

Francisco Revson Fernandes Pereira

Research Interests Block, Convolutional, Algebraic Geometric, and Quantum Coding Theory
Entanglement-Assisted Quantum Codes, Code-Based Cryptography
Information Measuring and Information Processing in Quantum Systems

Education **Ph.D. Visitor Student Internship**, Mathematics and Computing Science
Eindhoven University of Technology, The Netherlands September 2018 - August 2019
Supervisor: Ruud Pellikaan
Research Areas: Quantum Error Correcting Codes, Entanglement-Assisted Quantum Codes, Algebraic Geometry Codes, Cyclic Codes

Doctor in Science, Electrical Engineering
Federal University of Campina Grande, Brazil March 2016 - November 2019
Thesis: Algebraic Geometry Codes and its Applications to Quantum Coding Theory (In Portuguese)
Supervisors: Giuliano Gadioli La Guardia and Francisco Marcos de Assis
Research Areas: Classical and Quantum Error Correcting Codes, Entanglement-Assisted Quantum Codes, Algebraic Geometry Codes, Convolutional Codes

Master in Engineering, Electrical Engineering
Federal University of Campina Grande, Brazil August 2014 - February 2016
Thesis: Quantum Key Distribution via Shannon-Kotel'nikov Maps (In Portuguese)
Supervisor: Francisco Marcos de Assis
Summary: Quantum key distribution (QKD) schemes are a standard quantum-based method to exchange secret keys. A new QKD protocol using nonlinear modulation is proposed and analyzed. The theory of Shannon-Kotel'nikov maps and bosonic channels are merged to synthesize such protocol.

Bachelor in Engineering, Electrical Engineering
Federal University of Campina Grande, Brazil February 2009 - August 2014
Thesis: Classical Capacity of Noiseless Bosonic Channel (In Portuguese)
Supervisor: Francisco Marcos de Assis
Summary: In the quantum mechanical paradigm, optical channels belong to a larger family of quantum channels which are called bosonic channel. Considering noiseless bosonic channels, we computed the capacity of such channels and showed how to use classical PAM to achieve it.

Term Visiting Positions

09/2018–08/2019	Supervisor: Ruud Pellikaan	Department of Mathematics and Computing Science, Eindhoven University of Technology, The Netherlands
06/2019	Supervisor: Diego Ruano	Department of Algebra, Analysis, Geometry and Topology, University of Valladolid, Spain

Peer-reviewed Articles

1. Francisco Revson F. Pereira, Giuliano G. La Guardia, Francisco M. de Assis. "Classical and Quantum Convolutional Codes Derived from Algebraic Geometry Codes," *IEEE Transactions on Communications*, vol. 67, no. 1, pages 73–82, January 2019
2. Giuliano G. La Guardia, Francisco Revson F. Pereira, "Good and asymptotically good quantum codes derived from algebraic geometry codes," *Quantum Information Processing*, vol. 16, no. 6, article no. 165, June 2017. arXiv:1612.07150

Preprints

1. Francisco Revson F. Pereira, Ruud Pellikaan, Giuliano G. La Guardia, Francisco M. de Assis, "Entanglement-assisted Quantum Codes from Algebraic Geometry Codes." arXiv:1907.06357, July 2019
2. Francisco Revson F. Pereira, "Entanglement-assisted Quantum Codes from Cyclic Codes," arXiv:1911.06384, Nov. 2019.

Recent Conference Articles

1. Francisco Revson F. Pereira, Ruud Pellikaan, Giuliano G. La Guardia, Francisco M. de Assis, “Application of Complementary Dual AG Codes to Entanglement-Assisted Quantum Codes,” Proceedings of the *IEEE International Symposium on Information Theory*, Paris, France, 2019
2. Francisco Revson F. Pereira, “Quantum BCH and Reed-Solomon Entanglement-Assisted Codes,” Proceedings of the *40th WIC Symposium on Information Theory in the Benelux*, Gent, Belgium, 2019
3. Francisco Revson F. Pereira, Ruud Pellikaan, Giuliano G. La Guardia, Francisco M. de Assis, “Entanglement-assisted Quantum Codes from Algebraic Geometry Codes,” Proceedings of the *WCC 2019: The Eleventh International Workshop on Coding and Cryptography*, Saint-Jacut-de-la-Mer, France, 2019
4. Francisco Revson F. Pereira, Giuliano G. La Guardia, “Códigos Convolucionais Quânticos Derivados de Códigos Algébrico-Geométricos,” Proceedings of the *XXXVI Simpósio Brasileiro de Telecomunicações e Processamento de Sinais*, Campina Grande, Brazil, 2018
5. Francisco Revson F. Pereira, Giuliano G. La Guardia, “Novos Códigos Convolucionais Derivados de Códigos Algébrico-Geométricos,” Proceedings of the *XXXV Simpósio Brasileiro de Telecomunicações e Processamento de Sinais*, São Pedro, Brazil, 2017
6. Bárbara Carnauba, Danieverton Moretti, Francisco Revson F. Pereira, “Modified Mach-Zehnder interferometer and quantum interference between a coherent state and single-photon entangled states,” Proceeding of the *XXXIV NNE Brazilian Physics Meeting*, Natal, Brazil, 2016

Recent Conference Talks

1. (Invited Talk) *Entanglement-Assisted Quantum AG Codes*. International Congress on Industrial and Applied Mathematics. Valencia, Spain, 2019
2. *Application of Complementary Dual AG Codes to Entanglement-Assisted Quantum Codes*. IEEE International Symposium on Information Theory. Paris, France, 2019
3. *Quantum BCH and Reed-Solomon Entanglement-Assisted Codes*. 40th WIC Symposium on Information Theory in the Benelux. Gent, Belgium, 2019
4. *Entanglement-assisted Quantum Codes from Algebraic Geometry Codes*. WCC 2019, Saint-Jacut-de-la-Mer, France, 2019
5. *Quantum BCH and Reed-Solomon Entanglement-Assisted Codes*. Codes, Cryptology and Curves – Celebrating the influence of Ruud Pellikaan. Eindhoven, The Netherlands, 2019

Event Participation

- *Executive School on Post-Quantum Cryptography 2019*, Eindhoven, The Netherlands, 2019
- *International Congress on Industrial and Applied Mathematics*, Valencia, Spain, 2019
- *2019 IEEE International Symposium on Information Theory*, Paris, France, 2019
- *40th WIC Symposium on Information Theory in the Benelux*, Gent, Belgium, 2019

Honors and Awards

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| 06/2019 | Scholarship for Diamant Ph.D. Travel Grants at <i>University of Valladolid</i> , Spain, provided by Dutch Diamant cluster |
| 09/2018–08/2019 | Scholarship for Visitor Ph.D. Student at Eindhoven University of Technology, The Netherlands, provided by Brazilian government through CNPq |
| 2014 | <i>Student Awards of Academic Excellence</i> given by the Institute for Advanced Studies in Communications (IECOM) and Datashop, Federal University of Campina Grande |
| 08/2010–07/2013 | Scholarship for undergraduate research provided by Brazilian government through CNPq |