Olin College of Engineering ♦ 1000 Olin Way ♦ Needham, MA 02492 ♦ Phone: 781-292-2558 ♦ E-mail: dshuman@olin.edu

## EDUCATION

2004 – 2010	<ul> <li>University of Michigan</li> <li>Ph.D., Electrical Engineering: Systems</li> <li>M.S., Applied Mathematics</li> <li>M.S., Electrical Engineering: Systems</li> <li>GPA: 4.14/4.00</li> <li>Major: Communications; Minor: Control</li> <li>Thesis advisor: Prof. Mingyan Liu</li> <li>Thesis title: "From sleeping to stockpiling: Energy conservation via stochastic scheduling in wirely</li> </ul>	Ann Arbor, MI (April 2010) (May 2009) (May 2006)
1997 – 2001	<ul> <li>Stanford University</li> <li>M.S., Engineering-Economic Systems &amp; Operations Research</li> <li>B.A., Economics, with a Minor in Computer Science</li> <li>GPA: 3.88/4.00 (M.S.); 3.74/4.00 (B.A.)</li> <li>Elected to Phi Beta Kappa</li> <li>Studied abroad at Oxford University, England, Spring 2000</li> <li>Master's project: "Dynamic allocation of R&amp;D funding across a portfolio of electricity generation while facing uncertain technical success," in conjunction with the Electric Power Research Institut</li> </ul>	Stanford, CA technologies te (EPRI)
1993 – 1997 Slumma dv (	<ul> <li>Phillips Academy</li> <li>Elected to Cum Laude Society</li> </ul>	Andover, MA
SUMMARY (	DF ACADEMIC INTERESTS	

Research Interests:	• <b>Signal processing on graphs</b> , including ranked choice voting, multiscale transforms, computational harmonic analysis, sparse approximation theory, dictionary learning, and polynomial approximations for fast, distributed processing
	• Stochastic control, including resource allocation and stochastic scheduling problems, energy-efficient design of wireless communication networks, inventory theory, and approximate dynamic programming
Teaching Interests:	• Data science (all levels), signal processing, linear algebra, computational linear algebra, probability and stochastic processes, statistical modeling, machine learning, optimization, network science, and spectral graph theory

## ACADEMIC POSITIONS

2022 - Current	Professor, Data Science and Applied Mathematics, Franklin W. Olin College of Engineering Needham, MA	
2019 - 2022	<ul> <li>Associate Professor, Department of Mathematics, Statistics, and Computer Science, Macalester College St. Paul, M</li> <li>Data Science Coordinator, 2015 – 2022</li> <li>Math Coordinator, 2021 – 2022</li> </ul>	
2014 - 2018	Assistant Professor, Department of Mathematics, Statistics, and Computer Science, Macalester College St. Paul, MN	
2010 - 2013	<ul> <li>Postdoctoral Researcher, Ecole Polytechnique Fédérale de Lausanne (EPFL)</li> <li>Advisors: Prof. Pierre Vandergheynst and Prof. Pascal Frossard</li> <li>Researched new techniques for processing data on graphs, including multiscale analysis methods and efficient distributed optimization techniques</li> <li>Applications included data analysis for social and transportation networks, distributed signal processing in sensor and camera networks, image processing, statistical learning problems, and analysis of astrophysical data</li> </ul>	
2006 - 2010	<ul> <li>Graduate Student Research Assistant, University of Michigan</li> <li>Conducted research on stochastic scheduling, estimation, and resource allocation problems in communications networks</li> <li>Applications included wireless multimedia streaming, duty cycling and clock calibration of wireless sensor networks, and soil moisture smart sensor webs</li> </ul>	

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## AWARDS, FELLOWSHIPS, AND GRANTS

2023	<b>Recipient</b> , the 2023 IEEE Signal Processing Society Best Paper Award, which honors "a paper of exceptional merit," for the 2018 paper "Distributed signal processing via Chebyshev polynomial approximation"	
2023	<b>Recipient</b> , the 2023 IEEE Signal Processing Society Outstanding Editorial Board Member Award, honoring "outstanding editorial board service for the IEEE Transactions on Signal and Information Processing Over Networks"	
2016	<b>Recipient</b> , the 2016 IEEE Signal Processing Magazine Best Paper Award, which honors "an article of exceptional merit and broad interest," for the 2013 paper "Signal processing on graphs: Extending high-dimensional data analysis to networks and other irregular domains"	
2014 - 2015	<b>Fellow</b> , Project NExT (New Experiences in Teaching), Mathematical Association of America. Project NExT is a professional development program to improve young faculty's teaching, research, and service skills in undergraduate mathematics	
2010	<b>Co-Author</b> , grant application for a project on signal processing on graphs that was awarded CHF 161,135 (approx. \$190,000) by the Swiss National Science Foundation	
2010	<b>Recipient</b> , the Distinguished Achievement Award from the University of Michigan College of Engineering, awarded annually to one student in each department based on research, leadership, and academic performance	
2000 - 2001	Semifinalist, Stanford Entrepreneur's Challenge business plan competition	

#### **TEACHING EXPERIENCE**

2022 - Current	urrent Instructor and Co-Instructor, Franklin W. Olin College of Engineering		
	<ul> <li>ENGX 2000 – Quantitative Engineering Analysis 1 (Fall 2022, Fall 2023)</li> </ul>		
	<ul> <li>ENGX 2005 – Quantitative Engineering Analysis 2 (Spring 2023)</li> </ul>		
	<ul> <li>MTH 2130 – Probability and Statistics: Probabilistic Modeling (Fall 2022)</li> </ul>		
	• ENGR 3531 / MTH 2131 – Data Science With an Eye Towards Sustainability (Spring 2	.024)	
2014 - 2022	Instructor, Macalester College	St. Paul, MN	
	• STAT/COMP 112 – Introduction to Data Science (Fall 2018, Fall 2021)		
	• STAT 155 – Introduction to Statistical Modeling (Spring 2014, Spring 2019, Spring 202	21)	
	• MATH 236 – Linear Algebra (Fall 2014, Fall 2015, Fall 2016)	,	
	• MATH 254 – Probability and Mathematical Statistics (Fall 2015, Spring 2016)		
	• MATH/STAT 354 – Probability (Fall 2019, Fall 2020, Spring 2021)		
	<ul> <li>MATH/STAT/COMP 365 – Computational Linear Algebra (Spring 2014, Spring 2015, Spring 2016 Spring 2022)</li> </ul>		
	• MATH 437 – Signal Processing (Fall 2014, Fall 2016, Fall 2018, Fall 2021)		
	• MATH 494 (now STAT/COMP 456) – Projects in Data Science (Fall 2017)		
2018 – 2021	<ul> <li>Instructor, Data Science and Statistics Boot Camps Minneapolis, MN and Wayzata, MN</li> <li>Taught three to five day workshops to build the statistical, data, and computing literacy of mathematics Ph.D. students attending the Math-to-Industry Boot Camp at the Institute for Math and its Applications (IMA) at the University of Minnesota (June 2019, June 2020, June 2021)</li> <li>Taught a four-day data science workshop for approximately 30 employees of Cargill (October 2018)</li> </ul>		
Fall 2011	<b>Co-Instructor</b> , Ecole Polytechnique Fédérale de Lausanne (EPFL)	Lausanne, Switzerland	
and Fall 2012	• EE-204 – Circuits and Systems I (with Prof. Volkan Cevher)		
	• Prepared and gave some lectures to 125-150 students, led recitation and MATLAB sessions, revamped the syllabus, chose the homework problems, wrote the exams, and managed a team of six teaching assistants		
2010 - 2013	Informal Instructor, Signal Processing Laboratories, EPFL	Lausanne. Switzerland	
	• Taught selected topics in convex optimization and spectral graph theory in weekly lab n	neetings	
Fall 2007	Graduate Student Instructor, University of Michigan	Ann Arbor, MI	
	EECS 401 – Probabilistic Methods in Engineering		
Summer 1999	Teaching Assistant, Labor Economics class, Stanford Sophomore College Stanford, CA		
1995 – 1999	Volunteer Tutor in English, Algebra, and Calculus Andover, MA; Lawrence,	in English, Algebra, and Calculus Andover, MA; Lawrence, MA; and East Palo Alto, CA	

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## STUDENT ADVISING AND MENTORING EXPERIENCE

2022 – Current	<ul> <li>Supervisor, Undergraduate Research Group on Signal Processing on Graphs         Franklin W. Olin College of Engineering Needham, MA     </li> <li>Work closely with four to six Olin undergraduate research students on a weekly basis during academic year and a daily basis during the summer, teaching them about signal processing and graph theory, developing their abilities to read journal articles and conduct numerical experiments, and providing feedback on their communication     </li> </ul>	
2022 – Current	Academic Advisor, Franklin W. Olin College of Engineering       Needham, MA         • Official academic advisor for 10-15 students, and informal advisor to others       Needham, MA	
2022 – Current	<ul> <li>Capstone Advisor, Franklin W. Olin College of Engineering Needham, MA</li> <li>Subject matter expert for student team developing an open, interactive roadway high injury network map to better understand equity and other contextual factors</li> <li>Subject matter expert for student team developing environmental, social, and governance (ESG) investing metrics</li> </ul>	
2023	<ul> <li>BOW DataFest Organizer and Mentor, Franklin W. Olin College of Engineering Needham, MA</li> <li>Initiated and coordinated Babson, Olin, and Wellesley College (BOW) participation in this weekend-long, national undergraduate data science competition, in which over 70 BOW students participated</li> </ul>	
2023	<ul> <li>Doctoral Thesis Committee Member</li> <li>Elie Chedemail, ENSAI École Nationale de Statistique et Analyse de l'Information, Cesson-Sévigné, France</li> </ul>	
Summer 2020, Summer 2019, Summer 2018, Summer 2017, Summer 2015	<ul> <li>Supervisor, Undergraduate Research Group on Signal Processing on Graphs, Macalester College St. Paul, MN</li> <li>Led diverse research groups of up to four Macalester students that included at least half women and at least half international students, from countries including Jamaica and China</li> <li>Worked closely with the students on a daily basis, teaching them about signal processing and graph theory, developing their abilities to read journal articles, encouraging them to use numerical experimentation to investigate new mathematical ideas, and providing feedback on their oral and written communication</li> <li>Ran the ten week programs like an REU, with students giving formal presentations, presenting at a poster session, writing a final technical report, and incorporating their code into an open access toolbox</li> <li>Students presented their findings at research conferences and workshops <ul> <li>"Signal processing on the permutahedron: New analysis tools for ranked choice data," Ellen Chen and Jennifer DeJong, poster presentation at the 2019 Midstates Consortium for Math and Science Undergraduate Research Symposium</li> <li>"Spectrum-adapted polynomial approximation for matrix functions," Tiffany Fan, poster presentation at the 2019 Graph Signal Processing Workshop</li> <li>"An M-channel critically sampled filter bank for graph signals," Yan Jin, oral presentation at the 2017 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)</li> <li>"Graph reduction methods for multiscale dictionary designs," Andre Archer, Stefan Faridani, Yan Jin and Elle Weeks, poster presentation at the 2016 Joint Mathematics Meetings</li> <li>Published two conference napers and three iournal articles with Macalester undergraduates (see below for details)</li> </ul> </li> </ul>	
2014 - 2022	Academic Advisor, Mathematics, Statistics, and Computer Science, Macalester College       St. Paul, MN         • Official academic advisor for 8-10 students at a time, and informal advisor and mentor to numerous others	
2015 – 2021	<ul> <li>Undergraduate Honors Thesis Advisor, Macalester College St. Paul, MN</li> <li>Yilin (Ellen) Chen, Mathematics, 2021 (co-advisor), now a Ph.D. student at University of Chicago, Computational and Applied Mathematics</li> <li>Tiffany Fan, Mathematics, 2019, now a Ph.D. student at Stanford University, Institute for Computational &amp; Mathematical Engineering</li> <li>Shuni Li, Mathematics, 2018, now a Ph.D. student at University of California, Berkeley, Statistics</li> <li>Zhaoqi Li, Mathematics, 2018 (co-advisor), now a Ph.D. student at University of Washington, Statistics</li> <li>Yan Jin, Mathematics, 2016, now a Ph.D. student at M.I.T., Institute for Data, Systems, and Society</li> </ul>	
2014 - 2022	Undergraduate Honors Thesis Committee Member, Macalester CollegeSt. Paul, MN• Daniel Chechelnitsky, Computer Science, 2022Matt Zhang, Economics, 2021• Matt Zhang, Economics, 2021Tayeb Zaidi, Physics, 2017• Cory Stern, Economics, 2016Sophors Khut, Mathematics, 2014	

• Ruby Byrne, Physics, 2014

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## STUDENT ADVISING AND MENTORING EXPERIENCE (cont.)

2016 – 2022	<ul> <li>Capstone Advisor, Mathematics, Statistics, and Computer Science, Macalester College</li> <li>Henry Bell, Aaron Gould, Elizabeth Schnaubelt, Nadav Skloot, Claire Wilson, 2022</li> <li>Yilin (Ellen) Chen, Aidan Toner-Rogers, 2021</li> <li>Tiffany Fan, Tianyou Li, Gloria Odoemelam, Ana Pooley, Qian Wang, 2019</li> <li>Aaron Haefner, Eli Lilleskov, Alex Webb, Zun Yin, 2017</li> <li>Yan Jin, Jamie Morrow, Charles Park, Cory Stern, Hayley Williams, and Hanyue Xu, 2016</li> <li>Brittany Ehmann, Eli Liebman, Sam Naden, Zixiao Wang, and Jared Willard, 2015</li> </ul>	St. Paul, MN
2016 - 2022	<ul> <li>2022 Data Science for Social Good (DS4Good) Club Advisor, Macalester College</li> <li>Initiated and advised this student organization, which worked closely with Twin Cities non-profit organizations on data science projects</li> </ul>	
2016 - 2022	<ul> <li>DataFest Organizer and Mentor, Macalester College</li> <li>Initiated and coordinated Macalester's participation in this weekend-long, national undergraduate data science competition, in which 50-75 Macalester students participated each year</li> </ul>	St. Paul, MN
2014 - 2022	<ul> <li>Ad Hoc Mentor, student organizations such as Women in MSCS and Macalester Consulting Group, Macalester College</li> <li>Presented insights on my consulting and financial services experience, as well as job searching tips</li> <li>Helped Women in MSCS organize a workshop on salary negotiation and the pay gap</li> </ul>	St. Paul, MN
2016 - 2022	Pre-Engineering Advisor, Macalester College	St. Paul, MN
2010 - 2013	Master's Thesis Co-Supervisor and Mentor, Signal Processing Laboratories, EPFLLausa• Co-supervised the master's theses of Mohammadjavad Faraji and Nathanael Perraudin	nne, Switzerland

#### SERVICE TO THE PROFESSION

2023	Panel Reviewer, National Science Foundation, Computer and Information Science and Engineering (CISE)		
2021 – Current	<ul> <li>Associate Editor, IEEE Transactions on Signal Processing</li> <li>Manage the peer review process for approximately 25-35 manuscripts per year</li> </ul>		
2019 - 2022	<ul> <li>Associate Editor, IEEE Transactions on Signal and Information Processing over Networks</li> <li>Managed the peer review process for approximately 10-15 manuscripts per year</li> </ul>		
2022	External Department Reviewer, Computer Science and Data Science programs		
2017 - 2019	<ul><li>Associate Editor, IEEE Signal Processing Letters</li><li>Managed the peer review process for approximately 30-40 manuscripts per year</li></ul>		
2019	Technical Chair and Co-Organizer, 2019 Graph Signal Processing Workshop		
2015 - 2018	Technical Program Committee Member, IEEE Global Conference on Signal and Information Processing		
2015	Co-Organizer, panel on "Preparing a Successful Grant Application" at the 2015 Joint Mathematics Meetings		
2012 - 2014	<b>Co-Organizer and Co-Editor</b> , special session on "Localization, Diversity, and Uncertainty in Signal Representations" at the 2012 European Signal Processing Conference and June 2014 special issue of Advances in Computational Mathematics on the same subject		
2011	<b>Organizer</b> , three-day workshop for the European project UNLocX (uncertainty principles versus localization properties), which was attended by team members from six universities and multiple companies		
2007 – Current	<b>Reviewer for journals</b> such as Applied and Computational Harmonic Analysis, IEEE Transactions on Signal Processing, IEEE Transactions on Signal and Information Processing over Networks, IEEE Signal Processing Magazine, IEEE Journal of Selected Topic in Signal Processing, IEEE Signal Processing Letters, IEEE Transactions on Information Theory, Journal of Fourier Analysis and Applications, Proceedings of the IEEE, IEEE/ACM Transactions on Networking, IEEE Communications Letters, IEEE Transactions on Communications, IEEE Transactions on Mobile Computing, and IEEE Transactions on Vehicular Technology		

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#### SERVICE TO THE PROFESSION (cont.)

2007 – Current **Reviewer for conferences** such as the IEEE Global Conference on Signal and Information Processing, the IEEE International Conference on Acoustics, Speech and Signal Processing, the Graph Signal Processing Workshop, the Conference on Neural Information Processing Systems, the European Signal Processing Conference, the IEEE Statistical Signal Processing Workshop, the IEEE International Conference on Communications, and the IEEE

#### SERVICE TO THE COLLEGE

2022 - 2024	DEI Champion, Franklin W. Olin College of Engineering		
	<ul> <li>Integrated longitudinal student data (e.g., alumni and BCSSE/NSSE surveys) to perform a quantitative study of racial equity in Olin students' sense of belongingness, participation in high impact practices, academic success, and post-graduation outcomes</li> <li>Participated in the monthly workshops and trainings of the Racial Equity and Justice Institute at Bridgewater State</li> </ul>		
	University		
2022 - 2024	Member of the Admissions Committee, Franklin W. Olin College of Engineering		
2020 - 2022	<ul> <li>Elected Member of the Strategic Planning and Analysis Committee, Macalester College</li> <li>Primary author of the <u>Macalester Financial Model Overview document</u></li> <li>Co-led numerous sessions to educate Macalester students, staff, and faculty about the College's finances and connections to strategy, in preparation for the 2021-2022 strategic planning process</li> </ul>		
2021 - 2022	Member of the Task Force on the Budget, Macalester College		
2021 - 2022	Member of Presidential Task Force on Student Employment, Macalester College		
2020 - 2021	Co-Author of the Biennial Faculty Salary Audit, Macalester College		
2020 - 2021	Member of the COVID-19 Surveillance Testing Design Team, Macalester College		
2019 - 2020	Participant in the Academic Leadership Seminar, Macalester College		
Sep. 2018	<b>Participant</b> , Faculty Career Enhancement Conference: Collaboration to Address 21 <sup>st</sup> Century Challenges in Liberal Education through Inclusive Communities of Practice, Associated Colleges of the Midwest, Rosemont, IL		
Fall 2016	Participant in the Faculty Learning Community on Advising and Inclusivity, Macalester College		

### SERVICE TO THE DEPARTMENT

2015 – 2022	<ul> <li>Data Science Coordinator, Macalester College</li> <li>Co-developed a new Introduction to Data Science course with three statistics and computer science colleagues, and developed a new Projects in Data Science course</li> <li>Played a leading role in curriculum revisions that resulted in a new Minor in Data Science (2015), a new Major in Data Science (2021), and a new Major in Statistics (2021)</li> <li>Initiated and organized weekend-long DataFest competition each year</li> <li>Initiated and supported the Data Science for Good (DS4Good) student organization by connecting student leaders to partner organizations in the Twin Cities</li> <li>Approved all student data science minor plans (over 100 since the program was introduced); advised students on data science graduate school programs; and connected students to employers hiring data scientists</li> <li>Co-led introductory data science training workshops for Macalester faculty to foster new collaborations across departments and divisions and generate broader participation in the data science program</li> <li>Participated in the AALAC Big Data Workshop (Jan. 2016) and the AALAC Workshop on Data Science in the Liberal Arts (Spring 2021), both focused on data science curriculum development</li> </ul>
2021 - 2022	<ul> <li>Math Coordinator, Macalester College</li> <li>One of two area coordinators who worked closely with the Chair to lead the department</li> <li>Served as the point person for visiting faculty; managed the hiring of new visiting faculty; planned the course schedule; organized and led monthly meetings for math faculty; and approved students' major and minor plans</li> </ul>

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## SERVICE TO THE DEPARTMENT (cont.)

2019 – 2022	<ul> <li>Candidate Review Committee Member, Macalester College</li> <li>Taryn Flock, pre-tenure review, 2021</li> <li>Lisa Lendway, NTT series review, 2020</li> <li>Lauren Milne, pre-tenure review, 2020</li> <li>Will Mitchell, pre-tenure review, 2020</li> <li>Brianna Heggeseth, tenure review, 2019</li> <li>Lori Ziegelmeier, tenure review, 2019</li> </ul>
2015 - 2019	<ul> <li>Faculty Search Committee Member, Macalester College</li> <li>Statistics, 2019 (hired Kelsey Grinde)</li> <li>Mathematics, 2018-2019 (hired Taryn Flock)</li> <li>Applied Mathematics, 2018-2019 (hired Will Mitchell)</li> <li>Statistics, 2017-2018 (hired Brianna Heggeseth and Leslie Myint)</li> <li>Statistics, 2016-2017 (no hire)</li> <li>Computer Science, 2015-2016 (hired Bret Jackson)</li> </ul>
2016 - 2017	Co-Organizer, Department Seminar Series, Mathematics, Statistics and Computer Science, Macalester College
2014 - 2017	<ul> <li>Library Liaison, Mathematics, Statistics and Computer Science, Macalester College</li> <li>Undertook a comprehensive review of the data science literature, and updated the library's collection accordingly</li> </ul>

### CORPORATE WORK EXPERIENCE

2001 - 2004	Senior Analyst, Monitor Group	New York, NY; London, England; and Cambridge, MA
(Intern in 2000)	Worked for the investment banking division of a global str	ategy consulting firm
	Structured and developed valuation models and financial analyses	
	• Researched in-depth company information, industry tre	ends, and emerging technologies
	Designed and analyzed strategic options available to client companies	
	• Interacted with senior clients (e.g. CEO, CFO, Head of Strategy), lawyers, and financial advisors	
	Sample mergers and acquisitions advisory and strategy con	sulting projects:
	<ul> <li>Advised a blue-chip private equity firm on a ~\$100m acquisition of a European telecommunication services business</li> </ul>	
	<ul> <li>Helped a leading global consumer electronics company develop the structure, scope, and business plan for a new interactive television entity</li> </ul>	
	Advised a fiber-optics technology company on acquisit aerospace sector	ion and licensing opportunities in the
Summer 1999	Information Technology Intern, Federal Home Loan Bar	nk Boston, MA
	• Configured and installed new computers; maintained us	ser support line
Summer 1997	<ul><li>Network Engineer Intern, Raytheon Corporation</li><li>Collaborated with a team of 14 engineers on an overhand</li></ul>	ul of the network infrastructure

SOFTWARE	
GSPBox:	<ul> <li>MATLAB and Python graph signal processing toolbox available at https://lts2.epfl.ch/gsp/</li> <li>N. Perraudin, J. Paratte, D. Shuman, L. Martin, V. Kalofolias, P. Vandergheynst, and D. K. Hammond, "GSPBOX: A toolbox for signal processing on graphs," <i>arXiv e-print</i>, August 2014.</li> </ul>
UnLocBoX:	<ul> <li>MATLAB convex optimization toolbox available at https://lts2.epfl.ch/unlocbox/</li> <li>N. Perraudin, D. Shuman, G. Puy, and P. Vandergheynst, "UNLocBoX: A MATLAB convex optimization toolbox for proximal splitting methods," <i>arXiv e-print</i>, December 2016.</li> </ul>

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#### PUBLICATIONS AND PRESENTATIONS

- E. Isufi, F. Gama, D. I Shuman, and S. Segarra, "Graph filters for signal processing and machine learning on graphs," *IEEE Transactions on Signal Processing*, in press.
- G. Leus, A. G. Marques, J. M. F. Moura, A. Ortega, and D. I Shuman, "Graph signal processing: History, development, impact, and outlook," *IEEE Signal Processing Magazine*, vol. 40, no. 4, pp. 49-60, June 2023.
- Y. Chen\*, J. DeJong\*, T. Halverson, and D. I Shuman, "Signal processing on the permutahedron: Tight spectral frames for ranked data analysis," *Journal of Fourier Analysis and Applications*, vol. 27, art. 70, August 2021.
- D. I Shuman, "Localized spectral graph filter frames: A unifying framework, survey of design considerations, and numerical comparison," *IEEE Signal Processing Magazine*, vol. 37, no. 6, pp. 43-63, November 2020.
- T. Fan\*, D. I Shuman, S. Ubaru, and Y. Saad, "Spectrum-adapted polynomial approximation for matrix functions with applications in graph signal processing," *Algorithms*, vol. 13, no. 11, 295, pp. 1-22, November 2020.
- S. Li\*, Y. Jin\*, and D. I Shuman, "Scalable M-channel critically sampled filter banks for graph signals," *IEEE Transactions on Signal Processing*, vol. 67, no. 15, pp. 3954-3969, June 2019.
- D. I Shuman, P. Vandergheynst, D. Kressner, and P. Frossard, "Distributed signal processing via Chebyshev polynomial approximation," *IEEE Transactions on Signal and Information Processing over Networks*, vol. 4, no. 4, pp. 736-751, December 2018.
- N. Perraudin, B. Ricaud, D. I Shuman, and P. Vandergheynst, "Global and local uncertainty principles for signals on graphs," *APSIPA Transactions on Signal and Information Processing*, vol. 7, April 2018.
- D. I Shuman, M. J. Faraji, and P. Vandergheynst, "A multiscale pyramid transform for graph signals," *IEEE Transactions on Signal Processing*, vol. 64, no. 8, pp. 2119-2134, April 2016.
- D. I Shuman, B. Ricaud, and P. Vandergheynst, "Vertex-frequency analysis on graphs," *Applied and Computational Harmonic Analysis*, vol. 40, no. 2, pp. 260-291, March 2016.
- D. I Shuman, C. Wiesmeyr, N. Holighaus, and P. Vandergheynst, "Spectrum-adapted tight graph wavelet and vertex-frequency frames," *IEEE Transactions on Signal Processing*, vol. 63, no. 16, pp. 4223-4235, August 2015.
- D. Thanou, D. I Shuman, and P. Frossard, "Learning parametric dictionaries for signals on graphs," *IEEE Transactions on Signal Processing*, vol. 62, no. 15, pp. 3849-3862, August 2014.
- D. I Shuman, S. K. Narang, P. Frossard, A. Ortega, and P. Vandergheynst, "The emerging field of signal processing on graphs: Extending high-dimensional data analysis to networks and other irregular domains," *IEEE Signal Processing Magazine*, vol. 30, no. 3, pp. 83-98, May 2013.
   [Winner of the 2016 IEEE Signal Processing Magazine Best Paper Award]
- D. I Shuman, M. Liu, and O. Wu, "Energy-efficient transmission scheduling with strict underflow constraints," *IEEE Transactions on Information Theory*, vol. 57, no. 3, pp. 1344-1367, March 2011.
- M. Moghaddam, D. Entekhabi, Y. Goykhman, K. Li, M. Liu, A. Mahajan, A. Nayyar, D. Shuman, and D. Teneketzis, "A wireless soil moisture smart sensor web using physics-based optimal control: Concept and initial demonstrations," *IEEE Journal of Special Topics in Applied Earth Observations and Remote Sensing*, vol. 3, no. 4, pp. 522-535, December 2010.
- D. I Shuman, A. Nayyar, A. Mahajan, Y. Goykhman, K. Li, M. Liu, D. Teneketzis, M. Moghaddam, and D. Entekhabi, "Measurement scheduling for soil moisture sensing: From physical models to optimal control," *Proceedings of the IEEE, Special Issue on Sensor Network Applications*, vol. 98, no. 11, pp. 1917-1933, November 2009.

\* Denotes undergraduate co-author

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## PUBLICATIONS AND PRESENTATIONS (cont.)

Book Chapter:	• D. I Shuman and M. Liu, "Opportunistic scheduling with deadline constraints in wireless networks," in <i>Performance Models and Risk Management in Communication Systems</i> , edited by N. Gulpinar, P. Harrison, and B. Rustem, pp. 127-155, Springer, 2010.
Conference Papers:	• L. Fan*, D. I Shuman, S. Ubaru, and Y. Saad, "Spectrum-adapted polynomial approximation for matrix functions," in <i>Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP),</i> Brighton, UK, May 2019.
	• Y. Jin* and D. I Shuman, "An M-channel critically sampled filter bank for graph signals," in <i>Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)</i> , New Orleans, LA, March 2017.
	• D. Thanou, D. I Shuman and P. Frossard, "Parametric dictionary learning for graph signals," in <i>Proceedings of the IEEE Global Conference on Signal and Information Processing (GlobalSIP)</i> , Atlanta, GA, December 2013.
	• B. Ricaud, D. I Shuman, and P. Vandergheynst, "On the sparsity of wavelet coefficients for signals on graphs," in <i>Proceedings of SPIE Wavelets and Sparsity</i> , San Diego, CA, August 2013.
	• D. I Shuman, B. Ricaud, and P. Vandergheynst, "A windowed graph Fourier transform," in <i>Proceedings of the Statistical Signal Processing Workshop (SSP)</i> , Ann Arbor, MI, August 2012.
	• D. I Shuman, P. Vandergheynst, and P. Frossard, "Chebyshev polynomial approximation for distributed signal processing," in <i>Proceedings of the International Conference on Distributed Computing in Sensor Systems (DCOSS)</i> , Barcelona, Spain, June 2011.
	• D. I Shuman, M. J. Faraji, and P. Vandergheynst, "Semi-supervised learning with spectral graph wavelets," in <i>Proceedings of the International Conference on Sampling Theory and Applications (SampTA)</i> , Singapore, May 2011.
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	• D. Shuman and M. Liu, "Energy-efficient transmission scheduling for wireless media streaming with strict underflow constraints," in <i>Proceedings of the International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)</i> , Berlin, Germany, March-April 2008, pp. 354-359.
	• D. Shuman and M. Liu, "Optimal sleep scheduling for a wireless sensor network node," in <i>Proceedings of the Asilomar Conference on Signals, Systems, and Computers</i> , Pacific Grove, CA, October 2006, pp. 1337-1341.
Other Presentations:	• D. Shuman (joint work with Y. Chen, J. DeJong, and T. Halverson), "Signal processing on the permutahedron: Tight spectral frames for ranked data analysis," invited talk at the <i>Machine Learning and Signal Processing on Graphs Conference (LearnGraph)</i> , Marseille, France, November 2022.
	• Y. Chen, J. DeJong, T. Halverson, and D. Shuman, "Signal processing on the permutahedron: Tight spectral frames for ranked data analysis," invited talk at the <i>Applied Representation Theory Seminar</i> , co-hosted by Denison University and Harvey Mudd College (virtual), May 2021.
	• D. Shuman, "Dictionary design for graph signal processing," invited talk at the <i>Applied Math Seminar</i> , Department of Mathematics, Yale University, New Haven, CT, January 2019.
	• D. Shuman, "Signal processing on graphs: Extending high-dimensional data analysis to networks and other irregular domains," invited talk at the <i>MSCS Seminar</i> , Department of Mathematics, Statistics, and Computer Science, Macalester College, Saint Paul, MN, November 2018.
	• D. Shuman, "A scalable M-channel critically sampled filter for graph signals," presented at the Graph Signal

Processing Workshop, EPFL, Lausanne, Switzerland, June 2018.

Olin College of Engineering ♦ 1000 Olin Way ♦ Needham, MA 02492 ♦ Phone: 781-292-2558 ♦ E-mail: dshuman@olin.edu

## PUBLICATIONS AND PRESENTATIONS (cont.)

Other • Presentations (cont.):	D. Shuman, "Numerical linear algebra problems arising in graph signal processing," invited talk for the research groups of Professors Yousef Saad and Daniel Boley, Department of Computer Science and Engineering, University of Minnesota, Minneapolis, MN, March 2018.
•	D. Shuman, "Dictionary design for graph signal processing," invited talk at the <i>Inverse Problems and Analysis Seminar</i> , Department of Mathematical Sciences, University of Delaware, Newark, DE, October 2017.
•	D. Shuman, "Dictionary design for graph signal processing," invited talk at the <i>Data Science Lab Seminar</i> , Institute for Mathematics and its Applications, Minneapolis, MN, February 2017.
•	K. Saxe and D. Shuman, "Data science: A natural fit in the liberal arts curriculum," presented at the <i>SIAM Annual Meeting</i> , Boston, MA, July 2016. Covered in the <i>SIAM News Blog</i> : <u>https://sinews.siam.org/Details-Page/data-science-in-the-liberal-arts</u> .
•	D. Shuman, "Dictionary design for graph signal processing," invited plenary tutorial presented at the <i>Graph Signal Processing Workshop</i> , University of Pennsylvania, Philadelphia, PA, May 2016.
•	D. Shuman, "Reflections on the development and future of Macalester's new data science minor," presented on an invited panel at the AALAC Big Data Workshop, Wellesley College, Wellesley, MA, January 2016.
•	A. Archer*, S. Faridani*, Y. Jin*, E. Weeks*, A. Beveridge, and D. Shuman, "Graph reduction methods for multiscale dictionary design," presented at the <i>MAA Undergraduate Student Poster Session of the Joint Mathematics Meetings</i> , Seattle, WA, January 2016.
•	D. Shuman, "10-25: It's time for the 411 on the new data science minor," presented at the <i>Talking About Teaching</i> seminar at the Serie Center for Scholarship and Teaching as well as the Mathematics, Statistics, and Computer Science Department Tea, Macalester College, St. Paul, MN, October and November 2015.
•	D. Shuman, B. Ricaud, and P. Vandergheynst, "A windowed graph Fourier transform," presented at the <i>International Traveling Workshop for Interacting Sparse Models and Technology (iTWIST)</i> , Marseille, France, May 2012.
•	P. Vandergheynst and D. Shuman, "Wavelets on graphs, an introduction," invited talk at Université de Provence, Marseille, France, November 2011.
•	D. Shuman, M. Liu, and O. Wu, "Inventory control of multiple items under stochastic prices and budget constraints," presented at the <i>INFORMS Annual Meeting</i> , San Diego, CA, October 2009.
•	D. Shuman and M. Liu, "From sleeping to stockpiling: Energy conservation via scheduling in wireless networks," presented at the <i>Information Theory and Applications Workshop (ITA)</i> , La Jolla, CA, February 2009.

The publications and presentations listed above are available at my home page: <u>http://faculty.olin.edu/dshuman/</u>