Boulat A. Bash

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Education

2015 **Ph. D. (Computer Science)**, *University of Massachusetts*, Amherst, Massachusetts
Advisors: Don Towsley and Dennis Goeckel
Thesis: Fundamental Limits of Covert Communications *(won outstanding doctoral dissertation award)*

2008 **M. S. (Computer Science)**, *University of Massachusetts*, Amherst, Massachusetts

2001 **A. B. (Economics), *cum laude***, *Dartmouth College*, Hanover, New Hampshire

Employment

2024– **Associate Professor**, *Electrical & Computer Engineering Department*, University of Arizona, Tucson, Arizona

2018–2024 **Assistant Professor**, *Electrical & Computer Engineering Department*, University of Arizona, Tucson, Arizona

2015–2018 **Scientist**, *Quantum Information Processing Group*, Raytheon BBN Technologies, Cambridge, Massachusetts

2005–2015 **Research Assistant**, *College of Information and Computer Sciences*, University of Massachusetts, Amherst, Massachusetts

2004–2005 **Research Associate**, *Computer Science Department*, Boston University, Boston, Massachusetts

2000–2002 **Analyst**, *Quantitative Strategies Group, Asset Management Division*, Goldman Sachs & Co., New York, New York

Awards

2024 Research Leadership Institute, 2024–2025 Cohort, University of Arizona, College of Engineering representative

2020 National Science Foundation (NSF) Faculty Early Career Development Program (CAREER) Award, for "Covert Quantum Sensing"

2016 Raytheon Space and Airborne Systems (SAS) Excellence in Engineering and Technology Award for the theoretical and experimental work on covert communication

2015 National Security Agency (NSA) Best Scientific Cybersecurity Paper Competition Honorable Mention, for "Quantum-secure Covert Communication on Bosonic Channels" (journal ref. [19])

2015 University of Massachusetts School of Computer Science Outstanding Doctoral Dissertation Award, nominated for the ACM Doctoral Dissertation Award

2001 Francis Ouimet Scholarship Fund Student Speaker Award

Research Interests

I am broadly interested in applications of classical and quantum information theory to practical problems of reliability and security. Specifically, I study the fundamental limits of communications and sensing with signals that are mathematically provable to be secure against adversaries that are restricted only by the laws of quantum mechanics, and push towards these limits by engineering experimental and prototype systems. A lot of my work is on covert, or low probability of detection/intercept (LPD/LPI) systems. I collaborate closely with experts in radio and optical systems engineering as well as in physics. While most of my work focuses on electronic systems, I am also keenly interested in applications of information-theoretic approaches to securing biomechanical and very large distributed computing systems.

Grants and Contracts

2022–2027 **Collaborative Research: HSI Implementation and Evaluation Project: Transfer Students' Success in Quantum Information Science and Engineering**, *National Science Foundation (NSF)*, Grant number DUE-2150530
Role: Co-PI.

2021–2025 **U.S.-Ireland R&D Partnership: Collaborative Research: CNS Core: Medium: A unified framework for the emulation of classical and quantum physical layer networks**, *National Science Foundation (NSF)*, Grant number CNS-2107265
Role: PI.

2020–2025 **CAREER: Covert Quantum Sensing**, *National Science Foundation (NSF)*, Grant number CCF-2045530
Role: PI.

2020–2023 **FET: Small: Quantum-secure quantum-enhanced covert networks over generalized bosonic channels**, *National Science Foundation (NSF)*, Grant number CCF-2006679
Role: PI.

2019–2020 **Quantum-secure low probability of detection/intercept (LPD/LPI) networks**, *Army Research Office (ARO)*, Grant number W911NF-19-1-0412
Role: PI.

2016–2017 **Quantum-secured Imperceptible and unExploitable Communication and sensing Technologies (QUIET)**, *Defense Advanced Research Projects Agency (DARPA)*, Contract number HR0011-16-C-0111
Role: PI.

Invited Talks and Tutorials

- *Covert Communication: From Classical to Quantum.* Seminar at the Technical University of Braunschweig, Braunschweig, Germany, July 21, 2025.
- *Covert Communication: From Classical to Quantum.* CONNECT Centre Seminar at Trinity College Dublin, Ireland, July 8, 2025.
- *Covert Communication: From Classical to Quantum.* Optical Sciences Colloquium at the Wyant College of Optical Sciences, University of Arizona, Tucson AZ, USA, April 3, 2025.
- *Covert Communication: From Classical to Quantum.* CS and ECE Colloquium at the University of Connecticut, Storrs, CT, USA, February 28, 2025.
- *Quantum-Enhanced Transmittance Sensing.* Optical, Molecular & Quantum Science Seminar at the University of Oregon, Eugene OR, USA, January 25, 2024.
- *Covert Communication over Classical-Quantum Channels.* Workshop Inf. Theory and Related Fields, In Memory of Ning Cai, Bielefeld, Germany, November 24, 2023
- *Quantum-Enhanced Transmittance Sensing.* Quantum Optical Technologies Expert Meeting on Optical and Quantum Communications, University of Warsaw, Warszawa, Poland, October 9, 2023.
- *Quantum-Enhanced Transmittance Sensing.* Seminar at the Technical University of Munich, Munich, Germany, June 20, 2022.
- *Covert Communication: Fundamental Limits and Quantum Enhancements.* Electrical and Computer Engineering Department Colloquium, Brigham Young University, Provo, UT, March 10, 2022
- *Introduction to the Information Theory of Covert Communication.* Joint tutorial with Matthieu R. Bloch. 2021 International Symposium on Information Theory: Melbourne, Victoria, Australia [online due to COVID-19 pandemic], July 18, 2021
- *Fundamental Limits of Covert Communications and Sensing: Core Results and Future Directions.* Applied Research Laboratory: University of Texas, Austin, TX, November 15, 2019
- *Fundamental Limits of Covert Communications and Sensing: Core Results and Future Directions.* University of Warsaw, Warsaw, Poland, June 12, 2019
- *Quantum Limits of Low Probability of Detection/Intercept (LPD/LPI) Communications and Sensing.* Army Research Laboratory, Adelphi MD, January 24, 2019
- *Hiding Signals in Noise: Fundamental Limits of Covert Communication and Sensing.* College of Optical Sciences Colloquium, University of Arizona, Tucson AZ, November 30, 2017
- *Quantum-secure Covert Communication on Bosonic Channels.* Science of Security Quarterly Lablet Meeting, Laurel MD, November 2, 2016

Journal Publications

[21] Michael S. Bullock, Azadeh Sheikholeslami, Mehrdad Tahmasbi, Robert C. Macdonald, Saikat Guha, and **Boulat A. Bash**. "Fundamental Limits of Covert Communication

over Classical-Quantum Channels". In: *IEEE Trans. Inf. Theory* 71.4 (Apr. 2025), pp. 2741–2762. DOI: 10.1109/TIT.2025.3537970.

[20] Rohan Bali, Ashley N. Tittelbaugh, Shelbi L. Jenkins, Anuj Agrawal, Jerry Horgan, Marco Ruffini, Daniel C. Kilper, and **Boulat A. Bash**. "Routing and Spectrum Allocation in Broadband Quantum Entanglement Distribution". In: *IEEE J. Sel. Areas Commun.* 43.5 (2025), pp. 1856–1870. DOI: 10.1109/JSAC.2025.3548794.

[19] Elyakim Zlotnick, **Boulat A. Bash**, and Uzi Pereg. "Entanglement-Assisted Covert Communication via Qubit Depolarizing Channels". In: *IEEE Trans. Inf. Theory* 71.5 (2025), pp. 3693–3706. DOI: 10.1109/TIT.2025.3546191.

[18] Ali Cox, Quntao Zhuang, Christos N. Gagatsos, **Boulat A. Bash**, and Saikat Guha. "Transceiver designs to attain the entanglement assisted communications capacity". In: *Phys. Rev. Appl.* 19 (6 June 2023), p. 064015. DOI: 10.1103/PhysRevApplied.19.064015.

[17] Boyu Zhou, **Boulat A. Bash**, Saikat Guha, and Christos N. Gagatsos. "Bayesian minimum mean square error for transmissivity sensing". In: *Phys. Rev. Res.* 5 (4 Oct. 2023), p. 043033. DOI: 10.1103/PhysRevResearch.5.043033.

[16] Zihao Gong, Nathaniel Rodriguez, Christos N. Gagatsos, Saikat Guha, and **Boulat A. Bash**. "Quantum-Enhanced Transmittance Sensing". In: *IEEE J. Sel. Topics Signal Process.* 17.2 (2023), pp. 473–490. DOI: 10.1109/JSTSP.2022.3222680.

[15] Shuhong Hao, Haowei Shi, Christos N. Gagatsos, Mayank Mishra, **Boulat Bash**, Ivan Djordjevic, Saikat Guha, Quntao Zhuang, and Zheshen Zhang. "Demonstration of Entanglement-Enhanced Covert Sensing". In: *Phys. Rev. Lett.* 129 (1 June 2022), p. 010501. DOI: 10.1103/PhysRevLett.129.010501.

[14] Wenhua He, Saikat Guha, Jeffrey H. Shapiro, and **Boulat A. Bash**. "Performance Analysis of Free-space Quantum Key Distribution Using Multiple Spatial Modes". In: *Opt. Express* 29.13 (June 2021), pp. 19305–19318. DOI: 10.1364/OE.426556.

[13] Christos N. Gagatsos, Michael S. Bullock, and **Boulat A. Bash**. "Covert Capacity of Bosonic Channels". In: *IEEE J. Sel. Areas Inf. Theory* 1 (2 Aug. 2020), pp. 555–567. DOI: 10.1109/JSAIT.2020.3017199.

[12] Michael S. Bullock, Christos N. Gagatsos, Saikat Guha, and **Boulat A. Bash**. "Fundamental limits of quantum-secure covert communication over bosonic channels". In: *IEEE J. Sel. Areas Commun.* 38.3 (Mar. 2020), pp. 471–482. eprint: arXiv:1907.04228[cs.IT].

[11] Christos N. Gagatsos, **Boulat A. Bash**, Animesh Datta, Zheshen Zhang, and Saikat Guha. "Covert sensing using floodlight illumination". In: *Phys. Rev. A* 99 (6 June 2019), p. 062321. DOI: 10.1103/PhysRevA.99.062321. eprint: arXiv:1812.10743[quant-ph].

[10] Azadeh Sheikholeslami, Majid Ghaderi, Donald Towsley, **Boulat A. Bash**, Saikat Guha, and Dennis Goeckel. "Multi-Hop Routing in Covert Wireless Networks". In: *IEEE Trans. Wireless Commun.* 17.6 (June 2018), pp. 3656–3669. DOI: 10.1109/TWC.2018.2812881. eprint: arXiv:1803.04100[cs.NI].

[9] Ramin Soltani, Dennis Goeckel, Don Towsley, **Boulat A. Bash**, and Saikat Guha. "Covert Wireless Communication with Artificial Noise Generation". In: *IEEE Trans. Wireless Commun.* 17.11 (Nov. 2018), pp. 7252–7267. DOI: 10.1109/TWC.2018.2865946. eprint: arXiv:1610.00384[cs.IT].

[8] Tamara V. Sobers, **Boulat A. Bash**, Saikat Guha, Don Towsley, and Dennis Goeckel. "Covert Communication in the Presence of an Uninformed Jammer". In: *IEEE Trans. Wireless Commun.* 16.9 (Sept. 2017), pp. 6193–6206. DOI: 10.1109/TWC.2017.2720736.

[7] Christos N. Gagatsos, **Boulat A. Bash**, Saikat Guha, and Animesh Datta. "Bounding the quantum limits of precision for phase estimation with loss and thermal noise". In: *Phys. Rev. A* 96 (6 Dec. 2017), p. 062306. DOI: 10.1103/PhysRevA.96.062306. eprint: arXiv:1701.05518[quant-ph].

[6] Dennis Goeckel, **Bash A. Bash**, Saikat Guha, and Don Towsley. "Covert Communications When the Warden Does Not Know the Background Noise Power". In: *IEEE Commun. Lett.* 20.2 (Feb. 2016), pp. 236–239. DOI: 10.1109/LCOMM.2015.2507594.

[5] **Boulat A. Bash**, Dennis Goeckel, and Don Towsley. "Covert Communication Gains From Adversary's Ignorance of Transmission Time". In: *IEEE Trans. Wireless Commun.* 15.12 (Dec. 2016), pp. 8394–8405. DOI: 10.1109/TWC.2016.2614502.

[4] **Boulat A. Bash**, Dennis Goeckel, Saikat Guha, and Don Towsley. "Hiding Information in Noise: Fundamental Limits of Covert Wireless Communication". In: *IEEE Commun. Mag.* 53.12 (Dec. 2015). DOI: 10.1109/MCOM.2015.7355562. eprint: arXiv:1506.00066[cs.IT].

[3] **Boulat A. Bash**, Andrei H. Gheorghe, Monika Patel, Jonathan L. Habif, Dennis Goeckel, Don Towsley, and Saikat Guha. "Quantum-Secure Covert Communication on Bosonic Channels". In: *Nat. Commun.* 6 (Oct. 2015). DOI: 10.1038/NCOMMS9626.

[2] **Boulat A. Bash**, Dennis Goeckel, and Don Towsley. "Limits of Reliable Communication with Low Probability of Detection on AWGN Channels". In: *IEEE J. Sel. Areas Commun.* 31.9 (Sept. 2013), pp. 1921–1930. DOI: 10.1109/JSAC.2013.130923. eprint: arXiv:1202.6423[cs.IT].

[1] **Boulat A. Bash**, Dennis Goeckel, and Don Towsley. "Asymptotic Optimality of Equal Power Allocation for Linear Estimation of WSS Random Processes". In: *IEEE Wireless Commun. Lett.* 2.3 (Feb. 2013), pp. 247–250. DOI: 10.1109/WCL.2013.020513.120908.

Conference Publications

[47] Tiju Cherian John, **Boulat A. Bash**, and Christos N. Gagatsos. "Fundamental Limits of Quickest Change-point Detection with Continuous-Variable Quantum States". In: *Proc. Inform. Theory Workshop (ITW)*. Sydney, NSW, Australia, Sept. 2025.

[46] Ohad Kimelfeld, **Boulat A. Bash**, and Uzi Pereg. "Covert Entanglement Generation and Secrecy". In: *Proc. Inform. Theory Workshop (ITW)*. Sydney, NSW, Australia, Sept. 2025.

[45] Ohad Kimelfeld, **Boulat A. Bash**, and Uzi Pereg. "Covert Entanglement Generation and Secrecy". In: *Proc. Beyond IID*. Munich, Germany, July 2025.

[44] Evan J. D. Anderson, Michael S. Bullock, Filip Rozpędek, and **Boulat A. Bash**. "Achievability of Covert Quantum Communication". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. Ann Arbor, MI, USA, June 2025.

[43] Vivek Vasan, Anuj Agrawal, Alexander Nico-Katz, Jerry Horgan, **Boulat A. Bash**, Daniel C. Kilper, and Marco Ruffini. "Control Protocol for Entangled Pair Verification in Quantum Optical Networks". In: *Proc. IEEE Int. Conf. Commun. (ICC)*. Montréal, QC, Canada, June 2025.

[42] Rohan Bali, Trevor E. Bailey, Michael S. Bullock, and **Boulat A. Bash**. "Experimental Covert Communication Using Software-Defined Radio". In: *Proc. IEEE Mil. Commun. Conf. (MILCOM) Workshop Quantum Technol.* Los Angeles, CA, USA, Oct. 2025.

[41] Evan J. D. Anderson, Michael S. Bullock, Ohad Kimelfeld, Christopher K. Eyre, Filip Rozpędek, Uzi Pereg, and **Boulat A. Bash**. "Covert Entanglement Generation over Bosonic Channels". In: *Proc. IEEE Int. Conf. Quantum Comput. Eng. (QCE)*. Alburquerque, NM, USA, 2025.

[40] Michael S. Bullock, Azadeh Sheikholeslami, Mehrdad Tahmasbi, Robert C. Macdonald, Saikat Guha, and **Boulat A. Bash**. "Covert Communication over Classical-Quantum Channels". In: *Proc. Beyond IID*. Urbana-Champaign, IL, USA, July 2024.

[39] Zihao Gong and **Boulat A. Bash**. "On Two-stage Quantum Estimation and the Asymptotics of Quantum-enhanced Transmittance Sensing". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. Athens, Greece, July 2024.

[38] Rohan Bali, Ashley Tittelbaugh, Shelbi L. Jenkins, Anuj Agrawal, Jerry Horgan, Marco Ruffini, Daniel Kilper, and **Boulat A. Bash**. "Routing and Spectrum Allocation in Broadband Degenerate EPR-Pair Distribution". In: *Proc. IEEE Int. Conf. Commun. (ICC)*. Denver, CO, USA, June 2024.

[37] Evan J. D. Anderson, Christopher K. Eyre, Isabel M. Dailey, Filip Rozpędek, and **Boulat A. Bash**. "Square Root Law for Covert Quantum Communication over Optical Channels". In: *Proc. IEEE Int. Conf. Quantum Comput. Eng. (QCE)*. Montréal, QC, Canada, 2024, pp. 1817–1823.

[36] Johannes Rosenberger, Abdalla Ibrahim, **Boulat A. Bash**, Christian Deppe, Roberto Ferrara, and Uzi Pereg. "Capacity Bounds for Identification With Effective Secrecy". In: *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*. Taipei, Taiwan, June 2023, pp. 1202–1207.

[35] Elyakim Zlotnick, **Boulat Bash**, and Uzi Pereg. "Entanglement-Assisted Covert Communication via Qubit Depolarizing Channels". In: *Proc. IEEE Int. Symp. Inf. Theory (ISIT)*. Taipei, Taiwan, June 2023, pp. 198–203.

[34] Michael S. Bullock, Wesley Webb, Samuel H. Knarr, Timothy C. Burt, James A. Drakes, Victor G. Bucklew, Saikat Guha, and **Boulat A. Bash**. "Spread-Photon Architecture for Quantum-Secure Communications". In: *Proc. IEEE Photon. Conf. (IPC)*. Orlando, FL, USA, Nov. 2023.

[33] Rohan Bali, Ashley Tittelbaugh, Shelbi L. Jenkins, Anuj Agrawal, Jerry Horgan, Marco Ruffini, Daniel Kilper, and **Boulat A. Bash**. "Optical network design for entanglement distribution". In: *Proc. Southwest Quantum Inf. Technol. (SQuInT) Workshop*. Alburquerque, NM, USA, Oct. 2023.

[32] Zihao Gong and **Boulat A. Bash**. "On the Asymptotics of Two-stage Quantum Estimation". In: *Proc. Southwest Quantum Inf. Technol. (SQuInT) Workshop*. Alburquerque, NM, USA, Oct. 2023.

[31] Wesley Webb, Michael S. Bullock, Samuel H. Knarr, Timothy C. Burt, James A. Drakes, Saikat Guha, **Boulat A. Bash**, and Victor G. Bucklew. "Spread Photon Transceiver for Quantum Secure Communications". In: *Proc. IEEE Mil. Commun. Conf. (MILCOM) Workshop Quantum Technol.* Boston, MA, USA, Oct. 2023.

[30] Shuhong Hao, Haowei Shi, Christos N. Gagatsos, Mayank Mishra, **Boulat Bash**, Ivan Djordjevic, Saikat Guha, Quntao Zhuang, and Zheshen Zhang. "Experimental Entanglement-Enhanced Covert Sensing". In: *Conf. Lasers Electro-Opt.* San Jose, CA, USA, May 2022, FF4A.1.

[29] Zheshen Zhang, Shuhong Hao, Haowei Shi, Christos N. Gagatsos, Mayank Mishra, **Boulat A. Bash**, Ivan B. Djordjevic, Saikat Guha, and Quntao Zhuang. "Demonstration of quantum-optimum entanglement-enhanced covert sensing". In: *Bull. Amer. Phys. Soc.* Chicago, IL, USA, Mar. 2022.

[28] Zuhra Amiri, **Boulat A. Bash**, and Janis Nötzel. "Performance of Quantum Preprocessing under Phase Noise". In: *IEEE Globecom Workshops (GC Wkshps): 6G-Quantum Commun. Netw.* Dec. 2022, pp. 298–303.

[27] Evan J.D. Anderson and **Boulat A. Bash**. "Fundamental Limits of Thermal-Noise Lossy Bosonic Multiple Access Channel". In: *IEEE Globecom Workshops (GC Wkshps): 6G-Quantum Commun. Netw.* Dec. 2022.

[26] Tianrui Tan, Kwan Kit Lee, Amit Ashok, Animesh Datta, and **Boulat A. Bash**. "Robust Adaptive Quantum-Limited Super-Resolution Imaging". In: *Proc. Asilomar Conf. Signals Syst. Comput.* Pacific Grove, CA, USA, Nov. 2022.

[25] Evan J.D. Anderson, Saikat Guha, and **Boulat A. Bash**. "Fundamental Limits of Bosonic Broadcast Channels". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. virtual, July 2021.

[24] Zihao Gong, Christos N. Gagatsos, Saikat Guha, and **Boulat A. Bash**. "Fundamental Limits of Loss Sensing over Bosonic Channels". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. virtual, July 2021.

[23] Mehrdad Tahmasbi, Saikat Guha, **Boulat A. Bash**, and Matthieu R. Bloch. "Signaling for Covert Quantum Sensing". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. virtual, July 2021.

[22] Wenhua He, Saikat Guha, Jeffrey H. Shapiro, and **Boulat A. Bash**. "Performance Analysis of Free-space Quantum Key Distribution Using Multiple Spatial Modes". In: *Proc. Conf. Lasers Electro-Opt. (CLEO)*. virtual, May 2021.

[21] Michael S. Bullock, Christos N. Gagatsos, and **Boulat A. Bash**. "Capacity Theorems for Covert Bosonic Channels". In: *Proc. Inform. Theory Workshop (ITW) 2020*. virtual, Apr. 2021.

[20] Michael S. Bullock, Christos N. Gagatsos, Saikat Guha, and **Boulat A. Bash**. "Entanglement-Assisted Quantum-Secure Covert Communication". In: *OSA Quantum 2.0 Conf.* virtual, Sept. 2020, QM6B.5.

[19] Saikat Guha, Quntao Zhuang, and **Boulat A. Bash**. "Infinite-fold enhancement in communications capacity using pre-shared entanglement". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. virtual, June 2020.

[18] Shakil Ahmed and **Boulat A. Bash**. "Average Worst-Case Secrecy Rate Maximization Via UAV and Base Station Resource Allocation". In: *Proc. Conf. Commun. Control Comp. (Allerton)*. Monticello, IL, USA, Sept. 2019.

[17] Michael S. Bullock, Christos N. Gagatsos, Saikat Guha, and **Boulat A. Bash**. "Fundamental limits of quantum-secure covert communication over bosonic channels". In: *Proc. Conf. Commun. Control Comp. (Allerton)*. Monticello, IL, USA, Sept. 2019. eprint: `arXiv:1907.04228[cs.IT]`.

[16] **Boulat A. Bash**, Christos Gagatsos, and Saikat Guha. "Fundamental limits of discrete-modulation quantum-secure covert optical communication". In: *Proc. Central Eur. Workshop Quantum Opt. (CEWQO)*. June 2019.

[15] Christos N. Gagatsos, **Boulat A. Bash**, Animesh Datta, Zheshen Zhang, and Saikat Guha. "Covert sensing using floodlight illumination". In: *Proc. Conf. Lasers Electro-Opt. (CLEO)*. San Jose, CA, USA: Opt. Soc. Amer., May 2019, FF1F.7.

[14] Dennis Goeckel, Azadeh Sheikholeslami, Tamara Sobers, **Boulat A. Bash**, Don Towsley, and Saikat Guha. "Covert Communications in a Dynamic Interference Environment". In: *Proc. IEEE Int. Workshop Signal Process. Advances Wireless Commun. (SPAWC)*. Kalamata, Greece, June 2018.

[13] **Boulat A. Bash**, Christos N. Gagatsos, Animesh Datta, and Saikat Guha. "Fundamental limits of quantum-secure covert optical sensing". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. Aachen, Germany, June 2017. eprint: `arXiv:1701.06206[quant-ph]`.

[12] Dennis Goeckel, **Boulat A. Bash**, Azadeh Sheikholeslami, Saikat Guha, and Don Towsley. "Covert Active Sensing of Linear Systems". In: *Proc. Asilomar Conf. Signals Syst. Comput.* Pacific Grove, CA, USA, Nov. 2017.

[11] Tamara V. Sobers, **Boulat A. Bash**, Saikat Guha, Don Towsley, and Dennis Goeckel. "Covert Communications on Continuous-Time Channels in the Presence of Jamming". In: *Asilomar Conf. Signals Syst. Comput.* Pacific Grove, CA, USA, Nov. 2017.

[10] Azadeh Sheikholeslami, **Boulat A. Bash**, Donald Towsley, Dennis Goeckel, and Saikat Guha. "Covert Communication over Classical-Quantum Channels". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. Barcelona, Spain, July 2016. eprint: `arXiv:1601.06826[quant-ph]`.

[9] Tamara V. Sobers, **Boulat A. Bash**, Dennis Goeckel, Saikat Guha, and Don Towsley. "Covert communication with the help of an uninformed jammer achieves positive rate". In: *Asilomar Conf. Signals Syst. Comput.* Pacific Grove, CA, USA, Nov. 2015, pp. 625–629.

[8] **Boulat A. Bash**, Dennis Goeckel, and Don Towsley. "LPD Communication when the Warden Does Not Know When". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. Honolulu, HI, July 2014. eprint: `arXiv:1403.1013[cs.IT]`.

[7] Ramin Soltani, **Boulat A. Bash**, Dennis Goeckel, Saikat Guha, and Don Towsley. "Covert Single-hop Communication in a Wireless Network with Distributed Artificial Noise Generation". In: *Proc. Conf. Commun. Control Comp. (Allerton)*. Monticello, IL, USA, Oct. 2014. eprint: `arXiv:1610.00384[cs.IT]`.

[6] **Boulat A. Bash**, Saikat Guha, Dennis Goeckel, and Don Towsley. "Quantum Noise Limited Communication with Low Probability of Detection". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. Istanbul, Turkey, July 2013.

[5] **Boulat A. Bash**, Dennis Goeckel, and Don Towsley. "Square Root Law for Communication with Low Probability of Detection on AWGN Channels". In: *Proc. IEEE Int. Symp. Inform. Theory (ISIT)*. Cambridge, MA, July 2012.

[4] **Boulat A. Bash**, Dennis Goeckel, and Don Towsley. "Clustering in Cooperative Networks". In: *Proc. IEEE Int. Conf. Comput. Commun. (INFOCOM) Mini-conference*. Shanghai, China, Apr. 2011.

[3] **Boulat A. Bash**. "Informed Detour Selection Helps Reliability". In: *Proc. IEEE Global Internet Symp. (GIS)*. Rio de Janeiro, Brasil, Apr. 2009, pp. 1–6.

[2] **Boulat A. Bash** and Peter J. Desnoyers. "Exact Distributed Voronoi Cell Computation in Sensor Networks". In: *Proc. ACM Int. Conf. Inform. Process. Sensor Netw. (IPSN)*. Cambridge, Massachusetts, USA, Apr. 2007, pp. 236–243.

[1] **Boulat A. Bash**, John W. Byers, and Jeffrey Considine. "Uniform Random Sampling in Sensor Networks". In: *Proc. Int. Workshop Data Manage. Sensor Netw. (DMSN)*. Toronto, Canada, Aug. 2004.

Patents

[2] Saikat Guha, Ali Cox, Quntao Zhuang, Christon N. Gagatsos, and **Boulat A. Bash**. "Processing Signals Using Entanglement-Assisted Communication". U.S. Application No. 18/289,884. Aug. 2024.

[1] **Boulat A. Bash** and Saikat Guha. "Covert Sensor". U.S. App. 10/274,587. Apr. 2019.

Technical Reports and Work in Submission

[1] **Boulat A. Bash**. *Post-IPO Flipping and Turnover: Predictive Factors for Long-Run Returns*. Social Sci. Res. Netw. work. paper 623502. May 2001.

Teaching

Spring 2025 **Introduction to Communications**, *UA ECE 340A*

Fall 2024 **Quantum Sensing and Quantum Machine Learning**, *UA ECE 540*

Fall 2023 **Quantum Sensing and Quantum Machine Learning**, *UA ECE 540*

Spring 2023 **Introduction to Communications**, *UA ECE 340A*

Fall 2022 **Detection and Estimation in Engineering Systems**, *UA ECE 639*

Spring 2022 **Introduction to Communications**, *UA ECE 340A*

Fall 2021 **Introduction to Communications**, *UA ECE 340A*

Fall 2020 **Introduction to Communications**, *UA ECE 340A*

Spring 2020 **Detection and Estimation in Engineering Systems**, *UA ECE 639*

Fall 2019 **Introduction to Communications**, *UA ECE 340A*

Spring 2019 **Introduction to Communications**, *UA ECE 340A*

Spring 2011 **Wireless Network Security: Information-Theoretic vs. Cryptographic Approaches**, *UMass CMPSCI 691WS/ECE 691WS*, www-net.cs.umass.edu/cs691ws/

Memberships and Professional Activities

Since 2006 Member, Institute of Electrical and Electronics Engineers (IEEE)

Since 2006 Member, Association for Computing Machinery (ACM)

Since 2019 Member, Optica (formerly OSA)

Guest editor, IEEE Journal of Selected Topics in Signal Processing (JSTSP), Special Issue on "Recent Advances in Wideband Signal Processing for Classical and Quantum Synthetic Apertures"

Organizer:

- 2022 Workshop on Entanglement Assisted Communication Networks (EACN), Bad Honef, Germany
- 2023 Workshop on Entanglement Assisted Communication Networks (EACN), Taipei, Taiwan
- 2024 Workshop on Entanglement Assisted Communication Networks (EACN), Braunschweig, Germany
- 2025 Workshop on Quantum Information at the 2025 IEEE International Symposium on Information Theory, Ann Arbor, Michigan, USA
- 2025 Workshop on Entanglement Assisted Communication Networks (EACN), Nice, France
- 2026 Workshop on Foundations of Future Communication Systems: Innovations in Communication (FFCS), Braunschweig, Germany

Technical Program Committee:

- IEEE International Conference on Quantum Computing and Engineering (QCE), 2025
- ACM SIGCOMM Workshop on Quantum Networks and Distributed Quantum Computing (QuNet), 2025
- IEEE Photonics Conference (IPC), 2020–2023

Reviewing board, IEEE Journal on Selected Areas of Communications (JSAC), Special Issue on "Quantum Information Science"

Reviewer:

- IEEE Transactions on Information Theory
- IEEE Transactions on Wireless Communications
- IEEE/ACM Transactions on Networking
- IEEE Transactions on Mobile Computing
- IEEE Journal on Selected Areas of Communications (JSAC)
- IEEE Transactions on Information Forensics & Security
- IEEE/OPTICA Journal of Lightwave Technology
- OPTICA Journal of Optical Communications and Networking
- ACM Transactions on Sensor Networks (TOSN)
- ACM SIGMOBILE Mobile Computing and Communications Review (MC^2R)
- APS Physical Review Letters
- IEEE Access
- Elsevier Physical Communication
- IEEE International Symposium on Information Theory (ISIT)
- Asilomar Conference on Signals, Systems, and Computers
- IEEE Globecom Workshops
- IEEE International Conference on Computer Communications (INFOCOM)
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)
- International Conference on Distributed Computing in Sensor Systems (DCOSS)