Swedish Handball League (Poster). [ICT Platform Day](#). Stockholm, Sweden. September 10, 2013

Optimization of Pool and Tournament Play in the Top Swedish Handball League (Poster). [SIAM Annual Meeting](#). San Diego, CA. July 9, 2013

Scheduling a Sports League with Divisional and Round-Robin Play. [4th International Conference on Mathematics in Sport](#). KU Leuven, Belgium. June 5, 2013

Sport League Scheduling. [KTH Internal Seminar](#). Stockholm, Sweden. January 7, 2013

Derivative-Free Optimization Applications. [KTH Automatic Control Lab Research Day](#). Stockholm, Sweden. September 18, 2012

Increasing Hydrogen Production in *Chlamydomonas reinhardtii* Using Derivative-Free Optimization (Poster). [ACCESS Ph.D. and Post-Doc Workshop](#). Stockholm, Sweden. September 6, 2012

Derivative-Free Techniques for Minimizing Stochastic Functions. [Front Range SIAM Student Conference](#). University of Colorado Denver. March 3, 2012



Non-intrusive Termination of Noisy Optimization. *CU Denver Optimization Seminar*. University of Colorado Denver. November 8, 2011

Optimal Scheduling of Tiled QR Factorization. *CU Denver Optimization Seminar*. University of Colorado Denver. October 4, 2011

Increasing Hydrogen Production in *Chlamydomonas reinhardtii* Using Derivative-Free Optimization (Poster). *Research and Creative Activities Symposium*. University of Colorado Denver. April 30, 2010

Derivative-Free Optimization Using a Trust Region Framework. *Front Range SIAM Student Conference*. University of Colorado Denver. March 6, 2010

Applications and Algorithms for Derivative-Free Optimization. *MAA Rocky Mountain Section Meeting*. Colorado State University. April 17, 2010

Sparse Principal Component Analysis. *Student Research Conference*. University of Colorado Denver. November 16, 2009

An Implementation of Scatter Search to Classify Medical Images. *MAA Rocky Mountain Section Meeting*. Colorado School of Mines. April 17, 2009

An Implementation of Scatter Search to Classify Medical Images. *Front Range SIAM Student Conference*. University of Colorado Denver. March 14, 2009

## Advisory Responsibilities

Ashwin Renganathan. ANL/MCS Postdoctoral Appointee. 2019–2021  
Algorithms for optimizing time-varying stochastic functions

Grant Getzelman. ANL/MCS Predoctoral Appointee. 2021  
Algorithms for efficiently constructing poised sets of points for regression models

Pankaj Chouhan. Argonne National Laboratory Givens Associate. 2021  
Assessment of Gaussian-process-based multifidelity optimization methods

Xinyu Fei. Argonne National Laboratory Givens Associate. 2021  
Quantum pulse optimization with binary controls

Caleb Ju. Argonne National Laboratory Givens Associate. 2021  
Decentralized distributed optimizing of sum of convex function

Akhil Vakayil. Argonne National Laboratory Givens Associate. 2021  
Large-scale dynamic ride sharing by iterative assignment

Ashish Kakkar. Argonne National Laboratory Givens Associate. 2021  
Mitigating errors in quantum computers using symmetries

Max Bowman. Argonne National Laboratory SULI. 2021  
Optimization of the quantum Toffoli gate

Misha Padidar. Argonne National Laboratory Givens Associate. 2020–2021  
Optimization and machine learning for the simulation particle accelerators in Synergia  
Modeling approaches for addressing simple unrelaxable constraints with unconstrained optimization methods

Baoyu Zhou. Argonne National Laboratory Givens Associate. 2020  
Manifold sampling for optimizing nonconvex piecewise-smooth compositions

Tyler Chang. DOE Office of Science Graduate Student Research Program. 2019  
An adaptive weighting scheme for multiobjective optimization

Taner Cokyasar. Argonne National Laboratory Givens Associate. 2019  
Efficient modeling of the shared household vehicle routing problem

Kaushik Kulkarni. Argonne National Laboratory Givens Associate. 2019

## Performance optimization of libEnsemble

- Prateek Jaiswal. Argonne National Laboratory Givens Associate. 2019  
Analysis of a coordinated multistart algorithm for stochastic optimization
- Tianxiang Gao. Argonne National Laboratory Givens Associate. 2018  
Developed a scalable, distributed ADMM implementation for phase retrieval problems
- Tsz Chung Ho. Argonne National Laboratory Givens Associate. 2018  
Implemented algorithms and structures for fast retrieval of information from spatial statistics data
- Prashant Palkar. Argonne National Laboratory Givens Associate. 2017–2018  
Developed and analyzed a method for mixed-integer derivative-free optimization
- German Villalobos. Argonne National Laboratory SULI. 2017  
Application of libEnsemble to coordinate evaluations of HFBTHO
- Matthew Buranosky. Argonne National Laboratory SULI. 2017  
Analysis of simulations of the Argonne Wakefield Accelerator beamline
- Xiao Huang. Argonne National Laboratory Givens Associate. 2017  
Stochastic derivative-free optimization
- Fengqiao Luo. Argonne National Laboratory Givens Associate. 2016  
Variable-speed vehicle platoon modeling
- Matt Menickelly. Argonne National Laboratory Givens Associate. 2014–2015  
Nonsmooth derivative-free optimization
- Christoph Kammer. KTH Department of Automatic Control Master's Degree Project. 2012–2013  
[Coordinated heavy truck platoon routing using global and locally distributed approaches](#)
- Erik Larsson and Gustav Sennton. KTH ACCESS Undergraduate Research Project. 2013  
Computational complexity of vehicle network problems
- Björn Tegelund and Saman Bidgol. KTH ACCESS Undergraduate Research Project. 2013  
High-performance, large-scale computation for control problems

## Mentoring

- NAACP's Afro-Academic, Cultural, Technological, and Scientific Olympics (ACT-SO)  
Elijah Rodriguez. Tsunami-Resistant Building Design. 2019–2020
- Jovanique Osafoh. Facial Recognition of Faces with Glasses. 2018–2019  
DuPage County Silver Medal in Computer Science
- DeChe' Lewis. Identifying Allicin in Garlic via Raman Spectroscopy. 2018–2019
- Kenan Collier. Hoopteams Basketball App. 2017–2018
- Caleb Hilliard. Roller Coaster Design. 2016–2017
- Nathan Thurmond. Do New Operating Systems Slow Down Phones? 2016–2017
- Jaleel Patterson. Video Game Stress and Cortisol in Saliva. 2016–2017
- Jalen Crump. Particle Accelerator Optimization. 2015–2016  
DuPage County Gold Medal in Physics. National Bronze Medal in Physics
- Michael James II. The Math Behind Blackjack. 2014–2015  
DuPage County Bronze Medal in Mathematics
- Akash Dhruv. ANL/MCS Postdoctoral Mentoring Program. June 2021–Present
- Jaehoon Koo. ANL/MCS Postdoctoral Mentoring Program. July 2020–Present
- Jacqueline Alvarez. University of California, Merced. Broader Engagement Program. SIAM CSE 2021
- Austin Chung. California State Polytechnic University, Pomona. Broader Engagement Program. SIAM CSE 2017

## Teaching Experience

### University Courses (instructor of record unless otherwise noted)

**DePaul University**

Trigonometry, Spring 2015

**KTH Royal Institute of Technology, Stockholm, Sweden**

Convex Optimization with Engineering Applications (with Anders Forsgren and Mikael Johansson),  
Fall 2012

**International College of Beijing**

Differential Calculus (3 sections and 6 recitations), Fall 2010

**University of Colorado Denver**

Integral Calculus, Summer 2011

Introduction to Abstract Mathematics, Summer 2008

Algebra for Social Science and Business, Spring 2008

Polynomial Calculus, Summer 2007

College Algebra, Fall 2007 & Spring 2007

Differential Calculus (TA), Fall 2006

**NSF Rocky Mountain Middle School Math-Science Partnership**

Math and Science of Musical Instruments (TA), Summer 2009

Math of Change (TA), Summer 2007

**Educational/Outreach Presentations**

What is math research? *STEM Outreach: Hillcrest Elementary School*. Virtual. March 9, 2021

Life as a Computational Mathematician. *First Look@Argonne: Minorities in STEM Conference*. Virtual.  
October 22, 2020

Hour of Code. *Lester Elementary School*. Downers Grove, IL. December 4, 2018

Hour of Code. *Lakeview Junior High*. Downers Grove, IL. December 5, 2017

Real-World Mathematics Problems. *Carl Schurz High School Career Day*. Chicago, IL. November 8,  
2017

Postdocs as Leaders and Mentors at the Diversity and Inclusion and STEM Education Nexus. **Poster  
Award Winner**. *National Postdoctoral Association Annual Meeting*. San Francisco, CA. March 18, 2017

Rapid Research Summary. *SULI student meeting*. Argonne National Laboratory. June 22, 2017

Hour of Code. *Oak Prairie Junior High*. Homer Glen, IL. December 6, 2016

Life as a Mathematician. *Carl Schurz High School STEM Career Day*. Chicago, IL. November 18, 2015

From Student to Researcher. *KTH ACCESS Undergraduate Research Kick-Off*. Stockholm, Sweden. June  
10, 2013

Probability and Non-Euclidean Geometry. *Stockholm International School*. Stockholm, Sweden. May  
24, 2013

Möbius Strips and Games. *Stockholm International School*. Stockholm, Sweden. April 26, 2013

Mathematics Cheerleading. *KTH Internal Seminar*. Stockholm, Sweden. March 11, 2013

Math Careers and Games. *Stockholm International School*. Stockholm, Sweden. January 28, 2013

Ricochet Robots. *Cesar Chavez Academy Denver*. Denver, CO. May 23, 2012

Discrete Optimization Problems and Algorithms. *Rocky Mountain Math Teachers' Circle*. Denver, CO.  
May 5, 2012

Surface Area, Volume, and Mammalian Heart Rate. *West Denver Preparatory Charter School – Highland  
Campus*. Denver, CO. April 17, 2012

Surprising Applications of Math. *West Denver Preparatory Charter School – Highland Campus*. Denver,  
CO. November 1, 2011

Subtraction Games. *STEM Magnet Lab School*. Northglen, CO. October 28, 2011

Helping Parents Help Their Kids. *Otho E. Stuart Middle School*. Commerce City, CO. September 29,  
2011

Optimal Egg Dropping. *Capstone Course for Secondary Teachers*. University of Colorado Denver.  
September 21, 2011

Sizes of Infinity. *Bennett High School*. Bennett, CO. May 13, 2011

Combinatorial Games - Taxman. *Bennett High School*. Bennett, CO. May 13, 2011

Sizes of Infinity. *Core Knowledge Charter School*. Parker, CO. May 3, 2011

Fun with Math. *Overland Trail Middle School Science Expo*. Brighton, CO. April 21, 2011

GK-12 Transforming Experiences at University of Colorado Denver. *GK-12 National Meeting*. Washington, D.C. March 27, 2010  
 Rubik's Cubes Made Easy. *STEMapalooza*. Denver, CO. November 16, 2009  
 Launching Water Balloons and Mathematics. *GK-12 National Meeting*. Washington, D.C. March 29, 2009  
 Möbius Strips and Instant Insanity. *Steele Elementary School Math Evening*. Denver, CO. March 17, 2009  
 Möbius Strips. *STEMapalooza*. Denver, CO. November 27, 2008

## Professional Community Service

### Conference Participation and Organization

Session Organizer and Chair: [Advances in Derivative-Free Optimization - Parts I–IV](#). *SIAM Conference on Optimization*. Virtual. July 20–23, 2021  
 Technical Breakout Organizer: [Quantum Algorithms](#). *Chicago Quantum Exchange Members and Partners Workshop*. Virtual. April 19, 2021  
 Workshop Organizer: [Quantum Feature Maps for the NISQ Era](#). *Chicago Quantum Exchange*. Virtual. April 16, 2021  
 Session Organizer and Chair: [Methods for Nonsmooth Optimization](#). *SIAM Conference Computational Science and Engineering*. Virtual. March 4, 2021  
 Session Organizer and Chair: [Algorithms for Numerically Optimizing Expensive Functions](#). *International Conference on Optimization*. Valencia, Spain. July 15, 2019  
 Session Organizer and Chair: [Nonsmooth Derivative-Free Optimization](#). *SIAM Conference on Optimization*. Vancouver, Canada. May 25, 2017  
 Session Chair: [Advances in Derivative-Free and Simulation-based Optimization III](#). *International Conference on Optimization*. Tokyo, Japan. August 10, 2016  
 Session Organizer: [Parallel Methods for DFO](#). *CORS/INFORMS International Conference*. Montreal, Canada. June 14, 2015  
 Session Chair: [Global Optimization](#). *SIAM Conference on Optimization*. San Diego, CA. May 19, 2014  
 Session Organizer and Chair: [Advances in Derivative-Free Optimization](#). *International Conference on Continuous Optimization*. Lisbon, Portugal. June 29, 2013  
 Proceedings Referee:  
 IEEE International Conference on Intelligent Transportation Systems. 2013, 2014, 2015, 2016  
 Transportation Research Board Annual Meeting. 2015, 2022

### Grant Referee

Chain Reaction Innovations: Cohort 4 Call for Applications  
 2020 NSERC Discovery Grant

### Journal Referee

ACM Transactions on Internet of Things, ACM Transactions on Mathematical Software, AMS Mathematical Reviews, Applied Numerical Mathematics, Computation Optimization and Applications, Computer Networks, Computers & Operations Research, Computing Surveys, Engineering Optimization, Environmental Modelling & Software, EURO Journal on Computational Optimization, European Journal of Operational Research, Frontiers in Robotics and AI: Biomedical Robotics, IEEE Access, IEEE Transactions on Automatic Control, IEEE Transactions on Intelligent Transportation Systems, IEEE Transactions on Quantum Engineering, IEEE Transactions on Vehicular Technology, IET Intelligent Transport Systems, INFORMS Journal on Computing, INFORMS Journal on Optimization, Journal of Combinatorial Optimization, Journal of Computational and Applied Mathematics, Journal of Intelligent Systems, Journal of Intelligent Transportation Systems: Technology, Planning, and Operations, Journal of Open Source Software, Journal of Quantitative Analysis in Sports, Mathematical Methods of Operations Research, Mathematical Programming Computation, Mathematical Programming, Mathematics of Computation, Naval Research Logistics, Numerical

Algorithms, Omega: The International Journal of Management Science, Open Transportation Journal, Optimization and Engineering, Optimization Letters, Optimization Methods and Software, Optimization, Pacific Journal of Optimization, SIAM Journal on Optimization, SIAM Journal on Scientific Computing, SN Operations Research Forum, Transportation Engineering, Transportation Research Part B: Methodological, Transportation Research Part C: Emerging Technologies, Transportation Research Part D: Transport and Environment, Transportation Research Part E: Logistics and Transportation Review, Transportmetrica A: Transport Science

## **Institutional Service**

### **Argonne National Laboratory**

Co-Chair: Argonne ACT-SO Program. 2015–Present

National competition medal count:

2021: 1 silver/1 bronze      2020: 3 gold/3 silver      2019: 4 gold/1 silver/1 bronze  
2018: 4 gold/2 silver/1 bronze      2017: 3 gold/1 silver/1 bronze      2016: 2 gold/1 silver/1 bronze

Member: ANL Workday Recruiting Extended Project Team January 2021–July 2021

Organizer: LANS Informal Seminar. December 2016–October 2019

Sponsor: Riley Murray’s Maria Goeppert Mayer Fellowship application 2020

Co-Organizer: MCS Career Fair Booth: SIAM-CSE21, SIAM-AN20, SIAM-CSE19, SIAM-AN18, SIAM-CSE17, SIAM-AN16

Co-Founder and Organizer: Creative Research Activities for Argonne Postdocs. 2015–2016

Speaker: “Careers at National Labs.” SIAM CSE Student Opportunities Luncheon. 2017

Volunteer: Introduce a Girl to Engineering Day. 2016, 2017

Volunteer: Postdoctoral Research Symposium. October 8, 2015

Test User: Better Scientific Software website. January 23, 2017

Member: Wilkinson Fellow search committee. 2016

Member: MCS Division Director search committee. 2016

### **KTH Royal Institute of Technology**

Organizing Committee Member: KTH NetCon Workshop. January 9, 2014

Organizing Committee Member: KTH ACCESS Innovation Day. May 17, 2013

Organizing Committee Member: KTH ACCESS Industrial Workshop. January 24, 2013

Recruiter and Sponsor: COMAP Mathematical Contest in Modeling. 2013

Team 19915: Andreas Pettersson, Artur Kransengren

Team 19916: Marcus Bertilsson, Björn Magnusson, Elsa Skuncke

### **University of Colorado Denver**

Co-Founder and Instructor:  $\LaTeX$ , Unix, and Beamer Seminar for CU Denver Graduate Students. Fall 2011

Faculty Search Committee Member: Instructor Position at the International College of Beijing. Fall 2011

Team Advisor: COMAP Mathematical Contest in Modeling. 2008–2010

Volunteer: Assigned optimal coverage of volunteers for STEMpalooza. Fall 2010

Math Department Recruiter: Spring Undergraduate Open House. February 2010

Volunteer: Math Club Finals Study Hall. Fall 2009, Spring 2010, Spring 2011, Fall 2011, Spring 2012

Organizing Committee Member: Front Range SIAM Student Conference. 2009, 2010, 2012

Student Symposium Committee Member: University of Colorado Denver Graduate School. Fall 2011



Panel Member: Graduate student orientation. Fall 2009 and Fall 2010

### **Postdissertation Courses**

Argonne Training Program on Extreme-Scale Computing. August 3-15, 2014

Simulation-Based Dynamic Traffic Assignment for the Deployment of Intelligent Transportation Systems. October 6, 2013

ICCOPT Summer Course on Sparse Optimization and Applications to Information Processing. July 28, 2013

ICCOPT Summer Course on PDE-Constrained Optimization. July 27, 2013

### **Professional Memberships**

Society for Industrial and Applied Mathematics. 2007–Present

Institute for Operations Research and the Management Sciences. 2008–Present

Mathematical Optimization Society. 2009–Present