

# ■ VICTOR LAWRENCE MINDEN ■

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## EDUCATION

**Stanford University**, Stanford, CA

Ph.D. & M.S. in Computational and Mathematical Engineering, 2017

Thesis title: *Data-sparse Algorithms for Structured Matrices*

Thesis advisor: Lexing Ying

**Tufts University**, Medford, MA

B.S. in Electrical Engineering and Mathematics, 2012

Graduated *summa cum laude* with highest thesis honors

Thesis title: *Improved Iterative Methods for NAPL Transport Through Porous Media*

Thesis advisor: Scott MacLachlan

## RESEARCH POSITIONS

**Flatiron Institute**, New York, NY

Flatiron Research Fellow, September 2017 – present

- Work with Dmitri Chklovskii and the computational neuroscience group
- Developing neurally plausible learning algorithms for online dimensionality reduction

**Lawrence Berkeley National Laboratory**, Berkeley, CA

Research Associate, Summer 2014

- Worked with Phil Colella and the applied numerical algorithms group
- Developed a novel algorithm for time-stepping constant-coefficient hyperbolic equations with rigorous consistency and stability results

**Lawrence Livermore National Laboratory**, Livermore, CA

Intern with Cyber Defenders, Summer 2012

- Worked with Van Henson and the eigensolvers group
- Analyzed spectral clustering techniques for network applications

**National Security Agency**, Fort Meade, MD

Intern with the Director's Summer Program, Summer 2011

- Developed algorithms in MATLAB for temporal graph analysis using novel clustering methods
- Implemented spectral graph theoretic and tensor analytic methods for investigating trends in dynamic relational data

**Argonne National Laboratory**, Argonne, IL

Intern, Summer 2010, Research Aide, 2010-2011

- Worked with Barry Smith and the Portable, Extensible Toolkit for Scientific Computation (PETSc) group
- Contributed GPU parallelization capabilities to PETSc, a C/C++ software library for high-performance linear algebra and scientific computation

## ACTIVITIES

**C<sup>2</sup>: Computational Consulting**, Stanford University

President (2014-2015) and consultant in mathematics and algorithms, 2013-2017

**EDGE Student Mentorship Program**, Stanford University

Student mentor to two doctoral students in the Enhancing Diversity in Graduate Education (EDGE) program, 2015-2017

PROGRAMMING	Python, MATLAB, C++, C, Julia, MPI, OpenMP, L <sup>A</sup> T <sub>E</sub> X
AWARDS	<b>Student Leadership Award</b> , ICME, Stanford University ..... 2017 <b>Ben Rolfs Memorial Award</b> , ICME, Stanford University ..... 2017 <b>Stanford Graduate Fellowship</b> , Office of Technology Licensing Fellow .... 2016 <b>DOE Computational Science Graduate Fellowship</b> ..... 2012 <b>NSF Graduate Research Fellowship</b> (declined) ..... 2012 <b>Alpha Xi Delta Prize Scholarship</b> , Tufts University ..... 2012 <b>Marshall Hochhauser Prize</b> , Tufts University ..... 2012 <b>Eta Kappa Nu ECE Honor Society</b> , Tufts University ..... 2011 <b>Tau Beta Pi Engineering Honor Society</b> , Tufts University ..... 2011 <b>Student Chapter Certificate of Recognition</b> , SIAM ..... 2011 <b>Honorable Mention</b> (with S. Bidwell, L. Clegg), COMAP MCM ..... 2011 <b>INFORMS Prize</b> (with D. Brady, L. Clegg), COMAP MCM ..... 2010 <b>Outstanding Winner</b> (with D. Brady, L. Clegg), COMAP MCM ..... 2010
PREPRINTS	1. V. <i>Minden</i> and L. Ying, <b>A Simple Solver for the Fractional Laplacian in Multiple Dimensions</b> , in review. 2. A. Damle, V. <i>Minden</i> , and L. Ying, <b>Robust and Efficient Multi-way Spectral Clustering</b> , in review.
PUBLICATIONS	1. V. <i>Minden</i> , A. Damle, K. L. Ho, and L. Ying, <b>Fast Spatial Gaussian Process Maximum Likelihood Estimation via Skeletonization Factorizations</b> , Multiscale Model. Simul. 15-4 (2017), pp. 1584-1611. 2. V. <i>Minden</i> , K. L. Ho, A. Damle, and L. Ying, <b>A Recursive Skeletonization Factorization Based on Strong Admissibility</b> , Multiscale Model. Simul. 15-2 (2017), pp. 768-796. 3. B. Lo, V. <i>Minden</i> , and P. Colella, <b>A Real-Space Green's Function Method for the Numerical Solution of Maxwell's Equations</b> , Communications in Applied Mathematics and Computational Science 11-2 (2016), pp. 143-170. 4. V. <i>Minden</i> , A. Damle, K. L. Ho, and L. Ying, <b>A Technique for Updating Hierarchical Skeletonization-Based Factorizations of Integral Operators</b> , Multiscale Model. Simul. 14-1 (2016), pp. 42-64. 5. V. <i>Minden</i> , C. Youn, and U. A. Khan, <b>A Distributed Self-Clustering Algorithm for Autonomous Multi-Agent Systems</b> , in the Proceedings of the 50th Annual Allerton Conference on Communication, Control and Computing, Monticello, IL, Oct. 2012. 6. V. <i>Minden</i> , B. Smith, and M. G. Knepley, <b>Preliminary Implementation of PETSc Using GPUs</b> , in the Proceedings of the 2010 International Workshop of GPU Solutions to Multiscale Problems in Science and Engineering, Springer, 2011.
CONFERENCE TALKS	1. <b>Copper Mountain Conference on Iterative Methods</b> , Copper Mountain, CO, 2018. "A recursive skeletonization factorization based on strong admissibility". 2. <b>SIAM Annual Meeting</b> , Pittsburgh, PA, 2017. "Fast spatial Gaussian process maximum likelihood estimation". 3. <b>SIAM Annual Meeting</b> , Boston, MA, 2016. "Efficient preconditioners and hierarchical interpolative decompositions".

4. **SIAM Conference on Uncertainty Quantification**, Lausanne, CHE, 2016. "Fast spatial Gaussian process maximum likelihood estimation via skeletonization factorizations".
5. **SIAM Conference on Applied Linear Algebra**, Atlanta, GA, 2015. "Exploiting hierarchical low-rank compression for fast updating".
6. **SIAM Annual Meeting**, Chicago, IL, 2014. "Updating techniques for hierarchical factorizations".
7. **Allerton Conference on Communication, Control, and Computing**, Monticello, IL, 2012. "A distributed self-clustering algorithm for autonomous multi-agent systems".

#### SEMINAR TALKS

1. **Copper Mountain Conference on Iterative Methods**, Copper Mountain, CO, 2018. "A recursive skeletonization factorization based on strong admissibility".
2. **Stanford Linear Algebra and Optimization Seminar**, Stanford, CA, 2016. "Fast algorithms exploiting low-rank structure for graph clustering and integral equations".
3. **ICME Student Seminar**, Stanford, CA, 2014. "A numerical method for solving Maxwell's equations in free-space using an approximate IVP Green's function".
4. **Tufts SIAM Student Seminar**, Medford, MA, 2010. "GPU computing for scientific computation applications".
5. **Tufts Mathematics Department Seminar**, Medford, MA, 2010. "From kills to kilometers: using centrophraphic techniques and rational choice theory for geographical profiling of serial killers".

#### OTHER TALKS

1. **DOE CSGF Annual Program Review**, Arlington, VA, 2016. "Fast spatial Gaussian process maximum likelihood estimation via skeletonization factorizations".
2. **Bay Area Scientific Computing Day**, Berkeley, CA, 2015. "Fast spatial Gaussian process maximum likelihood estimation".
3. **Gene Golub SIAM Summer School Speed Talk**, Delphi, GRC, 2015. "Fast computations with kernel matrices using hierarchical factorizations".

#### CONFERENCE POSTERS

**Computational and Systems Neuroscience (Cosyne)**, Denver, CO, 2018. "Biologically plausible online PCA without recurrent neural dynamics".

#### OTHER POSTERS

1. **ICME Student Xpo**, Stanford, CA, 2017. "Robust and efficient multi-way spectral clustering".
2. **ICME Student Xpo**, Stanford, CA, 2016. "Fast spatial Gaussian process maximum likelihood estimation via skeletonization factorizations".
3. **DOE CSGF Annual Program Review**, Arlington, VA, 2015. "A real-space Green's function method for the numerical solution of Maxwell's equations in free space".
4. **ICME Student Xpo**, Stanford, CA, 2015. "Updating hierarchical factorizations in response to localized modifications".
5. **DOE CSGF Annual Program Review**, Arlington, VA, 2014. "Updating techniques for tree-based factorizations".
6. **DOE CSGF Annual Program Review**, Arlington, VA, 2013. "Spectral methods for seed-set expansion on graphs".

7. **LLNL Student Poster Session**, Livermore, CA, 2012. "Commute time and related metrics for seed-set expansion".

## TEACHING

**Projects in Applied and Computational Mathematics**, Stanford University  
Student Mentor, Spring 2015 & Winter 2013

**CME Refresher Course: Linear Algebra**, Stanford University  
Instructor, September 2014

**Discrete Mathematics**, Tufts University  
Teaching Assistant, Spring 2011

**Assorted Mathematics / Computer Science**, Tufts University  
Tutor with the Academic Resource Center, 2009-2011