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## Personal Details

Name Valerio Bioglio  
Nationality Italian  
Office e-mail valerio.bioglio@unito.it  
Research Interests Error Correcting Codes, Fountain Codes, Game Theory, Information Theory, Network Coding, Compressed Sensing, Polar Codes

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## Current Position

From 2022 Tenure-track Assistant Professor (Ricercatore RTDb)  
Computer Science Department, Università degli studi di Torino (IT)  
Research Applied Mathematics, Coding and Information Theory, Distributed Algorithms  
Activity Researching and designing advanced algorithms and mathematical solutions for future communications.

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## Research Experience

2018 - 2022 Senior Research Engineer - Mathematical and Algorithmic Lab, France R&D Center, Huawei Tech. LTD , Boulogne-Billancourt (FR)  
2015 - 2017 Research Engineer - Mathematical and Algorithmic Lab, France R&D Center, Huawei Tech. LTD , Boulogne-Billancourt (FR)  
2012 - 2014 Senior Research Assistant - ERC CRISP project, Politecnico di Torino (IT)  
2012 Junior Research Assistant - ERC CRISP project, Politecnico di Torino (IT)  
2009 – 2012 PhD student in Computer Science, Università degli studi di Torino (IT)

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## Teaching Experience

2012 TA in Mathematics - Agronomy Department, Università degli studi di Torino (IT)  
2011–2012 TA in Computer Science - Mathematics Department, Università degli studi di Torino (IT)  
2010–2012 Tutor for Diderot project, Fondazione CRT, Torino (IT)  
2008–2009 TA in Calculus - Structural Engineering Department, Politecnico di Torino (IT)  
2008–2010 Museum guide, exposition Riflessioni&Riflessioni, Museo di Scienze Naturali, Torino (IT)

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## Education

2009 – 2012 Ph.D. in Computer Science, Università degli studi di Torino (IT)  
Dissertation Data Dissemination in Distributed Systems Using Rateless Codes; Advisor: Prof. Marco Grangetto  
2006–2008 Master of Science in Mathematics, 110/110 cum laude, Università degli studi di Torino (IT)  
Dissertation Decoding of Reed-Solomon Codes; Advisor: Prof. Umberto Cerruti  
2003–2006 Bachelor of Science in Mathematics, 110/110 cum laude, Università degli studi di Torino (IT)  
Dissertation Algorithms for the Resolution of the Hackenbush Game; Advisor: Prof. Umberto Cerruti

Relevant Courses Algebra, Algorithms, Analysis, Analytical Mechanics, Coding Theory, Complex Networks, Computational Algebra, Computational Complexity, Cryptography, Game Theory, Graph Theory, Markovian Stochastic Systems, Models for Animal Behavior, Models for Economical Planning, Networks and Computer Security, Ordinary Differential Equations, Physics, Probability and Statistics, Programming (Java, C), Theory of Computation.

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## Journal Publications

- [14] Bioglio V., Condo C., Land I., *Design of Polar Codes in 5G New Radio*, IEEE Communications Surveys and Tutorials, vol. 23:1 29-40, Jan. 2021
- [13] Bioglio, V., Gabry, F., Land, I., Belfiore, J.C., *Multi-Kernel Polar Codes: Concept and Design Principles*, IEEE Transactions on Communications, vol. 68:9 5350-5362, Sep. 2020
- [12] Condo, C., Bioglio, V., Hafermann, H., Land, I., *Practical Product Code Construction of Polar Codes*, IEEE Transactions on Signal Processing, vol. 68 2004-2014, Mar. 2020
- [11] Ferrand, P., Maso, M., Bioglio V., *High-Rate Regular APSK Constellations*, IEEE Transactions on Communications, vol. 67:3 2015-2023, Mar. 2019
- [10] Bioglio V., *MRB Decoding of LT Codes Over AWGN Channels*, IEEE Wireless Communications Letters, vol. 8:2 548-551, Feb. 2019
- [9] Bioglio V., Land I., *Polar-Code Construction of Golay Codes*, IEEE Communications Letters, vol. 22:3 466-469, Mar. 2018
- [8] Bioglio V., Gabry F., Godard L., Land I., *Two-Step Metric Sorting for Parallel Successive Cancellation List Decoding of Polar Codes*, IEEE Communications Letters, vol. 21:3 456-459, Mar. 2017
- [7] Gabry F., Bioglio V., Land I., *On Energy-Efficient Edge Caching in Heterogeneous Networks*, IEEE Journal on Selected Areas in Communications, vol. 34:12 3288-3298, Dec. 2016
- [6] Bianchi T., Bioglio V., Magli E., *Analysis of One-Time Random Projections for Privacy Preserving Compressed Sensing*, IEEE Transactions on Information Forensics and Security, vol. 11:2 313-327, Feb. 2016
- [5] Bioglio V., Grangetto M., Gaeta R., Sereno M., *Rateless Codes and Random Walks for P2P Resource Discovery in Grids*, IEEE Transactions on Parallel and Distributed Systems, vol. 25:4 1014-1023, Apr. 2014
- [4] Fiandrotti A., Bioglio V., Grangetto M., Gaeta R., Magli E., *Band Codes for Energy-Efficient Network Coding with Application to P2P Mobile Streaming*, IEEE Transactions on Multimedia, vol. 16:2 521-532, Feb. 2014
- [3] Bioglio V., Gaeta R., Grangetto M., Sereno M., *A Practical Random Network Coding Scheme for Data Distribution on Peer-to-peer Networks using Rateless Codes*, Performance Evaluation, vol. 70:1 1-13, Jan. 2013
- [2] Bioglio V., Gaeta R., Grangetto M., Sereno M., Spoto S., *A Game Theory Framework for ISP Streaming Traffic Management*, Performance Evaluation, Vol. 68:11 1162-1174, Nov. 2011
- [1] Bioglio V., Grangetto M., Gaeta R., Sereno M., *On the Fly Gaussian Elimination for LT Codes*, IEEE Communications Letters, Vol. 13:12 953-955, Dec. 2009

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## Conference Papers

- [34] Pillet, C., Bioglio, V., Land, I., *Classification of Automorphisms for the Decoding of Polar Codes*, IEEE International Conference on Communications (ICC), May 2022
- [33] Condo, C., Bioglio, V., Land, I., *High-Performance Low-Complexity Error Pattern Generation for ORBGRAND Decoding*, IEEE Global Communication Conference (GLOBECOM), Dec. 2021
- [32] Pillet, C., Bioglio V., Land I., *Polar Codes for Automorphism Ensemble Decoding*, Information Theory Workshop (ITW), Oct. 2021
- [31] Pillet, C., Bioglio V., Land I., *Polar Codes for Automorphism Ensemble Decoding*, Information Theory Workshop (ITW), Oct. 2021
- [30] Bioglio V., Condo C., Land I., *Sliding Window Polar Codes*, IEEE International Symposium on Information Theory (ISIT), Jul. 2021
- [29] Pillet, C., Condo, C., Bioglio, V., *SCAN List Decoding of Polar Codes*, IEEE International Conference on Communications (ICC), Jun. 2020
- [27] Pillet, C., Bioglio, V., Condo, C., *On List Decoding of 5G-NR Polar Codes*, IEEE Wireless Communications and Networking Conference (WCNC), May 2020
- [28] Condo, C., Bioglio, V., Land, I., *Staircase Construction with Non-Systematic Polar Codes* Optical Fiber Communications Conference and Exhibition (OFC), Mar. 2020
- [26] Bioglio V., Land I., Condo C., *SC-Flip Decoding of Polar Codes with High Order Error Correction Based on Error Dependency*, Information Theory Workshop (ITW), Aug. 2019
- [25] Bioglio V., Land I., Condo C., *Improved Hybrid Design of Polar Codes and Multi-Kernel Polar Codes*, IEEE International Symposium on Information Theory (ISIT), Jul. 2019
- [24] Bioglio V., Condo C., Land I., *Construction and Decoding of Product Codes with Non-Systematic Polar Codes*, IEEE Wireless Communications and Networking Conference (WCNC), Apr. 2019
- [23] Condo C., Bioglio V., Land I., *Generalized Fast Decoding of Polar Codes*, IEEE Global Communication Conference (GLOBECOM), Dec. 2018
- [22] Bioglio V., Land I., *On the Marginalization of Polarizing Kernels*, International Symposium on Turbo Codes & Iterative Information Processing (ISTC), Dec. 2018
- [21] Bioglio V., Land I., Gabry F., Belfiore J.C., *Flexible design of Multi-Kernel Polar Codes by reliability and distance properties*, International Symposium on Turbo Codes & Iterative Information Processing (ISTC), Dec. 2018
- [20] Bioglio V., Condo C., Land I., *Memory Management in Successive-Cancellation based Decoders for Multi-Kernel Polar Codes*, Asilomar Conference on Signals, Systems, and Computers, Oct. 2018
- [19] Bioglio V., Land I., *Polar codes with internal edge permutations*, IEEE Wireless Communications and Networking Conference (WCNC), Apr. 2018
- [18] Bioglio V., Gabry F., Land I., Belfiore J.C., *Minimum-Distance Based Construction of Multi-Kernel Polar Codes*, IEEE Global Communication Conference (GLOBECOM), Dec. 2017
- [17] Benammar M., Bioglio V., Gabry F., Land I., *Multi-Kernel Polar Codes: Proof of Polarization and Error Exponents*, IEEE Information Theory Workshop (ITW), Nov. 2017

- [16] Gabry F., Bioglio V., Land I., Belfiore J.C., *Multi-Kernel Construction of Polar Codes*, IEEE International Conference on Communications (ICC), May 2017
- [15] Gabry F., Bioglio V., Land I., *Online Caching in Heterogeneous Networks*, IEEE International Conference on Communications (ICC), May 2017
- [14] Bioglio V., Gabry F., Land I., *Low-Complexity Puncturing and Shortening of Polar Codes*, IEEE Wireless Communications and Networking Conference (WCNC), Mar. 2017
- [13] Tomasi B., Gabry F., Bioglio V., Land I., Belfiore J.C., *Low-Complexity Receiver for Multi-Level Polar Coded Modulation in Non-Orthogonal Multiple Access*, IEEE Wireless Communications and Networking Conference (WCNC), Mar. 2017
- [12] Gabry F., Bioglio V., Land I., *On Edge Caching with Secrecy Constraints*, IEEE International Conference on Communications (ICC), May 2016
- [11] Gabry F., Bioglio V., Land I., *On Edge Caching in the Presence of Malicious Users*, IEEE International Conference on Communications (ICC), May 2016
- [10] Bioglio V., Gabry F., Land I., *Optimizing MDS Codes for Caching at the Edge*, IEEE Global Communication Conference (GLOBECOM), Dec. 2015
- [9] Gabry F., Bioglio V., Land I., *On Energy-Efficient Caching at the Wireless Edge*, ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT), Dec. 2015
- [8] V Bioglio, T Bianchi, E Magli, *On the Fly Estimation of the Sparsity Degree in Compressed Sensing using Sparse Sensing Matrices*, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Apr. 2015
- [7] Bioglio V., Bianchi T., Magli E., *Secure Compressed Sensing over Finite Fields*, IEEE International Workshop on Information Forensics and Security (WIFS), Dec. 2014
- [6] Bioglio V., Coluccia G., Magli E., *Sparse Image Recovery using Compressed Sensing over Finite Alphabets*, IEEE International Conference on Image Processing (ICIP), Oct. 2014
- [5] Bianchi T., Bioglio V., Magli E. *On the security of Random Linear Measurements*, IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), May 2014
- [4] Fiandrotti A., Bioglio V., Magli E. *Feedback-driven Network Coding for Cooperative Video Streaming*, International Conference on Acoustics, Speech and Signal Processing (ICASSP), May 2013
- [3] Fiandrotti A., Bioglio V., Grangetto M., Gaeta R., Magli E. *Band Codes for Controlled-Complexity Random Linear Network Coding*, IEEE International Conference on Multimedia and Expo (ICME), Jul. 2012
- [2] Bioglio V., Grangetto M., Gaeta R., Sereno M. *An Optimal Partial Decoding Algorithm for Rateless Codes*, IEEE International Symposium on Information Theory (ISIT), Aug. 2011
- [1] Zola M., Bioglio V., Anglano C., Gaeta R., Grangetto M., Sereno M. *ENIGMA: Distributed Virtual Disks for Cloud Computing*, IEEE International Parallel and Distributed Processing Symposium, May 2011

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## Patents

- [16] Bioglio V., Condo C., *Device and method for encoding or decoding messages by means of a polar code*, WO2021151463A1 (application), Jan. 2020
- [15] Condo C., Bioglio V., Land I., *Staircase coding based on polar codes*, WO2021069076A1 (application), Oct. 2019
- [14] Bioglio V., Condo C., *Sliding window and subblock-wise encoding and decoding of polar codes*, WO2021001037A1 (application), Jul. 2019
- [13] Condo C., Bioglio V., Land I., *Apparatuses and methods for mapping frozen sets between polar codes and product codes*, WO2020052769A1 (application), Sep. 2018
- [12] Condo C., Bioglio V., Land I., *Decoders and methods for decoding polar codes and product codes*, WO2020052770A1 (application), Sep. 2018
- [11] Ferrand P., Bioglio V., Maso M., *Apparatuses and methods for generating an APSK signal*, WO2019091544A1 (application), Nov. 2017
- [10] Bioglio V., Land I., *Device and method for generating a multi-kernel polar code*, WO2019037841A1 (application), Aug. 2017
- [9] Bioglio V., Land I., Belfiore J. C., Gabry F., *Construction of a polar code based on a distance criterion and a reliability criterion, in particular of a multi-kernel polar code*, EP3652864B1 (granted), Jul. 2017
- [8] Bioglio V., Land I., Gabry F., *Decoding of multi-kernel polar codes*, WO2019007495A1 (application), Jul. 2017
- [7] Gabry F., Bioglio V., Belfiore J. C., Land I., *Apparatus and method for generating polar codes*, EP3529901B1 (granted), Dec. 2016
- [6] Gabry F., Bioglio V., Belfiore J. C., Land I., *Communication device and communication method using polar codes*, WO2018033206A1 (application), Aug. 2016
- [5] Tomasi B., Gabry F., Bioglio V., Land I., Belfiore J. C., He G., *Encoding device and method and corresponding decoding device and method*, EP3472955B1 (granted), Jul. 2016
- [4] Bioglio V., Gabry F., Land I., Belfiore J. C., *Devices and methods implementing polar codes*, US10541710B2 (granted), May 2016
- [3] Bioglio V., Gabry F., Godard L., Land I., *A metric sorter, a successive list cancellation decoder and metric sorting method*, WO2017178056A1 (application), Apr. 2016
- [2] Bioglio V., Gabry F., Land I., *A micro base station comprising a cache-memory to provide files to a user-equipment*, WO2017108070A1 (application), Dec. 2015
- [1] Gabry F., Bioglio V., Land I., *A base station and a method for managing the distribution of a plurality of files to a user equipment*, EP3351051B1 (granted), Oct. 2015

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## Languages

Italian	mother tongue
English	advanced level
French	advanced level
Japanese	basic knowledge

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## Extra-curricular Activities

2010–2013 Dubbing School ODS, Torino (IT). Trained in vocal/speech techniques for Theater

- 2009–2011 Ph.D. students representative in CDD, Computer Science Department of Università degli studi di Torino (IT)
- 2004–2008 Undergraduate students representative in CCL, Mathematics Department of Università degli studi di Torino (IT)