

Walter O. Krawec

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(Updated August 2019)

Education:

Ph.D. Computer Science

Stevens Institute of Technology, Hoboken NJ

Dissertation: *Semi-Quantum Key Distribution: Protocols, Security Analysis, and New Models*

Graduated May 2015

MA Mathematics

University at Albany (SUNY), Albany NY

Graduated May 2010

BA Mathematics

Mount Saint Mary College, Newburgh NY

Graduated May 2008

Professional Experience:

Assistant Professor of Computer Science & Engineering University of Connecticut , Storrs CT	2017-Present
Assistant Professor of Computer Science Iona College , New Rochelle NY	2015-2017
Research Assistant Stevens Institute of Technology , Hoboken NJ	2011-2015
Instructor University at Albany (SUNY) , Albany NY	2010-2011
Teaching Assistant University at Albany (SUNY) , Albany NY	2010-2011

Funding:

External:

- **NSF:** Secure Quantum Communication with Limited Resources
Principle Investigator, \$309,582 (10/1/18 to 9/30/21)
- **Comcast:** Development of Experimental Test-Bed for Multi-User Quantum Communication Protocols
Principle Investigator, \$225,125 (4/1/2019 to 2/29/2020)
- **Comcast:** Survey of Practical Quantum Key Distribution Systems
Principle Investigator, \$27,129 (8/1/18 to 12/31/20)

Internal:

- **University of Connecticut (REP):** Analyzing the Security of Quantum Cryptographic Protocols
Principle Investigator, \$18,069 (9/1/2019 to 6/1/2020)
- **University of Connecticut:** UConn Scholarship Facilitation Fund (SFF)
Principle Investigator, \$1120.12 (08/18 to 09/18)

Teaching Experience:

University of Connecticut , Storrs CT	2017-Present
<ul style="list-style-type: none">• Introduction to Computer and Network Security (Spring 2019)• Cryptography (Fall 2017, Fall 2018)• Introduction to Quantum Computing (Spring 2018)	
Iona College , New Rochelle NY	2015-2017
<ul style="list-style-type: none">• Cryptography (Spring 2016, Spring 2017)• Computer Networking and Network Programming (Spring 2016, Spring 2017)• Introduction to Robotics (Fall 2017)• Network Security (Fall 2016)• Automata and Formal Languages (Fall 2016)• Computer Science II (Spring 2016, Fall 2016)• Data Structures and Algorithm Analysis (Fall 2015)• Programming Languages (Fall 2015)	
University at Albany (SUNY) , Albany NY	2010-2011
<ul style="list-style-type: none">• Algebra and Calculus I (Fall 2010)• Calculus I (Spring 2011)	

Awards:

Robert Crooks Stanley Graduate Fellowship Stevens Institute of Technology	2014-2015
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Invited Talks:

Quantum Computing – The Final Frontier? <i>CableLabs Summer Conference</i>	Aug. 5, 2019
Quantum Key Distribution. <i>Comcast Quantum Computing Working Group</i>	June 8, 2018
Quantum Computing. <i>University of Connecticut EE-CS Graduate Seminar</i>	Feb. 16, 2018
Semi-Quantum Key Distribution. <i>University of Connecticut ECE/CSE Security Seminar</i>	Oct. 24, 2017
Security of a Semi-Quantum Key Distribution Protocol. <i>Security and Quantum Information Group (SQIG) in Instituto de Telecomunicacoes (IT) in Lisbon</i>	Sep. 25, 2017

Publications:

(* Represents a student coauthor.)

Peer-Reviewed Journal and Conference Papers:

1. O. Amer* and W.O. Krawec. Semi-Quantum Key Distribution with High Quantum Noise Tolerance. To appear: *Physical Review A*. pre-print available online: arXiv:1812.04144
2. A. Gagliano*, W.O. Krawec, and H. Iqbal*. From Classical to Semi-Quantum Secure Communication. To appear: *Proc. IEEE International Symposium on Information Theory (ISIT)* 2019. pre-print available online: arXiv:1901.01611
3. W.O. Krawec, S. Picek, and D. Jakobovic. Evolutionary Algorithms for the Design of Quantum Protocols. In *Applications of Evolutionary Computation (EvoApplications)* 2019. Lecture Notes in Computer Science, vol. 11454, Springer. **Best Paper Award.**
4. W.O. Krawec and E. Geiss*. Semi-Quantum Key Distribution with Limited Measurement Capabilities. *Proc. International Symposium on Information Theory and Its Applications (ISITA)*, Singapore, 2018, pp. 462-466
5. C. Vlachou, W.O. Krawec, P. Mateus, N. Paunkovic, and A. Souto. Quantum Key Distribution with Quantum Walks. *Quantum Information Processing* (2018) 17:288.
6. W.O. Krawec and F. Miao. Game Theoretic Security Framework for Quantum Key Distribution. *International Conference on Decision and Game Theory for Security*. Springer, pp. 38-58. (2018)

7. W.O. Krawec. Key-Rate Bound of a Semi-Quantum Protocol Using an Entropic Uncertainty Relation. To appear: *IEEE International Symposium on Information Theory (ISIT)* 2018.
8. W. O. Krawec and S. A. Markelon*. Genetic Algorithm to Study Practical Quantum Adversaries. *Proc. ACM GECCO 2018*. pp. 1270-1277. (2018)
9. W. O. Krawec. Practical Security of Semi-Quantum Key Distribution. *Proc. SPIE Quantum Information Science, Sensing, and Computation X. Vol. 10660* (2018).
10. W.O. Krawec, M.G. Nelson*, E.P. Geiss*. Automatic Generation of Optimal Quantum Key Distribution Protocols. *Proc. ACM GECCO 2017, Berlin (2017)*. pp. 1153-1160.
11. W.O. Krawec. Quantum Key Distribution with Mismatched Measurements over Arbitrary Channels. *Quantum Information & Computation*. Vol 17, No. 3 and 4, pages 209-241. (2017) Available online: arXiv:1608.07728
12. W.O. Krawec. An Improved Asymptotic Key Rate Bound for a Mediated Semi-Quantum Key Distribution Protocol. *Quantum Information & Computation*. Vol. 16, No. 9 and 10, pages 813-834 (2016). Available online: arXiv:1509.04797
13. W.O. Krawec. An Asymptotic Analysis of a Three State Quantum Cryptographic Protocol. *Proc. IEEE International Symposium on Information Theory (ISIT), Barcelona 2016*. Pages 2489 – 2493 (2016). Available online: arXiv:1601.00185
14. W.O. Krawec. Security of a Semi-Quantum Protocol where Reflections Contribute to the Secret Key. *Quantum Information Processing*, 15 (5), 2067-2090 (2016). Available online: arXiv:1510.07181
15. W.O. Krawec. A Genetic Algorithm to Analyze the Security of Quantum Cryptographic Protocols. *Proc. IEEE CEC 2016 (Vancouver Canada)*. Pages 2098-2105. (2016)
16. W.O. Krawec. Security Proof of a Semi-Quantum Key Distribution Protocol. *Proc. IEEE International Symposium on Information Theory (ISIT), Hong Kong 2015*. Pages 686-690 (2015). Available online: arXiv:1412.0282
17. W.O. Krawec. Mediated Semi-Quantum Key Distribution. *Physical Review A*, 91 032323 (2015). Available online: arXiv:1411.6024
18. W.O. Krawec. History Dependent Quantum Walk on the Cycle with an Unbalanced Coin. *Physica A: Statistical Mechanics and its Applications*, 428, pages 319-331 (2015). Available online: arXiv:1411.6298
19. W.O. Krawec. n-Player Impartial Combinatorial Games with Random Players. *Theoretical Computer Science*, 569, pages 1-12 (2015).
20. W.O. Krawec. Restricted Attacks on Semi-Quantum Key Distribution Protocols. *Quantum Information Processing*, 13 (11), pages 2417-2436 (2014)
21. W.O. Krawec. On the Application of Quantum Decision Theory to Artificial Life. *Proc. IEEE CEC*, pages 3323-3330, Cancun Mexico (2013)
22. W.O. Krawec. Regarding Modular Multiplicative Graphs. *Graph Theory Notes of NY LXIV*, pages 45-48. (2013)
23. W.O. Krawec. On the Emergent Behaviors of a Robot Controlled by a Real-Time Evolving Neural Network. *Proc. Of the 13th International Conference on the Simulation and*

Synthesis of Living Systems (ALife 13), pages 364-371, East Lansing MI. (2012)

- 24. W.O. Krawec. Modular Multiplicative Graphs. *Ars Combinatoria*. Vol. 124, pages 33-40
- 25. W.O. Krawec. Analyzing n-Player Impartial Games. *International Journal of Game Theory*, 41 (2) pages 345-367 (2012)

Posters and Poster Papers (Peer-Reviewed):

- 26. W.O. Krawec. Quantum Sampling and Entropic Uncertainty, with Applications. 9th *International Conference on Quantum Cryptography (Qcrypt)* 2019, Montreal Canada.
- 27. C. Vlachou, W.O. Krawec, P. Mateus, N. Paunkovic and A. Souto Quantum Walks and Quantum Key Distribution. 9th *International Conference on Quantum Cryptography (Qcrypt)* 2019, Montreal Canada.
- 28. W.O. Krawec. Mismatched Measurements and Quantum Key Distribution. 6th *International Conference on Quantum Cryptography (QCrypt)* 2016, Washington D.C.
- 29. W.O. Krawec. An Algorithm for Evolving Multiple Quantum Operators for Arbitrary Quantum Computational Problems. *Proc. ACM GECCO (Companion)* 2014, Vancouver Canada, pages 59-60
- 30. W.O. Krawec. Minimal Variable Quantum Decision Makers for Robotic Control. *Proc. ACM GECCO (Companion)* 2014, Vancouver Canada, pages 33-34
- 31. W.O. Krawec. Using Evolutionary Techniques to Analyze the Security of Quantum Key Distribution Protocols. *Proc. ACM GECCO (Companion)* 2014, Vancouver Canada, pages 171-172

Theses:

- 32. W.O. Krawec. Semi-Quantum Key Distribution: Protocols, Security Analysis, and New Models. Ph.D. Thesis, Stevens Institute of Technology, Hoboken NJ, May 2015
- 33. W.O. Krawec. Analyzing n-Player Impartial Games. MA Thesis, University at Albany (SUNY), Albany NY, May 2010

Abstracts:

- 34. W.O. Krawec. Security in the Semi-Quantum Setting. Presented at the AMS/MAA Joint Math Meetings, San Antonio TX, January 2015

Manuscripts:

- 35. W.O. Krawec. Simulating Quantum Algorithms with Q-Prog.
- 36. M. Daven and W.O. Krawec. Three-legged Spiders with Even Edge Count are Harmonious

Other (Not Peer-Reviewed) Articles:

37. W.O. Krawec. Evolutionary Robotics (Parts I and II). *Circuit Cellar Ink*. November-December 2015.
38. W.O. Krawec. Experiments in Developmental Robotics (Parts I and II). *Circuit Cellar Ink*. September-October 2013
39. W.O. Krawec. Creating an HC11 OS. *Dr. Dobbs Journal*. December 2008
40. W.O. Krawec. Programming the Pocket PC. *Nuts & Volts Magazine*. June 2006
41. W.O. Krawec. Palm Programming: An Introduction. *Nuts & Volts Magazine*. October 2004
42. W.O. Krawec. An HC11 File Manager. *Circuit Cellar Online*. April-May 2001

Professional Service:

I have served as reviewer for the following journals and conferences:

- *Nature Physics*
- *Quantum Information & Computation*
- *SIAM Reviews (SIREV)*
- *Entropy*
- *New Journal of Physics*
- *IEEE International Symposium on Information Theory (ISIT)*
- *Quantum Information Processing*
- *Theoretical Computer Science*
- *Discrete Mathematics*
- *Discrete Applied Mathematics*
- *Scientific Reports*

I am also a reviewer for the *AMS Mathematical Reviews* and serve on NSF panels.

Students:

PhD:

1. Omar Amer (Fall 2018 – present)
2. Hasan Iqbal (Fall 2018 – present)
3. Minwoo Bae (Fall 2018 – present)

Undergraduate:

1. Calvin Roth (2019)
2. Allison Gagliano (2018)
3. Alex Masi (2018)
4. Omar Amer (Honor's Student, Spring 2018)
5. Sam Markelon (2017-2019)
6. Michael Nelson (Honor's Student, 2017)
7. Eric Geiss (2016-2017)