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Dept. of Electrical & Systems Engineering
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TEACHING INTERESTS Engineering education is ailed by excitement, challenge, and discipline gaps. Students are excited about technology but do not pursue careers in engineering. Material taught in engineering classes becomes less challenging every year. Compartmental experience offered to students does not match reality of hazy separation between disciplines. Teaching goal is to contribute to the closing of these gaps through the development of new curricula.

RESEARCH INTERESTS Application of Signal Processing tools and methods to the study of networks. Topics of interest include optimal design of wireless networks, statistical signal processing in networks, distributed network optimization, game theoretic models of network behavior, collaboration in autonomous robot teams, networked control systems, and abstract representations of networked data structures.

APPOINTMENTS

University of Pennsylvania Professor <i>Electrical & Systems Engineering</i>	Philadelphia, Pennsylvania July 2018 - present
University of Pennsylvania Rosenbluth Associate Professor <i>Electrical & Systems Engineering</i>	Philadelphia, Pennsylvania July 2014 - June 2018
University of Pennsylvania Assistant Professor <i>Electrical & Systems Engineering</i>	Philadelphia, Pennsylvania July 2008 - June 2014

EMPLOYMENT

University of Minnesota Research Associate <i>Electrical & Computer Engineering</i>	Twin Cities, Minnesota December 2006 - June 2008
University of Minnesota Research Assistant <i>Electrical & Computer Engineering</i>	Twin Cities, Minnesota May 2003 - December 2006
Bellsouth Systems Engineer	Montevideo, Uruguay November 1998 - April 2003
Universidad de la República Oriental del Uruguay Research Assistant <i>Electrical Engineering</i>	Montevideo, Uruguay March 1997 - December 1998

Universidad de la República Oriental del Uruguay
Research Assistant
Physics

Montevideo, Uruguay
August 1995 - February 1997

EDUCATION

University of Minnesota
Ph. D. in Electrical & Computer Engineering
“Wireless Cooperative Communications and Networking”
Advisor: Prof. Georgios B. Giannakis

Twin Cities, Minnesota
December 2006

University of Minnesota
M. Sc. in Electrical & Computer Engineering
“Distributed Estimation in Wireless Sensor Networks”
Advisor: Prof. Georgios B. Giannakis

Twin Cities, Minnesota
September 2005

Universidad de la República Oriental del Uruguay
B. Sc. in Electrical Engineering

Montevideo, Uruguay
December 1998

ACADEMIC
HONORS

- Outstanding Researcher Award, Intel University Research Programs (2019).
- 2017 Christian R. and Mary F. Lindback Award for Distinguished Teaching presented by the University of Pennsylvania.
- Penn fellow, class of 2015.
- 2012 S. Reid Warren, Jr. Award presented by Penn’s undergraduate student body for outstanding teaching.
- Fulbright scholar, class of 2003.

PAPER AWARDS

- Cambridge Ring Publication of the Year Award (2021): “Graph Neural Networks for Decentralized Multi-Robot Path Planning.” Int. Conf. Intelligent Robots Systems, pp. 11785-11792, October 2020. Coauthored with Q. Li, F. Gama, and A. Prorok.
- IEEE Signal Processing Society Young Author Best Paper Award for Santiago Segarra: “Network Topology Inference from Spectral Templates,” IEEE Trans. Signal Info. Process. over Networks, vol. 3, pp. 467-483, September 2017 Coauthored with Antonio G. Marques and Gonzalo Mateos.
- Distinguished paper award by the International Consortium of Chinese Mathematicians (2018): “Decentralized dynamic optimization through the alternating direction method of multipliers,” IEEE Trans. Signal Process., vol. 62, pp. 1185 – 1197, March 2014. Coauthored with Q. Ling.
- 2014 O. Hugo Schuck paper award: “Optimal power management in wireless control systems,” in Proc. American Control Conf., pp. 1562–1569, Washington DC, June 17-19 2013. Co-authored with K. Gatsis and G. Pappas.

- CONFERENCE PAPER AWARDS
- Student paper award for Z. Wang at the European Signal Processing Conference (2021): “Stability of Neural Networks on Riemannian Manifolds.” Coauthored with L. Ruiz.
 - Paper award at the International Conference on Acoustics, Speech and Signal Processing (2020): “Better Safe than Sorry: Risk-Aware Nonlinear Bayesian Estimation.” Coauthored with D. Kalogerias, L. Chamon and G. J. Pappas.
 - Student paper award for L. Chamon at the International Conference on Acoustics, Speech and Signal Processing (2020): “The Empirical Duality Gap of Constrained Statistical Learning.” Coauthored with S. Paternain, and M. Calvo-Fullana.
 - Student paper award for L. Ruiz at the European Signal Processing Conference (2019): “Gated Graph Convolutional Recurrent Neural Networks.” Coauthored with F. Gama.
 - Student paper award for S. Paternain at the Conference on Decision and Control (2017): “Safe Online Navigation of Convex Potentials in Spaces with Convex Obstacles.”
 - Paper award at the 2016 IEEE Sensor Array and Multichannel Signal Processing Workshop (SAM): “Stationary Graph Processes: Nonparametric Power Spectral Estimation.” Coauthored with S. Segarra, A. Garcia Marques, and G. Leus.
 - Student paper award for S. Segarra at the 2016 Statistical Signal Processing Workshop: “Network Topology Identification from Spectral Templates.” Coauthored with G. Mateos and A. Garcia Marques.
 - Student paper award for S. Segarra at the 2015 Asilomar Conference on Signals Systems and Computers: “Sampling of graph signals: Successive local aggregations at a single node.” Coauthored with A. Garcia Marques and G. Leus.
 - Student paper award for K. Gatsis at the American Control Conference (ACC) 2013: “Optimal power management in wireless control systems.” Coauthored with G. Pappas.
 - Student paper award at the International Conference on Acoustics, Speech and Signal Processing 2006: “SOI-KF: Distributed Kalman filtering with low-cost communications using the sign of innovations.” Coauthored with Georgios B. Giannakis and Stergios I. Roumeliotis.
 - Student paper award at the International Conference on Acoustics, Speech and Signal Processing 2005: “Non-parametric distributed quantization-estimation using wireless sensor networks.” Coauthored with Georgios B. Giannakis.

- RESEARCH FUNDING
1. *Proactive Human-Autonomy Collaborative Teams (PHACT)*. Lockheed Martin Corp. A. Ribeiro (Principal Investigator) and V. Kumar. Awarded amount: \$300,000. August 2021 - July 2022.
 2. *Deployment of Autonomous Ground Robots to Facilitate Communication*. Internet of Things for Precision Agriculture, NSF Engineering Research Center. A. Ribeiro (Principal Investigator), D. Cappelleri, S. Carpin, and V. Kumar. Awarded amount: \$110,869.90. December 2021 - December 2022.
 3. *AI Institute: TILOS: The Institute for Learning-enabled Optimization at Scale*. Award No: N/A. National Science Foundation. V. Kumar (Principal Investigator), S. Bidokhti, H. Hassani, A. Ribeiro, and C. J. Taylor. Awarded amount: \$2,790,000 October 2021 - September 2026.

4. *SIOP-DYNAM-O: Social Information/Opinion Dynamics and Optimization*. Award No: N/A. Department of Defense. R. Ghrist (Principal Investigator), V. Preciado, and A. Ribeiro. Awarded amount: \$1,386,190. December 2020 - December 2023.
5. *Collaborative Research: Transferable, Hierarchical, Expressive, Optimal, Robust, Interpretable NETWORKS (THEORINET)*. Award No: N/A. National Science Foundation - Simons Research Collaborations on the Mathematical and Scientific Foundations of Deep Learning (MoDL). A. Ribeiro (Principal Investigator), E. Dobriban, R. Ghrist, and G. Pappas. Awarded amount: \$2,000,000. September 2020 - August 2025.
6. *Penn1: Experimental Testbed on Wireless Autonomous Systems*. Award No: N/A. Office of Naval Research. V. Kumar (Principal Investigator), A. Hsieh, and A. Ribeiro. Awarded amount: \$501,437. August 2020 - July 2021.
7. *Learning What to Sense and Communicate for Multi Vehicle Teams*. Award No: N/A. Office of Naval Research. V. Kumar (Principal Investigator) and A. Ribeiro. Awarded amount: \$1,020,000. May 2020 - April 2023.
8. *HDR TRIPODS: FINPenn: Center for the Foundations of Information Processing at the University of Pennsylvania*. Award No: 1934960. National Science Foundation. A. Ribeiro (Principal Investigator), K. Daniilidis, E. Dobriban, R. Ghrist, and S. Sarkar. Awarded amount: \$1,500,000. September 2019 - August 2022.
9. *PLUTO: Pennsylvania Laboratory for Underground Tunnel Operations*. Defense Advanced Research Projects Agency. C.J. Taylor (Principal Investigator), V. Kumar and A. Ribeiro. Awarded amount: \$4,367,368. September 2018 - August 2021.
10. *Rethinking Communication and Control for Low-Latency, High Reliability IoT Devices*. Award No: 1837253. National Science Foundation. G. Pappas (Principal Investigator), H. Hassani, and A. Ribeiro. Awarded amount: \$1,000,000. September 2018 - August 2021.
11. *Distributed Collaborative Intelligent Systems Technology*. Contract No: W911NF-17-2-0181. Army Research Laboratory. A. Ribeiro (Program Manager). Awarded amount: \$27,000,000. December 2017 - December 2022.
12. *Intel Science and Technology Center on Wireless Autonomous Systems (ISTC-WAS)*. Intel Corp. A. Ribeiro (Center Director), F. Aflatouni, D. Lee, D. Katabi, V.Kumar, R. Mangharam, G. Pappas. Awarded amount: \$1,500,000. October 2017 - October 2020.
13. *Metric Representations of Network Data (Award No: 1717120)*, National Science Foundation. A. Ribeiro. Awarded amount: \$450,000, August 2017 - August 2020.
14. *Geometric and Graph Structures in Information Characterization and Extraction (Award No: W911NF1710438)*, Army Research Office. A. Ribeiro (principal investigator) and Joan Bruna. Awarded amount: \$750,000, August 2017 - August 2020.
15. *Optimal Communication for faster sensor network coordination (Award No: 1302222)*, National Science Foundation. M. Zavlanos (principal investigator), V. Preciado, and A. Ribeiro. Awarded amount: \$774,000, October 2013 - October 2016.
16. *CoDoN: Categorification of Data over Networks (Award No: 1304-560288)*, DARPA Defense Sciences Office. R. Ghrist (principal investigator) and A. Ribeiro. Awarded amount: \$1,300,000, July 2012 - June 2016.
17. *New Paradigms for Scalable, Online, Decentralized Optimization (Award No: N00014-12-*

- 1-0997), Office of Naval Research. A. Jadbabaie (principal investigator), A. Ozdaglar, A. Rahklin, and A. Ribeiro. Awarded amount: \$1,500,000, July 2012 - July 2017.
18. *Circles of Trust: An Axiomatic Construction of Clustering in Asymmetric Networks* (Award No: 1217963), National Science Foundation, Division: Computer and Communications Foundations. A. Ribeiro (principal investigator). Awarded amount: \$305,215, August 2012 - July 2015.
 19. *Control Science for Next Generation Sensing* (Award No: FA9550-10-1-0567), Air Force Office of Scientific Research, Multi-University Research Initiative. D. Koditschek (principal investigator), A. Jadbabie, V. Kumar, A. Ribeiro, University of Minnesota, University of California at Berkeley. Awarded amount: \$7,000,000, November 2010 - October 2015.
 20. *CAREER: Towards a formal theory of wireless networking* (Award No: 0952867), National Science Foundation, Division: Computer and Communications Foundations, Program: Communication and Information Theory. A. Ribeiro (principal investigator). Awarded amount: \$400,000, September 2010 - August 2015.
 21. *Distributed statistical inference of dynamic systems with sensor networks* (Award No: 1017454), National Science Foundation, Division: Computer and Communications Foundations, Program: Sensor Networks. A. Ribeiro (principal investigator). Awarded amount: \$300,000, September 2010 - August 2013.
 22. *Theoretical foundations of wireless networks* (Award No: W911NF-10-1-0388), Army Research Office, Network Sciences Division. A. Ribeiro (principal investigator). Awarded amount: \$300,000, August 2010 - July 2013.
 23. *Micro Autonomous Systems and Technology Collaborative Technology Alliance, Center for Communication, Networking and Coordination* (Contract No: W911NF-08-2-0004), Army Research Laboratory. A. Ribeiro (Deputy Program Manager). Awarded amount: \$22,000,000, November 2009 - October 2017.
 24. *Quantitative analysis and design of control networks* (Award No: 0931239), National Science Foundation, Division: Computer and Network Systems, Program: Computer Systems, Information Technology Research. G. Pappas (principal investigator), R. Alur, I. Lee, R. Mangharam, and A. Ribeiro. Awarded amount: \$1,509,319, September 2009 - August 2013.

FORMER PHD
STUDENTS

Luana Ruiz	University of Pennsylvania July 2022
Arbaaz Khan	University of Pennsylvania
Maria Peifer	University of Pennsylvania
Ekaterina Tolstaya	University of Pennsylvania
Luiz Chamon	University of Pennsylvania

	<i>Learning Under Requirements</i>	October 2020
	Fernando Gama <i>Foundations of Graph Neural Networks</i>	University of Pennsylvania May 2020
	Mark Eisen <i>Machine Learning in Wireless Communication Systems</i>	University of Pennsylvania August 2019
	Weiyu Huang <i>Network Data Analytics: Network Comparison and Applied Graph Signal Processing</i>	University of Pennsylvania April 2018
	Santiago Paternain <i>Stochastic Control Foundations of Autonomous Behavior</i>	University of Pennsylvania August 2018
	Aryan Mokhtari <i>Efficient Methods for Large-Scale Empirical Risk Minimization</i>	University of Pennsylvania July 2017
	Alec Koppel <i>Stochastic Optimization for Multi-Agent Statistical Learning and Control</i>	University of Pennsylvania June 2017
	Santiago Segarra <i>Metric Representations of Networks</i>	University of Pennsylvania August 2016
	James Stephan <i>Communication Aware Mobile Robot Teams</i>	University of Pennsylvania August 2015
	Ceyhun Eksin <i>Bayesian Network Games</i>	University of Pennsylvania January 2015
	Yichuan Hu <i>Distributed Algorithms for Optimal Design of Wireless Networks</i>	University of Pennsylvania September 2013
FORMER POSTDOCS	Zebang Shen	September 2020 - September 2022
	Dionysios Kalogierias	September 2019 - September 2020
	Mikhail Gerasimenko	July 2019 - December 2019
	Elvin Isufi	December 2018 - June 2019
	Miguel Calvo Fullana	September 2017 - September 2020
CURRENT PHD STUDENTS		

Fred Vatnsdal	Expected Graduation: Summer 2027
Shervin Khalafi	Expected Graduation: Summer 2027
Yigit Berkay	Expected Graduation: Summer 2027
Jaon He	Expected Graduation: Summer 2027
Amanda Igwe	Expected Graduation: Summer 2027
Ignacio Hounie	Expected Graduation: Summer 2026
Juan Elenter	Expected Graduation: Summer 2026
Samar El Araby	Expected Graduation: Summer 2025
Damian Owerko	Expected Graduation: Summer 2025
Sourajit Das	Expected Graduation: Summer 2025
Juan Cerviño	Expected Graduation: Summer 2024
Zhiyang Wang	Expected Graduation: Summer 2024
Vinicius Lima	Expected Graduation: Summer 2023
Harshat Kumar	Expected Graduation: Summer 2023

CURRENT
POSTDOCS

Igor Spasojevic	July 2022 - September 2024
Navid Naderializadeh	August 2021 - September 2023
Saurabh Sihag	January 2021 - September 2023
Charilaos Kanatsoulis	October 2020 - September 2023
Alejandro Parada	September 2019 - September 2023

EDITORIAL

- IEEE Signal Processing Magazine. Associate editor (2018-2021).
- Special Issue on Graph Signal Processing. IEEE Journal of Selected Topics in Signal Processing and IEEE Transactions on Signal and Information Processing over Networks (joint issue). Guest Editor (2017).
- Special Issue on Cooperative Signal Processing for Heterogeneous and Multi-Task Wireless Sensor Networks. IEEE Journal of Selected Topics in Signal Processing. Guest Editor (2017).
- IEEE Transactions on Signal and Information Processing over Networks. Associate editor (2015-2018).

- Special Issue on Cooperative Communications in Wireless Networks. EURASIP Journal on Wireless Communications and Networking. Guest Editor (2009).

WORKSHOPS &
CONFERENCES

- Graph Signal Processing Workshop. University of Minnesota. Steering Committee Member (2019).
- Workshop on Machine Learning for Network Data. New York University. Chair. (2019)
- Asilomar Conference on Signals Systems and Computers. Networks track. Technical area chair (2018).
- International Workshop on Signal Processing Advances in Wireless Communications. Special Session on Wireless Autonomous Systems. Chair (2018).
- Graph Signal Processing Workshop. École Polytechnique Fédérale de Lausanne. Organizing Committee (2018).
- Data Science Workshop. École Polytechnique Fédérale de Lausanne. Special Session on Convolutional Neural Networks for Graph Data. Chair (2018).
- DIMACS Workshop on Distributed Optimization, Information Processing, and Learning. Rutgers University. Organizing Committee (2017).
- Graph Signal Processing Workshop. Carnegie Mellon University. Organizing Committee (2017).
- IPAM Workshop on Emerging Wireless Networks. University of California at Los Angeles. Organizing Committee (2017).
- Asilomar Conference Signals Systems Computers. Networks track. Technical area chair (2016).
- IEEE Sensor Array and Multichannel Signal Processing Workshop. Special Session on Graph Signal Processing. Chair (2016).
- Graph Signal Processing Workshop. University of Pennsylvania. Chair (2016).
- International Conference Acoustics, Speech, Signal Processing Special Session on Recent Advances in the Emerging Field of Signal Processing on Graphs. Chair (2016).
- IEEE International Workshop. on Computational Advances in Multi-Sensor Adaptive Processing Special Session on Network Data and Graph Signal Processing. Chair (2015).
- Allerton Conference on Communication, Control and Computing. Special Session on Graph Signal Processing. Chair (2015).
- Signal Processing Society. Signal Processing for Communications Technical Committee. Member (2014-2016).
- Global Signal and Information Processing Conference Network Theory Symposium. Chair (2014).
- Global Signal and Information Processing Conference Network Theory Symposium. Chair (2013).
- Signal Processing Society. Signal Processing for Communications Technical Committee. Member (2011-2013).
- Asilomar Conference Signals Systems Computers. Networks track. Technical area chair (2011).
- International Conference on Acoustics, Speech and Signal Processing. External expert reviewer (2011).
- International Conference on Acoustics, Speech and Signal Processing. External expert reviewer (2010).

- International Conference on Acoustics, Speech and Signal Processing. External expert reviewer (2009).
- First Workshop on Distributed Estimation and Control in Networked Systems. Technical Program Committee (2009).

SERVICE

- Electrical and Systems Engineering Graduate Group. Chair (2020-2022).
- Systems Engineering Undergraduate Program. Chair (2018-2022).
- Wireless Autonomous Systems Intel Science and Technology Center. Director (2017-2020).
- Faculty Search Committee for Information and Decision Sciences. Chair (2018-2020).
- Ph.D. Colloquium. Host (2015-2018).
- Electrical and Systems Engineering Graduate Group. Chair (2015-2018).
- Student Disciplinary System. Hearing Officer (2015-2017).
- Faculty Search Committee for Information and Decision Sciences. Member (2013-2016).
- Faculty Senate. Elected Representative for the Departments of Computer and Information Sciences and Electrical and Systems Engineering (2013-2015).
- Systems Engineering Undergraduate Program. Chair (2013-2015).

PUBLICATIONS **Journal papers**

1. Z. Gao, F. Gama and A. Ribeiro, "Spherical Convolutional Neural Networks: Stability to Perturbations in $SO(3)$," EURASIP Journal on Signal Processing 196. October 2022. Online: arxiv.org/abs/2010.05865.
2. V. Lima, M. Eisen, K. Gatsis and A. Ribeiro, "Model-Free Design of Control Systems over Wireless Fading Channels," IEEE Transactions on Signal Processing 197. July 2022. Online: arxiv.org/abs/2009.01751.
3. F. Gama, Q. Li, E. Tolstaya, A. Prorok and A. Ribeiro, "Synthesizing Decentralized Controllers With Graph Neural Networks and Imitation Learning," IEEE Transactions on Signal Processing 70:1932-1946. April 2022. Online: arxiv.org/abs/2012.14906.
4. Z. Wang, M. Eisen and A. Ribeiro, "Learning Decentralized Wireless Resource Allocations with Graph Neural Networks," IEEE Transactions on Signal Processing 70:1850-1863. March 2022. Online: arxiv.org/abs/2107.01489.
5. S. Paternain, J. A. Bazerque and A. Ribeiro, "Policy Gradient for Continuing Tasks in Non-stationary Markov Decision Processes," IEEE Transactions on Automatic Control . March 2022. Online: arxiv.org/abs/2010.08443.
6. S. Paternain, M. Calvo-Fullana, L. F. O. Chamon and A. Ribeiro, "Safe Policies for Reinforcement Learning via Primal-Dual Methods," IEEE Transactions on Automatic Control . February 2022. Online: arxiv.org/abs/1911.09101.
7. D. Mox, V. Kumar and A. Ribeiro, "Learning Connectivity-Maximizing Network Configurations," IEEE Robotics and Automation Letters 7(2):5552-5559. January 2022.

8. V. Lima, M. Eisen, K. Gatsis and A. Ribeiro, "Large-Scale Graph Reinforcement Learning in Wireless Control Systems," *IEEE Transactions on Control of Network Systems* (submitted). January 2022. Online: arxiv.org/abs/2201.09859.
9. T. K. Hu, F. Gama, T. Chen, W. Zheng, Z. Wang, A. Ribeiro and B. M. Sadler, "Scalable Perception-Action-Communication Loops with Convolutional and Graph Neural Networks," *IEEE Transactions on Signal and Information Processing over Networks* 8. December 2021. Online: arxiv.org/abs/2106.13358.
10. L. Ruiz, L. F. O. Chamon and A. Ribeiro, "Transferability Properties of Graph Neural Networks," *IEEE Transactions on Signal Processing* (submitted). December 2021. Online: arxiv.org/abs/2112.04629.
11. Z. Gao, E. Isufi and A. Ribeiro, "Stability of Graph Convolutional Neural Networks to Stochastic Perturbations," *EURASIP Journal on Signal Processing* 188:108216. November 2021. Online: arxiv.org/abs/2106.10526.
12. Z. Gao, M. Eisen and A. Ribeiro, "Resource Allocation via Model-Free Deep Learning in Free Space Optical Communications," *IEEE Transactions on Communications* 70(2):920-934. November 2021. Online: arxiv.org/abs/2007.13709.
13. Juan Cervino, J. A. Bazerque, M. Calvo-Fullana and A. Ribeiro, "Multi-task Reinforcement Learning in Reproducing Kernel Hilbert Spaces via Cross-learning," *IEEE Transactions on Signal Processing* 69:5947-5962. October 2021. Online: arxiv.org/abs/2008.11895.
14. P. Brown, M. Eisen, S. Segarra, A. Ribeiro and G. Egan, "How the Word Adjacency Network algorithm works," *Digital Scholarship in the Humanities* . October 2021.
15. E. Isufi, F. Gama and A. Ribeiro, "EdgeNets: Edge Varying Graph Neural Networks," *Pattern Analysis and Machine Intelligence* . September 2021. Online: arxiv.org/abs/2001.07620 .
16. L. Ruiz, L. F. O. Chamon and A. Ribeiro, "Graphon Signal Processing," *IEEE Transactions on Signal Processing* 69:4961-4976. August 2021. Online: arxiv.org/abs/2003.05030.
17. Z. Gao, F. Gama and A. Ribeiro, "Wide and Deep Graph Neural Network with Distributed Online Learning," *IEEE Transactions on Signal Processing* (submitted). July 2021. Online: arxiv.org/abs/2107.09203.
18. A. Khan, V. Kumar and A. Ribeiro, "Large Scale Distributed Collaborative Unlabeled Motion Planning With Graph Policy Gradients," *IEEE Robotics and Automation Letters* 6(3):5340-5347. July 2021. Online: arxiv.org/abs/2102.06284.
19. Z. Gao, E. Isufi and A. Ribeiro, "Stochastic Graph Neural Networks," *IEEE Transactions on Signal Processing* 69:4428-4443. June 2021. Online: arxiv.org/abs/2006.02684.
20. G. Leus, S. Segarra, A. Ribeiro and A. G. Marques, "The Dual Graph Shift Operator: Identifying the Support of the Frequency Domain," *Journal of Fourier Analysis and Applications* 27(3):1-20. May 2021. Online: arxiv.org/abs/1705.08987.
21. L. F. O. Chamon, A. Amice and A. Ribeiro, "Approximately Supermodular Scheduling Subject to Matroid Constraints," *IEEE Transactions on Automatic Control* 67(3):1384-1396. April 2021. Online: arxiv.org/abs/2003.08841.

22. L. F. O. Chamon, S. Paternain, M. Calvo-Fullana and A. Ribeiro, "Constrained Learning with Non-Convex Losses," IEEE Transactions on Information Theory (submitted). March 2021. Online: arxiv.org/abs/2103.05134.
23. M. Calvo-Fullana, S. Paternain, L. F. O. Chamon and A. Ribeiro, "State Augmented Constrained Reinforcement Learning: Overcoming the Limitations of Learning with Rewards," IEEE Transactions on Automatic Control (submitted). February 2021. Online: arxiv.org/abs/2102.11941.
24. M. Calvo-Fullana, A. Pyattaev, D. Mox, Sergey Andreev and A. Ribeiro, "Communications and Robotics Simulation in UAVs: A Case Study on Aerial Synthetic Aperture Antennas," IEEE Communications Magazine 59(1):22-27. February 2021.
25. L. Ruiz, F. Gama and A. Ribeiro, "Graph Neural Networks: Architectures, Stability, and Transferability," Proceedings of the IEEE 109(5):660-682. February 2021. Online: arxiv.org/abs/2008.01767.
26. M. Calvo-Fullana, D. Mox, A. Pyattaev, J. Fink, V. Kumar and A. Ribeiro, "ROS-NetSim: A Framework for the Integration of Robotic and Network Simulators," IEEE Robotics and Automation Letters 6(2):1120-1127. February 2021. Online: arxiv.org/abs/2101.10113.
27. F. Gama, Q. Li, E. Tolstaya, A. Prorok and A. Ribeiro, "Decentralized Control with Graph Neural Networks," IEEE Transactions on Signal Processing (submitted). December 2020. Online: arxiv.org/abs/2012.14906.
28. E. Tolstaya, J. Paulos, V. Kumar and A. Ribeiro, "Multi-Robot Coverage and Exploration using Spatial Graph Neural Networks," (submitted). November 2020. Online: arxiv.org/abs/2011.01119.
29. L. Ruiz, F. Gama and A. Ribeiro, "Gated Graph Recurrent Neural Networks," IEEE Transactions on Signal Processing 68:6303-6318. October 2020. Online: arxiv.org/abs/2002.01038.
30. S. Paternain, J. A. Bazerque, A. Small and A. Ribeiro, "Stochastic Policy Gradient Ascent in Reproducing Kernel Hilbert Spaces," IEEE Transactions on Automatic Control 66(8). October 2020. Online: arxiv.org/abs/1807.11274.
31. D. S. Kalogerias, M. Eisen, G. J. Pappas and A. Ribeiro, "Model-Free Learning of Optimal Ergodic Policies in Wireless Systems," IEEE Transactions on Signal Processing 68:6272-6286. October 2020. Online: arxiv.org/abs/1911.03988.
32. A. Koppel, G. Warnell, E. Stump, P. Stone and A. Ribeiro, "Policy Evaluation in Continuous MDPs with Efficient Kernelized Gradient Temporal Difference," IEEE Transactions on Automatic Control 66(4):1856-1863. October 2020. Online: arxiv.org/abs/1709.04221.
33. F. Gama, J. Bruna and A. Ribeiro, "Stability Properties of Graph Neural Networks," IEEE Transactions on Signal Processing 68:5680-5695. September 2020. Online: arxiv.org/abs/1905.04497.
34. A. Mokhtari and A. Ribeiro, "Stochastic Quasi-Newton Methods," 108(11):1906-1922. September 2020. Online: arxiv.org/abs/2009.03768.
35. M. Peifer, A. Ribeiro and , "Federated Classification using Parsimonious Functions in Reproducing Kernel Hilbert Spaces," IEEE Transactions on Signal Processing .

- September 2020. Online: arxiv.org/abs/2009.01433.
36. A. Parada-Mayorga and A. Ribeiro, "Algebraic Neural Networks: Stability to Deformations," *IEEE Transactions on Signal Processing* 69:3351-3366. September 2020. Online: arxiv.org/abs/2009.01433.
 37. M. Calvo-Fullana, C. Anton-Haro, J. Matamoros and A. Ribeiro, "Random Access Communication for Wireless Control Systems with Energy Harvesting Sensors," *IEEE Transactions on Signal Processing* 68:3961-3975. July 2020. Online: arxiv.org/abs/1801.10141.
 38. S. Paternain, S. Lee, M. M. Zavlanos and A. Ribeiro, "Distributed Constrained Online Learning," *IEEE Transactions on Signal Processing* 68:3486-3499. June 2020. Online: arxiv.org/abs/1903.06310.
 39. H. Kumar, D. S. Kalogerias, G. J. Pappas and A. Ribeiro, "Zeroth-order Deterministic Policy Gradient," (submitted). June 2020. Online: arxiv.org/abs/2006.07314.
 40. A. Khan, A. Ribeiro, V. Kumar and A. Francis, "Graph Neural Networks for Motion Planning," (submitted). June 2020. Online: arxiv.org/abs/2006.06248.
 41. A. Mokhtari, A. Koppel, M. Takac and A. Ribeiro, "A Class of Parallel Doubly Stochastic Algorithms for Large-Scale Learning," *Journal on Machine Learning Research* 21(120):1-51. June 2020.
 42. S. Paternain and A. Ribeiro, "Stochastic Artificial Potentials for Online Safe Navigation," *IEEE Transactions on Automatic Control* 65(5):1985-2000. May 2020. Online: arxiv.org/abs/1701.00033.
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Theses

1. A. Ribeiro, *Wireless cooperative communications and networking*. PhD thesis, University of Minnesota, Twin cities, April 2007.
2. A. Ribeiro, "Distributed quantization-estimation for wireless sensor networks," Master's thesis, University of Minnesota, Twin cities, August 2005.

KEYNOTES & PLENARIES

1. 2021 Mathematical and Scientific Foundations of Deep Learning Annual Meeting Plenary. *Learning under Requirements*. October 1, 2021.
2. European Signal Processing Conference. Plenary. *Graph Neural Networks*. September 3, 2019.
3. Graph Signal Processing Workshop. Plenary. *Graph Neural Networks*. June 7, 2019.
4. Workshop on Machine Learning in Wireless Communications at the International Conference on Communications. Keynote. *The Equivalence of Optimal Resource*

Allocation in Wireless Communications and Unsupervised Learning. May 24, 2019.

5. Global Signal Processing Conference. Plenary. *Statistical Signal Processing on Graphs*. December 9, 2016.
6. ENS Lyon Thematic Semester on Network Science: Dynamics On and Of Networks. Plenary. *Graph Signal Processing Tools for Distributed Sampling and Topology inference*. June 20, 2016.
7. 1st IEEE/ACM Workshop on Signal Processing Advances in Sensor Networks (CPSWeek). Keynote. *Bayesian Network Games*. April 8, 2013.
8. IEEE New Technologies Conference at Boeing. Plenary. *Robust Control of Mobility and Communications in Autonomous Robot Teams*. August 9, 2011.

TUTORIALS

1. IEEE International Conference on Acoustics, Speech and Signal Processing. *Graph Neural Networks*. May 5, 2020.
2. IEEE-SPS / EURASIP Summer School on Network- and Data-driven Learning: Fundamentals and Applications. *Graph Convolutional Neural Networks*. May 20-24, 2019.
3. IEEE International Conference on Acoustics, Speech and Signal Processing. *Graph Signal Processing*. March 5, 2017.
4. European Signal Processing Conference. *Graph Signal Processing*. August 29, 2016.
5. IEEE Sensor Array and Multichannel Signal Processing Workshop. *Graph Signal Processing*. July 10, 2016.

TALKS

1. MIT-Harvard Communications Information Networks Circuits and Signals (CINCS). Hamilton Institute. Seminar. *Learning Optimal Resource Allocations in Wireless Communications Systems*. May 19, 2021.
2. University of Pennsylvania. Workshop on Equivariance and Data Augmentation. Invited Talk. *Algebraic Neural Networks: Symmetry and Stability*. September 4, 2020.
3. University of Rochester. Electrical and Systems Engineering. Guest Lecture. *Graph Neural Networks*. October 23, 2019.
4. Distributed Collaborative Intelligent Systems Technology Collaborative Research Alliance. Annual Meeting. University of Southern California. *Joint Resource Allocation in Perception-Action-Communication Loops*. March 3, 2019.
5. Workshop on Machine Learning for Network Data. New York University. Invited Talk. *Invariance and Stability Properties of Graph Neural Networks*. January 29, 2019.
6. Delft University of Technology. Faculty of Electrical Engineering, Mathematics and Computer Science Seminar. *Graph Neural Networks*. January 28, 2019.
7. Joint Mathematics Meetings. Invited Talk. *Graph Neural Networks and Graph Scattering Transforms*. January 18, 2019.
8. Intel Science and Technology Center for Wireless Autonomous Systems Annual Meeting. Intel Labs. Invited Talk. *Learning Resource Allocations in Wireless*

- Communication Systems*. October 5, 2018.
9. New York University. Center for Data Science and Courant Institute. Seminar. *Convolutional Neural Networks Architectures for Signals Supported on Graphs*. March 29, 2018.
 10. Harvard University. Department of Electrical Engineering. Seminar. *Statistical Signal Processing on Graphs*. October 20, 2017.
 11. Intel Science and Technology Center for Wireless Autonomous Systems Kickoff Meeting. Intel Labs. Feature Talk. *Wireless Autonomous Systems*. October 2, 2017.
 12. Lehigh University. Department of Industrial and Systems Engineering Seminar. *High Order Methods for Empirical Risk Minimization*. September 19, 2017.
 13. Army Research Laboratory, Micro Autonomous Systems and Technology Collaborative Technology Alliance, Capstone meeting, *Mobile Autonomous Wireless Networks*, August 22, 2016.
 14. DIMACS Workshop on Distributed Optimization, Information Processing, and Learning, Rutgers University, Invited talk, *High-order Methods In Empirical Risk Minimization*, August 21, 2017.
 15. ONR Basic Research Challenge on Decentralized Online Optimization, Review meeting, *Incremental Quasi-Newton Methods with Local Superlinear Convergence Rate*, April 28, 2017.
 16. Quintile IMS, Seminar, *Rating Prediction via Graph Signal Processing*, April 18, 2017.
 17. IPAM Workshop on Emerging Wireless Networks, University of California at Los Angeles, Invited talk, *High order methods in empirical risk minimization*, February 7, 2017.
 18. Workshop on Heterogeneity, Diversity and Resilience in Multi-Robot Systems, Invited talk, *Online Learning for Characterizing Unknown Environments in Robotic Vehicle Models*, August 15, 2016.
 19. Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), Seminar, *Graph Signal Processing: Stationary Graph Signals and Topology Inference*, July 13, 2016.
 20. SIAM Annual Meeting, Invited talk, *Stability and continuity of centrality measures in weighted graphs*, July 13, 2016.
 21. École Polytechnique Fédérale de Lausanne (EPFL), Seminar, *Graph signal processing tools for distributed sampling and topology inference*, July 7, 2016.
 22. Graph Signal Processing Workshop, Invited talk, *Stationarity and power spectral density estimation of graph signals*, May 26, 2016.
 23. INFORMS Optimization Society Conference, Invited talk, *Stochastic quasi-newton methods for large-scale optimization*, March 19, 2016.
 24. Army Research Laboratory, Micro Autonomous Systems and Technology Collaborative Technology Alliance, Review meeting, *Augmenting local control with statistical learning*, March 21, 2016.
 25. IBM research, Seminar, *Distributed optimization: Beyond first order methods*, October 28, 2015.

26. Workshop on Foundations of Intelligent Sensing, Action and Learning, Invited talk, *Information, Complexity, and Representation of Autonomous Operation*, October 20, 2015.
27. International Symposium on Optimization, *Convergence of stochastic quasi-Newton methods*, Invited talk, July 17, 2015.
28. Yahoo research, Seminar, *Stochastic Quasi-Newton Methods*, June 30, 2015.
29. Rutgers University, ECE Colloquium, *Axiomatic construction of hierarchical clustering in asymmetric networks*, March 25, 2015.
30. Army Research Laboratory, Micro Autonomous Systems and Technology Collaborative Technology Alliance, Review meeting, *Decentralized network deployment for micro autonomous systems*, March 23, 2015.
31. Information Theory and Applications Workshop, University of California at San Diego, Invited talk, *Network Newton*, February 5, 2015.
32. University of Delaware, Seminar, *Axiomatic construction of hierarchical clustering in asymmetric networks*, October 6, 2014.
33. Army Research Laboratory, Micro Autonomous Systems and Technology Collaborative Technology Alliance, Review meeting, *Decentralized network deployment for micro autonomous systems*, April 1, 2014.
34. Information Theory and Applications Workshop, University of California at San Diego, Invited talk, *Hierarchical quasi-clustering methods for asymmetric networks*, February 13, 2014.
35. Princeton University, Seminar, *Axiomatic construction of hierarchical clustering in asymmetric networks*, November 12, 2013.
36. University of California at Los Angeles, Seminar, *Bayesian network games*, October 23, 2013.
37. Army Research Laboratory, Micro Autonomous Systems and Technology Collaborative Technology Alliance, Review meeting, *Robust wireless networks for connectivity management*, March 29, 2013.
38. Bellairs workshop on Signal Processing and Networks, McGill University, Invited talk, *Axiomatic construction of hierarchical clustering in asymmetric networks*, February 20, 2013.
39. Information Theory and Applications Workshop, University of California at San Diego, Invited talk, *Bayesian quadratic network game filters*, February 14, 2013.
40. Universidad de la Republica Oriental del Uruguay, Seminar, *Axiomatic construction of clustering in asymmetric networks*, December 12, 2012.
41. Universidad de la Republica Oriental del Uruguay, Seminar, *Algorithms for controlling mobility while maintaining robust wireless connectivity*, December 11, 2012.
42. Air Force Office of Scientific Research, Science of Information, Computation and Fusion, Review meeting, *MURI highlight technical talk: Asymmetric clustering*, December 5, 2012.
43. Army Research Laboratory, Micro Autonomous Systems and Technology Collaborative Technology Alliance, Review meeting, *Robust wireless networks for*

connectivity management, March 29, 2012.

44. Pennsylvania State University, Seminar, *Optimal resource allocation in wireless communication and networking*, March 1, 2012.
45. MAST Sensing, Perception, and Processing Thrust Research Directions Workshop, University of Michigan, Invited talk, *Communication issues in mobile micro autonomous systems*, February 24, 2012.
46. Information Theory and Applications Workshop, University of California at San Diego, Invited talk, *Circles of trust: An axiomatic theory of clustering in asymmetric networks*, February 6, 2012.
47. State University of New York at Buffalo, Seminar, *Optimal resource allocation in wireless communication and networking*, February 3, 2012.
48. Air Force Office of Scientific Research, Science of Information, Computation and Fusion, Review meeting, *Hierarchical clustering of asymmetric data*, November 9, 2011.
49. Stanford University, Seminar, *Optimal resource allocation in wireless communication and networking*, October 6, 2011.
50. Cornell University, Seminar, *Optimal resource allocation in wireless communication and networking*, October 6, 2011.
51. University of Delaware, Seminar, *Optimal resource allocation in wireless communication and networking*, May 2, 2011.
52. Army Research Laboratory, Micro Autonomous Systems and Technology Collaborative Technology Alliance, Review meeting, *Robust wireless networks for connectivity management*, April 1, 2011.
53. Princeton University, Seminar, *Optimal resource allocation in wireless communication and networking*, March 31, 2011.
54. Northwestern University, Seminar, *Optimal resource allocation in wireless communication and networking*, March 11, 2011.
55. Carnegie Mellon University, Seminar, *Optimal resource allocation in wireless communication and networking*, February 24, 2011.

TEACHING

1. *Signal and Information Processing (ESE 224)*. University of Pennsylvania. Spring 2022. Instructor rating: 2.57/4. Class rating: 2.22/4. Difficulty rating: 2.46/4. Enrollment: 56.
2. *Graph Neural Networks (ESE 514)*. University of Pennsylvania. Fall 2021. Instructor rating: 3.37/4. Class rating: 3.27/4. Difficulty rating: 2.11/4. Enrollment: 44.
3. *Signal and Information Processing (ESE 224)*. University of Pennsylvania. Spring 2021. Instructor rating: 3.20/4. Class rating: 2.96/4. Difficulty rating: 2.71/4. Enrollment: 58.
4. *Graph Neural Networks (ESE 514)*. University of Pennsylvania. Fall 2020. Instructor rating: 3.08/4. Class rating: 2.97/4. Difficulty rating: 2.31/4. Enrollment: 27.

5. *Signal and Information Processing (ESE 224)*. University of Pennsylvania. Spring 2020. Instructor rating: 2.57/4. Class rating: 2.40/4. Difficulty rating: 2.42/4. Enrollment: 79.
6. *Stochastic systems analysis and simulation (ESE 303)*. University of Pennsylvania. Fall 2019. Instructor rating: 2.32/4. Class rating: 1.88/4. Difficulty rating: 2.56/4. Enrollment: 73.
7. *Signal and Information Processing (ESE 224)*. University of Pennsylvania. Spring 2019. Instructor rating: 2.69/4. Class rating: 2.68/4. Difficulty rating: 2.54/4. Enrollment: 85.
8. *Stochastic systems analysis and simulation (ESE 303)*. University of Pennsylvania. Fall 2018. Instructor rating: 2.90/4. Class rating: 2.67/4. Difficulty rating: 2.69/4. Enrollment: 63.
9. *Signal and Information Processing (ESE 224)*. University of Pennsylvania. Spring 2018. Instructor rating: 3.16/4. Class rating: 3.06/4. Difficulty rating: 2.30/4. Enrollment: 75.
10. *Stochastic systems analysis and simulation (ESE 303)*. University of Pennsylvania. Fall 2017. Instructor rating: 2.83/4. Class rating: 2.51/4. Difficulty rating: 2.62/4. Enrollment: 86.
11. *Signal and Information Processing (ESE 224)*, University of Pennsylvania, Spring 2017. Class rating: 2.58/4, instructor rating: 2.90/4, difficulty rating: 2.49/4. Enrollment: 98.
12. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2016. Class rating: 2.11/4, instructor rating: 2.56/4, difficulty rating: 2.78/4. Enrollment: 75.
13. *Signal and Information Processing (ESE 224)*, University of Pennsylvania, Spring 2016. Class rating: 2.81/4, instructor rating: 3.11/4, difficulty rating: 2.29/4. Enrollment: 91.
14. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2015. Class rating: 2.71/4, instructor rating: 3.04/4, difficulty rating: 2.73/4. Enrollment: 72.
15. *Signal and Information Processing (ESE 224)*, University of Pennsylvania, Spring 2015. Class rating: 2.73/4, instructor rating: 2.88/4, difficulty rating: 2.77/4. Enrollment: 35.
16. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2014. Class rating: 2.18/4, instructor rating: 2.41/4, difficulty rating: 3.12/4. Enrollment: tbd.
17. *Modern convex optimization (ESE 605)*, University of Pennsylvania, Spring 2014. Class rating: 2.97/4, instructor rating: 2.92/4, difficulty rating: 3.32/4. Enrollment: 40.
18. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2013. Class rating: 2.57/4, instructor rating: 2.76/4, difficulty rating: 3.26/4. Enrollment: 47.
19. *Optimal design of wireless systems (ESE 675)*, University of Pennsylvania, Spring 2013.

- Class rating: 3.00/4, instructor rating: 3.56/4, difficulty rating: 2.67/4. Enrollment: 3.
20. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2012. Class rating: 2.93/4, instructor rating: 3.24/4, difficulty rating: 3.49/4. Enrollment: 47.
 21. *Optimal design of wireless systems (ESE 675)*, University of Pennsylvania, Spring 2012. Class rating: 3.00/4, instructor rating: 3.56/4, difficulty rating: 2.67/4. Enrollment: 9.
 22. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2011. Class rating: 3.16/4, instructor rating: 3.36/4, difficulty rating: 3.38/4. Enrollment: 49.
 23. *Special topics in Electrical and Systems Engineering: Optimal design of wireless networks (ESE 680)*, University of Pennsylvania, Spring 2011. Class rating: 2.75/4, instructor rating: 3.05/4, difficulty rating: 3.17/4. Enrollment: 10.
 24. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2010. Class rating: 2.65/4, instructor rating: 3.16/4, difficulty rating: 3.34/4. Enrollment: 43.
 25. *Special topics in Electrical and Systems Engineering: Optimal design of wireless networks (ESE 680)*, University of Pennsylvania, Spring 2010. Class rating: 3.21/4, instructor rating: 3.57/4, difficulty rating: 2.71/4. Enrollment: 14.
 26. *Stochastic systems analysis and simulation (ESE 303)*, University of Pennsylvania, Fall 2009. Class rating: 2.61/4, instructor rating: 2.94/4, difficulty rating: 3.44/4. Enrollment: 37.
 27. *Data communications (ESE 408)*, University of Pennsylvania, Spring 2009. Class rating: 4/4, instructor rating: 4/4, difficulty rating: 3.50/4. Enrollment: 2.