

# CURRICULUM VITAE, AMITABH BASU

Department of Applied Mathematics and Statistics  
100 Whitehead Hall  
3400 N. Charles St.  
Baltimore, MD 21218

Phone: (410)-516-4883  
E-mail: basu.amitabh@jhu.edu  
<http://www.ams.jhu.edu/~abasu9>

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EDUCATION                      **Carnegie Mellon University**, Pittsburgh, PA                      **August 2006 to May 2010**

Ph.D. in Algorithms, Combinatorics and Optimization (ACO).

- Dissertation Topic: *Corner Polyhedra and Maximal Lattice-free Convex Sets : A Geometric Approach to Cutting Planes*
- Advisor: Prof. Gérard Cornuéjols

**Stony Brook University**, Stony Brook, New York                      **August 2004 to May 2006**

M.S., Computer Science.

- Thesis Title: *Distributed Localization with Noisy Distance and Angle Information*
- Advisor: Prof. Joseph S.B. Mitchell

**Indian Institute of Technology**, Delhi, India                      **August 2000 to May 2004**

B.Tech., Computer Science and Engineering.

WORK  
EXPERIENCE

**The Johns Hopkins University**, Baltimore

Associate Professor (with tenure),

Dept. of Applied Mathematics and Statistics (Primary appointment)                      **July 2018–present**

Dept. of Computer Science (Secondary appointment)                      **July 2018–present**

Assistant Professor,

Dept. of Applied Mathematics and Statistics (Primary appointment)                      **July 2013–June 2018**

Dept. of Computer Science (Secondary appointment)                      **January 2018–June 2018**

**University of California, Davis**

Krener Assistant Professor, Dept. of Mathematics.                      **July 2010–June 2013**

**AT&T Shannon Labs-Research**, Florham Park, NJ

Summer research intern.                      **May–July 2005**

**INRIA**, Sophia-Antipolis, France

Summer research intern.                      **May–July, 2003**

HONORS AND  
AWARDS

**Scholastic**

- *Simons CRM Scholar-in-Residence* at the Centre de Recherches Mathématiques (CRM), Montreal, awarded jointly by CRM and the Simons Foundation, 2019.
- *US Junior Oberwolfach Fellow*, awarded by the Mathematisches Forschungsinstitut Oberwolfach (MFO) (collaborative grant from National Science Foundation (NSF)), 2018.
- *NSF CAREER award*, awarded by the National Science Foundation (NSF), 2015.
- *A.W. Tucker Prize* finalist, awarded by the Mathematical Optimization Society every 3

years to three finalists for the best doctoral dissertation worldwide in the field of mathematical optimization, 2012.

- *AMS-Simons Travel award*, awarded by the American Mathematical Society (AMS) to about 60 early career mathematicians obtaining their Ph.D. in the four years prior to award year, 2011.
- *Gerald L. Thompson Award*, awarded by the Tepper School of Business, Carnegie Mellon University for the best doctoral dissertation, 2010.
- *Egon Balas Award*, awarded by the Tepper School of Business, Carnegie Mellon University for the best student paper in the area of operations research, 2008.
- *William Larimer Mellon Fellowship*, Tepper School of Business, Carnegie Mellon University, 2006–2009.
- Gold medal at Indian National Physics Olympiad, 2000.
- *National Talent Search Scholar*, awarded by the National Council of Education, Research and Training (NCERT), India, 1998.

### Teaching

- *Joel Dean Award for Excellence in Teaching*, awarded by Dept. of Applied Mathematics and Statistics, Johns Hopkins University, 2016, 2017.
- *G. Thomas Sallee Mathematics Teaching Award*, awarded by Dept. of Mathematics, University of California, Davis, 2013.
- *ASUCD Excellence in Education Awards* nominee, awarded by Associated Students of University of California, Davis (ASUCD), 2012.

## RESEARCH PUBLICATIONS

### Papers under review

- R1 Two-halfspace closure, *submitted*  
with Hongyi Jiang
- R2 Complexity of cutting planes and branch-and-bound in mixed-integer optimization, *submitted*  
with Michele Conforti, Marco Di Summa and Hongyi Jiang
- R3 Split cuts in the plane, *submitted*  
with Michele Conforti, Marco Di Summa and Hongyi Jiang
- R4 Learning to rank via combining representations, *submitted*  
with Hayden S. Helm, Avanti Athreya, Youngser Park, Joshua T. Vogelstein, Michael Winding, Marta Zlatic, Albert Cardona, Patrick Bourke, Jonathan Larson, Chris White, Carey E. Priebe

### Invited Surveys (refereed)

- S1 Light on the infinite group relaxation, Part II: sufficient conditions for extremality, sequences and algorithms,  
*4OR: A quarterly journal of operations research*, vol. 14(2), 2016, pp.107–131,  
Joint work with Robert Hildebrand and Matthias Köppe
- S2 Light on the infinite group relaxation, Part I: foundations and taxonomy,  
*4OR: A quarterly journal of operations research*, vol. 14(1), 2016, pp.1–14,  
Joint work with Robert Hildebrand and Matthias Köppe
- S3 A geometric approach to cutting planes,  
*Mathematical Programming*, vol. 151(1), 2015, pp. 153–189,  
Joint work with Michele Conforti and Marco Di Summa

## Papers published/in press in refereed Journals

- P1 Admissibility of solution estimators for stochastic optimization,  
*to appear in SIAM Journal on Mathematics of Data Science*,  
Joint work with Tu Nguyen and Ao Sun
- P2 Optimal Probabilistic Catalogue Matching for Radio Sources,  
*to appear in Monthly Notices of the Royal Astronomical Society*,  
Joint work with Dongwei Fan, Tamás Budavári, Ray Norris
- P3 Mixed-integer bilevel representability,  
*to appear in Mathematical Programming*,  
Joint work with Chris Ryan and Sriram Sankaranarayanan
- P4 An extreme function which is nonnegative and discontinuous everywhere,  
*Mathematical Programming*, vol. 179 (1–2), 2020, pp. 447 – 453 (short communication),  
Joint work with Michele Conforti and Marco Di Summa
- P5 Optimal cutting planes from the group relaxations,  
*Mathematics of Operations Research*, vol. 44(4), 2019, pp. 1208–1220,  
Joint work with Michele Conforti, Marco Di Summa and Giacomo Zambelli
- P6 Mixed-integer linear representability, disjunctions, and variable elimination – modeling implications,  
*Mathematics of Operations Research*, vol. 44(4), 2019, pp. 1264–1285 (Preliminary version in *Proceedings of IPCO 2017, Lecture Notes in Computer Science*, vol. 10328, pp. 75–85),  
Joint work with Kipp Martin, Chris Ryan and Guanyi Wang
- P7 The structure of the infinite models in integer programming,  
*Mathematics of Operations Research*, vol. 44(4), 2019, pp. 1412–1430 (Preliminary version in *Proceedings of IPCO 2017, Lecture Notes in Computer Science*, vol. 10328, pp. 63–74),  
Joint work with Michele Conforti, Marco Di Summa and Joseph Paat
- P8 Non-unique lifting of integer variables in minimal inequalities,  
*SIAM Journal on Discrete Mathematics*, vol. 33(2), 2019, pp. 755–783,  
Joint work with Santanu Dey and Joseph Paat
- P9 Robust registration of astronomy catalogs with applications to the Hubble Space Telescope,  
*The Astronomical Journal*, vol. 158(5), Oct. 2019,  
Joint work with Fan Tian, Tamás Budavári, Stephen H. Lubow and Richard L. White
- P10 Can cut generating functions be efficient and good?,  
*SIAM Journal on Optimization*, vol. 29(2), 2019, pp. 1190–1210,  
Joint work with Sriram Sankaranarayanan
- P11 Probabilistic cross-identification of multiple catalogs in crowded fields,  
*The Astrophysical Journal*, vol. 870(1), article id 51, Jan. 2019,  
Joint work with Xiaochen Shi and Tamas Budavári
- P12 Approximation of corner polyhedra with families of intersection cuts,  
*SIAM Journal on Optimization*, vol. 28(1), 2018, pp. 904–929. (Preliminary version in *Proceedings of IPCO 2017, Lecture Notes in Computer Science*, vol. 10328, pp. 51–62),  
Joint work with Gennadiy Averkov and Joseph Paat
- P13 Approximation of Minimal Functions by Extreme Functions,  
*SIAM Journal on Optimization*, vol. 28(3), 2018, pp. 2518–2540,  
Joint work with Teresa Lebar
- P14 Minimal cut-generating functions are nearly extreme,  
*Mathematical Programming*, vol. 172(1–2), 2018, pp. 329 – 349, (Preliminary version in

- Proceedings of IPCO 2016, Lecture Notes in Computer Science, vol. 9682, pp. 202–213*,  
Joint work with with Robert Hildebrand and Marco Molinaro
- P15 Extreme functions with an arbitrary number of slopes,  
*Mathematical Programming, vol. 172(1), 2018, pp. 303–327, (Preliminary version in Proceedings of IPCO 2016, Lecture Notes in Computer Science, vol. 9682, pp. 190–201)*,  
Joint work with Michele Conforti, Marco Di Summa and Joseph Paat
- P16 Centerpoints: A link between optimization and convex geometry,  
*SIAM Journal on Optimization, vol. 27(2), 2017, pp. 866–889, (Preliminary version in Proceedings of IPCO 2016, Lecture Notes in Computer Science, vol. 9682, pp. 14–25)*,  
Joint work with Timm Oertel
- P17 Optimality certificates for convex minimization and Helly numbers,  
*Operations Research Letters, vol. 45(6), 2017, pp. 671–674*,  
Joint work with M. Conforti, G. Cornuéjols, R. Weismantel and S. Weltge
- P18 Equivariant perturbation in Gomory and Johnson’s infinite group problem III. Foundations for the  $k$ -dimensional case and applications to  $k = 2$ ,  
*Mathematical Programming, vol. 163(1), 2017, pp. 301–358*,  
Joint work with Robert Hildebrand and Matthias Köppe
- P19 Strong duality and sensitivity analysis in semi-infinite linear programming,  
*Mathematical Programming, vol. 161(1), 2017, pp. 451–485*,  
Joint work with Kipp Martin and Chris Ryan
- P20 Galaxy redshifts from discrete optimization of correlation functions,  
*The Astronomical Journal, vol. 152(6), article id 155, Nov. 2016*,  
Joint work with Benjamin Lee, Tamás Budavári and Mubdi Rahman
- P21 Probabilistic cross-identification in crowded fields as an assignment problem,  
*The Astronomical Journal, vol. 152(4), article id 86, Sept. 2016*,  
Joint work with Tamás Budavári
- P22 Operations that preserve the covering property of the lifting region,  
*SIAM Journal on Optimization, vol. 25(4), 2015, pp. 2313–2333*,  
Joint work with Joseph Paat
- P23 Lifting properties of maximal lattice-free polyhedra,  
*Mathematical Programming, vol. 154(1), 2015, pp. 81–111*,  
Joint work with Gennadiy Averkov
- P24 Projection: A unified approach to semi-infinite linear programs and duality in convex programming,  
*Mathematics of Operations Research, vol. 40(1), 2015, pp. 146–170*,  
Joint work with Kipp Martin and Chris Ryan
- P25 Equivariant perturbations for Gomory and Johnson’s infinite group problem I. The one-dimensional case,  
*Mathematics of Operations Research, vol. 40(1), 2015, pp. 105–129*,  
Joint work with Robert Hildebrand and Matthias Köppe
- P26 Characterization of the split closure via geometric lifting,  
*European Journal of Operational Research, vol. 243(3), 2015, pp. 745–751*,  
Joint work with Marco Molinaro
- P27 On the sufficiency of finite support duals in semi-infinite linear programming,  
*Operations Research Letters, vol. 42(1), 2014, pp. 16–20*,  
Joint work with Kipp Martin and Chris Ryan
- P28 The triangle closure is a polyhedron,  
*Mathematical Programming, vol. 145(1–2), 2014, pp. 19–58*,  
Joint work with Robert Hildebrand and Matthias Köppe

- P29 On Chubanov’s method for linear programming,  
*INFORMS Journal on Computing*, vol. 26(2), 2014, pp. 336–350,  
 Joint work with Jesús De Loera and Mark Junod
- P30 A  $(k + 1)$ -slope Theorem for the  $k$ -dimensional infinite group relaxation,  
*SIAM Journal on Optimization*, vol. 23(2), 2013, pp. 1021–1040,  
 Joint work with Robert Hildebrand, Matthias Köppe and Marco Molinaro
- P31 Unique lifting of integer variables in minimal inequalities,  
*Mathematical Programming*, vol. 141, 2013, pp. 561–576,  
 Joint work with Manoel Campelo, Michele Conforti, Gérard Cornuéjols and G. Zambelli
- P32 A counterexample to a conjecture of Gomory and Johnson,  
*Mathematical Programming*, vol. 133(1-2), 2012, pp. 25–38,  
 Joint work with Michele Conforti, Gérard Cornuéjols and Giacomo Zambelli
- P33 Unique minimal liftings for simplicial polytopes,  
*Mathematics of Operations Research*, vol. 37(2), 2012, pp. 346–355,  
 Joint work with Gérard Cornuéjols and Matthias Köppe
- P34 Intersection cuts with infinite split rank,  
*Mathematics of Operations Research*, vol. 37(1), 2012, pp. 21–40,  
 Joint work with Gérard Cornuéjols and François Margot
- P35 Convex sets and minimal sublinear functions,  
*Journal of Convex Analysis*, vol. 18(2), 2011, pp. 427–432,  
 Joint work with Gérard Cornuéjols and Giacomo Zambelli
- P36 Experiments with two-row cuts from degenerate tableaux,  
*INFORMS Journal on Computing*, vol. 23(4), 2011, pp. 578–590,  
 Joint work with Pierre Bonami, Gérard Cornuéjols and François Margot
- P37 On the relative strength of split, triangle and quadrilateral cuts,  
*Mathematical Programming*, vol. 126(2), 2011, pp. 281–314. (Preliminary version in  
*Proc. Symposium on Discrete algorithms (SODA), New York, January 2009*),  
 Joint work with Pierre Bonami, Gérard Cornuéjols and François Margot
- P38 Maximal lattice-free convex sets in linear subspaces,  
*Mathematics of Operations Research*, vol. 35(3), 2010, pp. 704–720,  
 Joint work with Michele Conforti, Gérard Cornuéjols and Giacomo Zambelli
- P39 Minimal inequalities for an infinite relaxation of integer programs,  
*SIAM Journal on Discrete Mathematics*, vol. 24(1), 2010, pp. 158–168,  
 Joint work with Michele Conforti, Gérard Cornuéjols and Giacomo Zambelli
- P40 Geometric algorithms for optimal airspace design and air traffic controller workload balancing,  
*ACM Journal on Experimental Algorithmics*, vol. 14(2), 2009, pp. 3–28. (Preliminary  
 version in *Proc. ALENEX 2008*).  
 Joint work with Joseph S.B. Mitchell and Girishkumar Sabhnani
- P41 Security types preserving compilation,  
*Computer Languages, Systems and Structures*, vol. 33(2), July 2007, pp. 35–59,  
 Joint work with Gilles Barthe and Tamara Rezk

**Papers published/in press in refereed Conference Proceedings** (\*not\* including those articles whose journal versions are included above)

- P42 Sparse coding and autoencoders,  
*Proceedings of the International Symposium on Information Theory (ISIT) 2018*,  
 Joint work with Akshay Rangamani, Anirbit Mukherjee, Tejaswini Ganapathy, Ashish Arora, Sang Chin and Trac D. Tran

- P43 Understanding deep neural networks with rectified linear units,  
*Proceedings of the International Conference on Learning Representations (ICLR) 2018*,  
 Joint work with Raman Arora, Poorya Mianjy and Anirbit Mukherjee
- P44 Computing approximate PSD Factorizations,  
*Proceedings of APPROX-RANDOM 2016, Leibniz International Proceedings in Informatics, vol. 60, article id 2*,  
 Joint work with Mike Dinitz and Xin Li
- P45 On the unique-lifting property,  
*Proceedings of IPCO 2014, Lecture Notes in Computer Science, vol. 8494, pp. 76–87*,  
 Joint work with Gennadiy Averkov
- P46 Equivariant perturbations for Gomory and Johnson’s infinite group problem II. The unimodular two dimensional case,  
*Proceedings of IPCO 2013, Lecture Notes in Computer Science, vol. 7801, pp. 62–73*,  
 Joint work with Robert Hildebrand and Matthias Köppe
- P47 A probabilistic analysis of the strength of split and triangle closures,  
*Proceedings of IPCO 2011, Lecture Notes in Computer Science, vol. 6655, pp. 27–38*,  
 Joint work with Gérard Cornuéjols and Marco Molinaro
- P48 On lifting integer variables in minimal inequalities,  
*Proceedings of IPCO 2010, Lecture Notes in Computer Science, vol. 6080, pp. 85–95*,  
 Joint work with Manoel Campelo, Michele Conforti, Gérard Cornuéjols and Giacomo Zambelli
- P49 Distributed localization using noisy distance and angle information,  
*Proceedings of the Seventh ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc’06), 2006, pp. 262–273*,  
 Joint work with Jie Gao, Joseph S. B. Mitchell and Girishkumar Sabhnani.

#### WORKING PAPERS

- W1 Combinatorial Optimization for Urban Planning: Strategic Demolition of Abandoned Houses in Baltimore, MD  
*In Preparation* with Lenny Fan, Philip Garboden and Tamás Budavári
- W2 Scalable N-way matching of astronomy catalogs  
*In Preparation* with Tu Nguyen and Tamás Budavári

#### GRANTS

- Title: Complexity of convex optimization with integer variables  
 Role: PI.  
 Agency: National Science Foundation (NSF), 2020–2023.  
 Total awarded: \$402,931.
- Title: Quantitative bounds for cutting plane and enumeration techniques in mixed-integer optimization.  
 Role: PI.  
 Agency: Air Force Office of Scientific Research (AFOSR), 2020–2023.  
 Total awarded: \$352,820.
- Title: Foundational Aspects of Discrete Optimization: Theory and Algorithms, *National Science Foundation Faculty Early Career Development (NSF CAREER) award*.  
 Role: PI.  
 Agency: National Science Foundation (NSF), 2015–2020.  
 Total awarded: \$500,000

- Title: Cutting Plane and Primal-Dual Approaches to Convex (Nonlinear) Mixed-Integer Optimization.  
Role: PI.  
Agency: Office of Naval Research (ONR), 2018–2021.  
Total awarded: \$313,319.
- *AMS-Simons Travel Grant*.  
Role: PI.  
Agency: American Mathematical Society (AMS) with support provided by the Simons Foundation, 2011–2013.  
Total Awarded: \$4000.

## INVITED TALKS

### Plenary/Distinguished Talks

1. The cut generating function approach in integer programming, *Plenary talk at the International Symposium on Combinatorial Optimization, Montreal, Canada, May 2020 (canceled due to COVID-19)*.
2. Representability of optimization models, *Plenary talk at the 19th French-German Conference on Optimization, Nice, France, September 2019*.
3. Representability of optimization models, *One of five panoramic talks at the Combinatorial Optimization Workshop, Oberwolfach, Germany, November 2018*.
4. Discrete Geometry meets Machine Learning, *One of seven distinguished talks at the 22<sup>nd</sup> Aussois Combinatorial Optimization Workshop, Aussois, France, January 2018*.
5. Cut-generating functions: where Convex/Discrete Geometry, Functional Analysis and Geometry of Numbers meet, *One of three distinguished talks at the 7<sup>th</sup> Cargese Combinatorial Optimization Workshop, Corsica, France, October 2016*.
6. Cut-Generating Functions: A tour d’horizon, *Invited tutorial in Polyhedral Combinatorics (PoCo 2015), Carnegie Mellon University, July 8–12, 2015*. PoCo 2015 was a summer school featuring lectures by experts in discrete optimization.

### Invited Talks at Universities and Research Labs

1. *Industrial Optimization seminar, Fields Institute, Toronto, Canada, October 2019*. Talk Title: Duality and algorithms for convex (nonlinear) mixed-integer optimization.
2. *Scientific Computing seminar, Institute of Applied Mathematics, University of British Columbia, Vancouver, Canada, March 2019*. Talk Title: Sublinearity in Integer Optimization.
3. *Optimization seminar, ETH Zurich, Zurich, Switzerland, May 2018*. Talk Title: Optimality of Gomory Cuts.
4. *Colloquium of the Dept. of Computational and Applied Mathematics (CAAM), Rice University, Houston, TX, USA, March 2018*. Talk Title: Discrete Optimization Techniques for Neural Networks.
5. *Colloquium of the Dept. of Operations Research and Information Engineering, Cornell University, Ithaca, NY, USA, January 2018*. Talk Title: Centerpoints: A Link Between Optimization and Convex Geometry.
6. *Integer programming seminar, IBM T.J. Watson Research Center, Yorktown Heights, NY, USA, March 2017*. Title: Understanding Deep Neural Networks with Rectified Linear Units.
7. *Discrete Optimization seminar, Georgia Institute of Technology, Atlanta, GA, USA, February 2017*. Title: Understanding Deep Neural Networks with Rectified Linear Units.

8. *Colloquium seminar for Department of Mathematical Sciences, George Mason University, Fairfax, VA, USA, April 2016.* Title: Projection: A Unified Approach to Semi-Infinite Linear Programs with applications to Convex Optimization.
9. *IEOR-DRO seminar, Columbia University, New York, NY, USA, February 2016.* Title: New Perspectives in Mixed-integer Optimization.
10. *Center for Scientific Computing and Mathematical Modeling (CSCAMM) seminar, U. Maryland-College Park, MD, USA, October 2015.* Title: Projection: A Unified Approach to Semi-Infinite Linear Programs with applications to Convex Optimization.
11. *Statistical Sciences and Operations Research (SSOR) and Discrete Mathematics seminar, Virginia Commonwealth University, Richmond, VA, USA, September 2015.* Title: Projection: A Unified Approach to Semi-Infinite Linear Programs with applications to Convex Optimization.
12. *Systems, Information, Learning and Optimization (SILO) seminar, U. Wisconsin-Madison, WI, USA, April 2015.* Title: On the Covering Property of the Lifting Region.
13. *Operations Research seminar, Carnegie Mellon University, Pittsburgh, PA, USA, October 2014.* Title: On the Covering Property of the Lifting Region.
14. *Operations Research and Discrete Math seminar, Clemson University, Clemson, SC, USA, October 2014.* Title: On the Covering Property of the Lifting Region.
15. *Optimization seminar, ETH Zurich, Zurich, Switzerland, May 2014.* Title: Projection: A Unified Approach to Semi-Infinite Linear Programs with applications to Convex Optimization.
16. *Colloquium seminar at Dept. of Mathematics, U.S. Naval Academy, Annapolis, MD, USA, March 2014.* Title: Recent Progress in Gomory and Johnson's Infinite Group Problem.
17. *Integer programming seminar, IBM T.J. Watson Research Center, Yorktown Heights, NY, USA, January 2014.* Title: Recent Progress in Gomory and Johnson's Infinite Group Problem.
18. *Management Science and Engineering dept. seminar, Stanford University, Palo Alto, CA, USA, February 2013.* Title: Mixed-Integer Linear Programming: A Solution Methodology.
19. *Colloquium seminar at ORIE, Cornell University, Ithaca, NY, USA, February 2013.* Title: Mixed-Integer Linear Programming: A Solution Methodology.
20. *Management Sciences seminar, University of Iowa, Iowa City, IA, USA, February 2013.* Title: Mixed-Integer Linear Programming: A Solution Methodology.
21. *Numerical Optimization seminar, Mathematical Institute, Oxford University, UK, January 2013.* Title: Fresh Developments in Discrete Optimization.
22. *Operations seminar, Booth School of Business, University of Chicago, Chicago, IL, USA, January 2013.* Title: Mixed-Integer Linear Programming: A Solution Methodology.
23. *Operations Research seminar, University of Michigan, Ann Arbor, MI, USA, January 2013.* Title: Mixed-Integer Linear Programming: A Solution Methodology.
24. *Trends in Optimization seminar, University of Washington, Seattle, WA, USA, October 2012.* Title: Corner Polyhedra and Maximal Lattice-Free Sets: A Geometric Approach to Cutting Planes
25. *Operations Research seminar, Massachusetts Institute of Technology, Boston, MA, USA, January 2012.* Title: Corner Polyhedra and Maximal Lattice-Free Sets: A Geometric Approach to Cutting Planes
26. *Quantitative Methods seminar, Purdue University, West Lafayette, IL, USA, January 2012.* Title: Corner Polyhedra and Maximal Lattice-Free Sets: A Geometric Approach to Cutting Planes



27. *Applied Mathematics and Statistics seminar, Johns Hopkins University, Baltimore, MD, USA, February 2012.* Title: Corner Polyhedra and Maximal Lattice-Free Sets: A Geometric Approach to Cutting Planes
28. *Algebra and Discrete Mathematics seminar, University of California, Davis, USA, October 2010.* Title: Geometry of Maximal Lattice-free Sets
29. *Operations Research seminar, Northwestern University, Chicago, IL, USA, January 2010.* Title: Corner Polyhedra and Maximal Lattice-Free Sets: A Geometric Approach to Cutting Planes
30. *Operations Research seminar, University of Michigan, Ann Arbor, MI, USA, January 2010.* Title: Corner Polyhedra and Maximal Lattice-Free Sets: A Geometric Approach to Cutting Planes.

### Invited Talks at Conferences and Workshops

1. *Discrete Optimization Talks (DOTs), virtual series on discrete optimization, July 2020.* Talk title: Provable complexity bounds for integer programming algorithms
2. *Mixed Integer Programming (MIP) conference, DIMACS, Rutgers University, NJ, USA, May 2020 (canceled due to COVID-19).* Talk title: Complexity of branch-and-bound and cutting plane algorithms.
3. *24<sup>th</sup> Aussois Combinatorial Optimization Workshop, Aussois, France, January 2020.* Talk title: Complexity of branch-and-bound and cutting plane algorithms.
4. *CRM/DIMACS Workshop on Mixed-Integer Nonlinear Programming, Université de Montréal, Montreal, Canada, October, 2019.* Talk title: Complexity of branch-and-bound and cutting plane algorithms.
5. *SAMSI semester on Foundations of Deep Learning (Opening Workshop), Statistical and Applied Mathematical Sciences Institute (SAMSI), Durham, NC, USA, August 2019.* Talk Title: Admissibility in stochastic optimization and deep learning.
6. *2<sup>nd</sup> Conference on Discrete Optimization and Machine Learning, RIKEN Center for Advanced Intelligence Project, Tokyo, Japan, July 2019.* Talk Title: Statistical decision theory perspectives on learning and stochastic optimization.
7. *5<sup>th</sup> Bay Area Optimization Meeting, University of Santa Cruz, Santa Cruz, CA, USA, May 2019.* Talk Title: Admissibility of solution estimators in stochastic optimization.
8. *23<sup>rd</sup> Aussois Combinatorial Optimization Workshop, Aussois, France, January 2019.* Talk Title: Admissibility of solution estimators in stochastic optimization.
9. *Theoretical Foundations of Deep Learning, Atlanta, GA, USA, October 2018.* Talk Title: Provable bounds on expressibility and training of neural networks.
10. *Modeling and OPTimization: Theory and Applications (MOPTA) conference, Bethlehem, PA, USA, August 2018.* Talk Title: Optimality of Gomory Cuts.
11. *International Symposium on Mathematical Programming (ISMP), Bordeaux, France, July 2018.* Talk Title: Optimality of Gomory Cuts.
12. *Optimization and Discrete Geometry : Theory and Practice, Tel Aviv University, Israel, April, 2018.* Talk Title: Discrete Geometry meets Machine Learning.
13. *INFORMS annual meeting, Houston, TX, USA, October 2017.* Title: Optimality of Gomory Cuts.
14. *SIAM Conference on Applied Algebraic Geometry, Atlanta, GA, USA, July 2017.* Title: Understanding Deep Neural Networks with Rectified Linear Units.
15. *INFORMS annual meeting, Nashville, TN, USA, November 2016.* Title: Centerpoints: A link between optimization and convex geometry.

16. *Modeling and OPTimization: Theory and Applications (MOPTA) conference, Bethlehem, PA, USA, August 2016.* Title: Centerpoints: A link between optimization and convex geometry.
17. *Workshop on Advances in Optimization (special workshop celebrating Prof. Shinji Mizuno's 60<sup>th</sup> birthday), Tokyo, Japan, August 2016.* Title: Centerpoints: A link between optimization and convex geometry.
18. *International Conference on Continuous Optimization (ICCOPT), Tokyo, Japan, August 2016.* Title: Projection: A Unified Approach to Semi-Infinite Linear Programs with applications to Convex Optimization.
19. *Integer Programming and Combinatorial Optimization (IPCO), Liege, Belgium, June 2016.* Title: Minimal cut-generating functions are nearly extreme.
20. *CORE@50: A Conference in honor of CORE's 50th anniversary, organized by Center for Operations Research and Econometrics (CORE), Louvain, Belgium, May 2016.* Title: The Lifting Problem in Cut-Generating Functions.
21. *Workshop on "Modern Techniques in Discrete Optimization: Mathematics, Algorithms and Applications", jointly organized by Casa Matemática Oaxaca and Banff International Research Station, Oaxaca, Mexico, November 2015.* Title: Introduction to Cut-Generating Functions.
22. *Mixed Integer Programming (MIP) conference, Chicago, IL, USA, June 2015.* Title: Approximate PSD Factorizations.
23. *International Symposium on Mathematical Programming (ISMP), Pittsburgh, PA, USA, July 2015.* Title: Techniques for the Infinite Group Problem.
24. *AMS spring eastern sectional meeting, Washington, D.C., March 2015.* Title: Techniques for the Infinite Group Problem.
25. *19<sup>th</sup> Aussois Combinatorial Optimization Workshop, Aussois, France, January 2015.* Title: Techniques for the Infinite Group Problem.
26. *Foundations of Computational Mathematics (FoCM) conference, Montevideo, Uruguay, December 2014.* Title: Projection: A Unified Approach to Semi-Infinite Linear Programs with applications to Convex Optimization,
27. *Combinatorial Optimization workshop, Oberwolfach, Germany, November 2014.* Title: On the Covering Property of the Lifting Region.
28. *SIAM conference on optimization, San Diego, CA, USA, May 2014.* Title: On the Sufficiency of Finite Support Duals in Semi-infinite Linear Programming.
29. *AMS spring eastern sectional meeting, Baltimore, MD, USA, March 2014.* Title: Recent Progress in Gomory and Johnson's Infinite Group Problem.
30. *18<sup>th</sup> Aussois Combinatorial Optimization Workshop, Aussois, France, January 2014.* Title: On the Unique-lifting property.
31. *INFORMS annual meeting, Minneapolis, MN, USA, October 2013.* Title: Recent Progress in Gomory and Johnson's Infinite Group Problem.
32. *International Symposium on Mathematical Programming (ISMP), Berlin, Germany, August 2012.* Title: A  $(k + 1)$ -slope theorem for the Infinite Group Problem.
33. *Bay Area Discrete Mathematics (BADMath) conference, University of California, Davis, USA, October 2011.* Title: A  $(k + 1)$ -slope theorem for the Infinite Group Problem.
34. *Mixed Integer Programming (MIP) conference, University of Waterloo, Ontario, Canada, June 2011.* Title: Unique Minimal Liftings for Minimal Inequalities.
35. *Discrete Optimization Workshop, Program on Optimization and its Applications at Institute for Pure and Applied Mathematics (IPAM), UCLA, Los Angeles, CA, USA, October 2010.* Title: Recent Trends in Cutting Planes for Mixed-Integer Linear Programs.

36. *INFORMS annual meeting, Austin, TX, November 2010*. Title: Intersection Cuts with Infinite Split Rank.
37. *INFORMS annual meeting, Austin, TX, November 2010*. Title: Convex Sets and Minimal Sublinear Functions.
38. *INFORMS annual meeting, Austin, TX, November 2010*. Title: On Lifting Integer Variables in Minimal Inequalities.
39. *Workshop on Multi-row Cuts, Bertinoro, Italy, November 2009*. Title: On Lifting Integer Variables in Minimal Inequalities.
40. *INFORMS annual meeting, San Diego, CA, USA, November 2009*. Title: On the Relative Strength of Two Row Cuts for MILPs.
41. *INFORMS annual meeting, San Diego, CA, USA, November 2009*. Title: Corner Polyhedra and Maximal Lattice-free Sets : A Geometric Approach to Cutting Plane Theory.
42. *International Symposium on Mathematical Programming (ISMP), Chicago, IL, USA, August 2009*. Title: A Counterexample to a Conjecture of Gomory and Johnson.

#### **Talks within Johns Hopkins University**

1. *Computer Science Theory seminar, April 2019*. Title: Admissibility of solution estimators in stochastic optimization.
2. *Computer Science department seminar, October 2017*. Title: Centerpoints: a link between optimization and convex geometry.
3. *Computer Science Theory seminar, November 2014*. Title: Cutting Planes and Geometry of Numbers.
4. *Applied Mathematics and Statistics department seminar, October 2014*. Title: On the Covering Property of the Lifting Region.
5. *Applied Mathematics and Statistics department seminar, October 2013*. Title: The “Infinite Group” Problem: Analysis and Combinatorics come together to solve Discrete Optimization

RESEARCH  
ADVISING

#### **Faculty mentor for postdoctoral researcher:**

1. Dr. Teresa Lebar, Ph.D.  
*Position at Hopkins:* Assistant Research Professor, Applied Math and Statistics, JHU.  
*Mentoring period:* January 2017–present.  
*First position:* Research scientist, Laboratory for Physical Sciences, College Park, MD, USA.

#### **Ph.D. Thesis advisor:**

Current:

1. Hongyi Jiang, Ph.D. candidate in Applied Math and Statistics, JHU.  
*Tentative Thesis Title:* TBD.  
*Advising period:* Advisee from January 2019–present.

Graduated:

1. Dr. Joseph Paat, Ph.D. in Applied Math and Statistics, JHU.  
*Thesis Title:* On the development of cut-generating functions.  
*Graduation date:* December 2016.  
*First position:* Postdoctoral researcher at the Institute for Operations Research, Department of Mathematics, ETH Zürich, Switzerland.

*Current position:* Assistant Professor (tenure-track), Sauder School of Business, University of British Columbia, Canada.

2. Sriram Sankaranarayanan (co-advised with Dr. Sauleh Siddiqui), Ph.D. in Civil Engineering, JHU.  
*Thesis Title:* Optimization with mixed-integer, complementarity and bilevel constraints with applications to energy and food markets  
*Graduation date:* October 2018.  
*First position:* Postdoctoral researcher in the Group for Research in Decision Analysis (GERAD), Polytechnique Montréal, Canada.
3. Anirbit Mukherjee, Ph.D. in Applied Math and Statistics, JHU.  
*Thesis Title:* A study of the mathematics of deep learning.  
*Graduation date:* June 2020.  
*First position:* Postdoctoral researcher in the Department of Statistics, The Wharton School, University of Pennsylvania.
4. Tu Nguyen, Ph.D. in Applied Math and Statistics, JHU.  
*Thesis Title:* Topics at the interface of optimization and statistics.  
*Graduation date:* July 2020.  
*First position:* Analyst, Quicken Loans.

**Ph.D. Thesis committee member** (not including Ph.D. advisees; \* indicates chair of committee):

1. Dr. Qi Wang, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Optimization with discrete simultaneous perturbation stochastic approximation using noisy loss function measurements.  
*Graduation date:* Fall 2013.
2. Dr. Stephen Chestnut, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Stream sketches, sampling and sabotage.  
*Graduation date:* Spring 2015.
3. Dr. Heng Weng\*, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Community detection using locality statistics.  
*Graduation date:* Fall 2015.
4. Dr. Yueling Loh, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Hybrid filter methods for nonlinear optimization.  
*Graduation date:* Spring 2016.
5. Dr. Hao Jiang, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Augmented Lagrangian based algorithms for nonconvex optimization with applications in subspace clustering.  
*Graduation date:* Spring 2016.
6. Dr. Lin Yang, Ph.D. in Computer Science, JHU.  
*Thesis Title:* Taming Big Data by Streaming.  
*Graduation date:* Fall 2017.
7. Dr. Tianyi Chen, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* A Fast Reduced-Space Algorithmic Framework for Sparse Optimization.  
*Graduation date:* Fall 2018.
8. Dr. Gaoran Yu\*, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Rigorous Bounds for Bond Percolation Thresholds of Three-dimensional Lattices.  
*Graduation date:* Fall 2018.

9. Dr. Elizabeth Reiland, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Interval Digraphs.  
*Graduation date:* Fall 2018.
10. Dr. Joshua Cape, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Statistical Analysis and Spectral Methods for Signal-Plus-Noise Matrix Models.  
*Graduation date:* Spring 2019.
11. Dr. Zeyu Zhang, Ph.D. in Computer Science, JHU.  
*Thesis Title:* Approximation Algorithms and Hardnesses for Compressing Graphs with Distance Constraints.  
*Graduation date:* Spring 2019.
12. Dr. Hongbin Chen, Ph.D. in Physics and Astronomy, JHU.  
*Thesis Title:* On Black Hole Information Paradox in AdS<sub>3</sub>/CFT<sub>2</sub>  
*Graduation date:* Spring 2019.
13. Dr. Kuan Cheng, Ph.D. in Computer Science, JHU.  
*Thesis Title:* Pseudorandom Constructions: Computing in Parallel and Applications to Edit Distance Codes  
*Graduation date:* Summer 2019.
14. Dr. Jeffrey (Heshy) Roskes, Ph.D. in Physics and Astronomy, JHU.  
*Thesis Title:* A boson learned from its context, and a boson learned from its end  
*Graduation date:* Fall 2019.
15. Dr. Yuliang Li, Ph.D. in Applied Mathematics and Statistics, JHU.  
*Thesis Title:* Novel Bayesian clustering methods for biomedical applications  
*Graduation date:* Summer 2020.
16. Dr. Kim V. Berghaus, Ph.D. in Physics and Astronomy, JHU.  
*Thesis Title:* Minimal thermal friction in cosmology  
*Graduation date:* Summer 2020.

**Master's thesis and project advisor:**

1. Paul Markakis (M.S. in Applied Math and Statistics, JHU, 2015).
2. Guanyi Wang (M.S. in Applied Math and Statistics, JHU, 2016).
3. Xiaochen Shi (M.S. in Applied Math and Statistics, JHU, 2016), co-advised with Tamás Budavári.
4. Lenny Fan (M.S. in Applied Math and Statistics, JHU, 2017), co-advised with Tamás Budavári.
5. Fan Tian (M.S. in Applied Math and Statistics, JHU, 2018), co-advised with Tamás Budavári.

**Master's thesis committee member:**

1. Brandon Crain (M.S. in Mathematics, UC Davis, 2012).

TEACHING

**Graduate courses**

*Johns Hopkins University*

1. **AMS 550.672: Graph Theory**, Spring 2014, 2015, 2016 at Johns Hopkins U.  
Introduction to graph theory: basic definitions, connectivity, trees, matchings, colorings, planarity, random graphs.

Course Evaluation:

Spring 2016:

Enrollment: 22, Overall course quality: 4.88/5.0, Overall instructor evaluation: 4.75/5.0

Spring 2015:

Enrollment: 14, Overall course quality: 4.82/5.0, Overall instructor evaluation: 4.91/5.0

Spring 2014:

Enrollment: 15, Overall course quality: 4.67/5.0, Overall instructor evaluation: 4.67/5.0

2. **AMS 550.666: Combinatorial Optimization**, Fall 2013, 2014, 2015, Spring 2017, 2018, 2019 at Johns Hopkins U.

Graduate level introduction to standard techniques of combinatorial optimization: flow problems, matching theory, polyhedral combinatorics, semidefinite optimization techniques, matroids.

Course Evaluation:

Spring 2020:

Enrollment: 9, Overall course quality: 4.57/5.0, Overall instructor evaluation: 4.71/5.0

Spring 2019:

Enrollment: 19, Overall course quality: 4.89/5.0, Overall instructor evaluation: 4.89/5.0

Spring 2018:

Enrollment: 13, Overall course quality: 4.85/5.0, Overall instructor evaluation: 5.0/5.0

Spring 2017:

Enrollment: 13, Overall course quality: 4.83/5.0, Overall instructor evaluation: 4.67/5.0

Fall 2015:

Enrollment: 11, Overall course quality: 4.83/5.0, Overall instructor evaluation: 5.0/5.0

Fall 2014:

Enrollment: 13, Overall course quality: 4.80/5.0, Overall instructor evaluation: 5.0/5.0

Fall 2013:

Enrollment: 18, Overall course quality: 4.55/5.0, Overall instructor evaluation: 4.45/5.0

3. **AMS 553.761: Nonlinear Optimization I**, Fall 2018 at Johns Hopkins U.

Graduate level introduction to standard techniques of unconstrained nonlinear, nonconvex optimization: optimality conditions, Newton's method for nonlinear equations, line search methods, trust region methods, conjugate gradient, least squares, numerical analysis issues in optimization.

Course Evaluation:

Fall 2019:

Enrollment: 21, Overall course quality: 4.40/5.0, Overall instructor evaluation: 4.74/5.0

Fall 2018:

Enrollment: 36, Overall course quality: 4.35/5.0, Overall instructor evaluation: 4.56/5.0

4. **AMS 550.865: Optimization and Discrete Math**, Spring 2016 at Johns Hopkins U. Reading course focused on recent research papers in convex and combinatorial optimization. Jointly run with Daniel Robinson.

Course Evaluation:

Spring 2016:

Enrollment: 6, Overall course quality: 5.0/5.0, Overall instructor evaluation: N/A

University of California, Davis

1. I have led a *Research Focus Group (RFG)* under the framework of the NSF-funded VIGRE program in the Department of Mathematics at UC Davis for the 2011–2012 academic year. This involved running regular research seminars, mini courses and workshops over the course of the 2010–2011 academic session, focused towards applications of convex geometry. Duties involved giving expository lectures to a group of 10–15 mathematics Ph.D. students and faculty, organizing presentations by participants and outside speakers, holding discussions and encouraging motivated Ph.D. students to attack open problems.

Course Evaluation: N/A

TEACHING  
(CONT'D)

Carnegie Mellon University

1. I co-taught **Advanced Integer Programming** (with Gérard Cornuéjols) at Carnegie Mellon University in Spring 2010. This is a core course for Ph.D. students in the Operations Research and ACO programs at Carnegie Mellon University.

Course Evaluation: N/A

Undergraduate courses

Johns Hopkins University

1. **AMS 553.465: Introduction to Convexity**, Fall 2016, 2017 at Johns Hopkins U. Convex sets: Basic definitions and examples, separating hyperplane theorems, Helly-Caratheodory-Radon type theorems, Farkas' lemma and Polyhedral theory; Convex functions: subdifferential calculus, support functions and gauges; Convex optimization: sub-gradient, ellipsoid, interior-point methods, discussion of LP as a special case.

Course Evaluation:

Fall 2018:

Enrollment: 17, Overall course quality: 4.75/5.0, Overall instructor evaluation: 4.81/5.0

Fall 2017:

Enrollment: 12, Overall course quality: 4.91/5.0, Overall instructor evaluation: 4.91/5.0

Fall 2016:

Enrollment: 12, Overall course quality: 5.0/5.0, Overall instructor evaluation: 5.0/5.0

2. **AMS 550.472: Graph Theory**, Spring 2014, 2015, 2016 at Johns Hopkins U. Introduction to graph theory: basic definitions, connectivity, trees, matchings, colorings, planarity, random graphs.

Course Evaluation:

Spring 2016:

Enrollment: 19, Overall course quality: 4.37/5.0, Overall instructor evaluation: 4.53/5.0

Spring 2015:

Enrollment: 8, Overall course quality: 5.0/5.0, Overall instructor evaluation: 4.86/5.0

Spring 2014:

Enrollment : 11, Overall course quality: 4.38/5.0, Overall instructor evaluation: 4.5/5.0

University of California, Davis

1. **MAT 25: Advanced Calculus**, Spring 2013 at UC Davis.

Introduction to the rigorous treatment of abstract mathematical (real) analysis.

Course Evaluation:

Enrollment : 59, Overall course quality: 4.5/5.0, Overall instructor evaluation: 4.7/5.0

2. **MAT 165: Mathematics and Computers**, Fall 2012 at UC Davis.

Introduction to computational mathematics and symbolic computation via the study of computational algebraic geometry.

Course Evaluation:

Enrollment : 23, Overall course quality: 4.5/5.0, Overall instructor evaluation: 4.4/5.0

3. **MAT 17B: Calculus for Biology & Medicine**, Fall 2012, Spring 2012, Fall 2011 at UC Davis.

This is the second course in the calculus series offered to biology majors at UC Davis.

Course Evaluation:

Fall 2012:

Enrollment : 149, Overall course quality: 4.7/5.0, Overall instructor evaluation: 4.9/5.0

Spring 2012:

Enrollment : 95, Overall course quality: 4.8/5.0, Overall instructor evaluation: 4.9/5.0

Fall 2011:

Enrollment : 145, Overall course quality: 4.4/5.0, Overall instructor evaluation: 4.5/5.0

4. **MAT 16A: Short Calculus I**, Spring 2012 at UC Davis.

This is the first course in the entry-level calculus series offered at UC Davis.

Course Evaluation:

Enrollment : 225, Overall course quality: 4.5/5.0, Overall instructor evaluation: 4.7/5.0

5. **MAT 16B: Short Calculus II**, Spring 2011 at UC Davis.

This is the second course in the entry-level calculus series offered at UC Davis.

Course Evaluation:

Enrollment : 89, Overall course quality: 4.4/5.0, Overall instructor evaluation: 4.5/5.0



6. **MAT 16C: Short Calculus III**, Spring 2011 at UC Davis.

This is the third and final course in the entry-level calculus series offered at UC Davis.

Course Evaluation:

Enrollment : 83, Overall course quality: 4.0/5.0, Overall instructor evaluation: 4.1/5.0

SERVICE

**Professional Service**

- Associate Editor, *Mathematics of Operations Research*, 2013–present.
- Associate Editor, *Discrete Optimization*, 2017–present.
- Chair, 2021 Albert W. Tucker prize committee, *Mathematical Optimization Society*.
- Program committee member, *Integer Programming and Combinatorial Optimization (IPCO) conference*, 2019, 2020.
- Program committee member, *International Symposium on Combinatorial Optimization (ISCO) conference*, 2018, 2020.
- Peer Review Panel member, *National Science Foundation (NSF)*, 2014, 2016, 2019.
- Peer Review of grant proposals, *National Fund for Scientific and Technological Development (FONDECYT)*, Chile, 2019.
- Peer Review of grant proposals, *Nederlandse Organisatie voor Wetenschappelijk Onderzoek (Dutch Research Council)*, Netherlands, 2020.
- Special Session organizer, *Joint Mathematics Meetings*, January 2019 (co-organized with Jesús De Loera).
- Vice Chair (Integer and Discrete Optimization), *INFORMS Optimization Society*, 2015–2017.
- Conference Cluster Chair (Integer and Discrete Optimization), *INFORMS Optimization Society meeting*, 2018.
- Conference Cluster Chair (Integer and Discrete Optimization), *INFORMS annual meeting*, 2015–2017.
- Chair, Program committee for the *Mixed Integer Programming (MIP) 2014* conference.
- Program committee member, *Mixed Integer Programming (MIP) 2013* conference.
- Program committee member, *Bay Area Discrete Math (BADMath) conference*, 2012–2013.
- Chair, Local organization committee, *Mixed Integer Programming (MIP) 2012* conference.
- Review Work and Technical Referee for the following:

Journals:

1. *Mathematical Programming Series A, B and C*
2. *Mathematics of Operations Research*
3. *SIAM Journal on Optimization*
4. *SIAM Journal on Discrete Mathematics*
5. *SIAM Journal on Applied Algebra and Geometry*
6. *Operations Research*
7. *Operations Research Letters*
8. *Discrete Optimization*
9. *INFORMS Journal on Computing*

10. *INFORMS Journal on Optimization*
11. *Journal of Optimization Theory and Applications*
12. *Computational Optimization and Algorithms*
13. *Naval Research Logistics*
14. *European Journal of Operational Research*
15. *Discrete Applied Mathematics*
16. *Journal of Mathematical Analysis and Applications*
17. *International Journal of Computational Geometry and Applications*
18. *London Mathematical Society's Journal of Computation and Mathematics*
19. *Bulletin of the Iranian Mathematical Society*

Conferences:

1. *Integer Programming and Combinatorial Optimization (IPCO)*
  2. *European Symposium on Algorithms (ESA)*
  3. *Latin and American Algorithms, Graphs and Optimization Symposium (LAGOS)*
  4. *Symposium on Discrete Algorithms (SODA)*
  5. *International Conference on Artificial Intelligence and Statistics (AISTATS)*
  6. *International Conference on Machine Learning (ICML)*
  7. *International Symposium on Combinatorial Optimization (ISCO)*
- Memberships:
    1. Mathematical Optimization Society (MOS), 2009–present.
    2. Institute for Operations Research and Management Sciences (INFORMS), 2008–2010, 2013, 2015–2018.
    3. Society for Industrial and Applied Mathematics (SIAM), 2014–2015, 2019 – present.
    4. American Mathematical Society (AMS), 2018 – present.