Giacomo Baggio

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APPOINTMENTS

Assistant Professor
Department of Information Engineering
University of Padova, Italy — 10/2019 – present

Postdoctoral Scholar
Department of Mechanical Engineering
University of California, Riverside, USA — 3/2018 – 9/2019
- Advisor: Prof. F. Pasqualetti

Visiting Scholar
Department of Engineering
University of Cambridge, UK — 9/2015 – 6/2016
- Advisor: Prof. R. Sepulchre

EDUCATION

Ph.D. Information Engineering
Department of Information Engineering
University of Padova, Italy — 2/2018
- Thesis: "Novel Results on the Factorization and Estimation of Spectral Densities"
- Supervisor: A. Ferrante
- External reviewers: Prof. R. Sepulchre (Univ. Cambridge), Prof. T. Georgiou (Univ. California Irvine)
- Finale grade: cum laude

"Laurea Magistrale" (M.Sc. equivalent), Automation Engineering
University of Padova, Italy — 4/2014
- Final grade: 110/110 cum laude

"Laurea Triennale" (B.Sc. equivalent), Mechatronics Engineering
University of Padova, Italy — 9/2011
- Final grade: 110/110 cum laude

HONORS & AWARDS

IEEE CSS Italy Chapter Best Young Author Paper Award, Finalist
IEEE Control Systems Society, Italy Chapter. Publication (J14). — 2023

IEEE CSS Italy Chapter Best Young Author Paper Award, Finalist
IEEE Control Systems Society, Italy Chapter. Publication (J9). — 2021

Roberto Tempo Best CDC Paper Award
IEEE Control Systems Society. Publication (C11). — 2020

IEEE Control Systems Letters Outstanding Paper Award
IEEE Control Systems Society. Publication (J8). — 2020

Best Student Paper Award (co-author)
American Control Conference (ACC), 2019. Publication (C7). — 2019

Best Student Paper Award (student author)
European Control Conference (ECC), 2018. Publication (C5).   2018

Outstanding Master Thesis Recognition
Department of Information Engineering, University of Padova, Italy   2014

RESEARCH
THEMES

Analysis and control of dynamical network systems.
Related publications: (J3), (J9), (J10), (J11), (J14), (J15), (J16), (J19).

Learning and data-driven control of dynamical systems.
Related publications: (J4), (J6), (J8), (J12), (J17), (J18).

Linear system theory.
Related publications: (J1), (J2), (J5), (J7).

Quantum information and control.
Related publications: (J13).

PROFESSIONAL
ACTIVITIES

Organization and editorial activities:

- Co-organizer of the workshop "Control Days 2022", Padova.   09/2022
- Co-organizer of the Invited Session (12 invited speakers) "Beyond Centralized and LTI Data-Driven Control", IEEE Conference on Decision and Control.   12/2021
- Associate Editor of European Control Conference (ECC)   2021-present
- Program Committee member "Complex Networks 2022"   2020-present

Invited speaker:

- ELLIIT Focus Period on "Network Dynamics and Control", Linköping.   09/2023
- Workshop "From behaviors and codes to intelligent network systems", Padova.   05/2023
- Mini-symposium "Data-driven Analysis and Control of Dynamical Systems", SIAM Conference on Applications of Dynamical Systems.   05/2021
- Satellite symposium "Controlling Complex Networks: When Control Theory Meets Network Science", NetSci 2021.   06/2021
- Gran Sasso Science Institute (GSSI).   10/2020
- Department of Mathematical Sciences, Polytechnic of Turin.   10/2017
- Department of Mathematics, University of Padova.   06/2017

Reviewer activity:

- International journals: IEEE Transactions on Automatic Control, Automatica, Control Systems Letters, Systems and Control Letters, IEEE Transactions on Control of Network Systems, IEEE Transactions on Control Systems Technology, IEEE Transactions on Network Science and Engineering, IEEE Transactions on Signal Processing, SIAM Journal on Control and Optimization, IET Control Theory & Applications, International Journal of Control, European Journal of Control, Journal of the Franklin Institute, Journal of Optimization Theory and Applications, IEEE Access, IEEE Systems.

- International conferences: IEEE Control and Decision Conference (CDC), American Control Conference (ACC), European Control Conference (ECC), IFAC World Congress, IFAC Workshop on Distributed Estimation and Control in Networked Systems (NecSys), IFAC Symposium on System Identification (SysID), Indian Control Conference (ICC).

TEACHING AND SUPERVISION ACTIVITY

University of Padova:

Instructor:

- Network Dynamical Systems, *M.Sc. Control Systems Engineering*	2023-24
- Signals and Systems, *B.Sc.. Mechatronics Engineering*	2023-24
- Signals and Systems, *B.Sc. Information Engineering*	2022-23
- Systems Theory, *M.Sc. Mechatronics Engineering*	2019-20, 2020-21, 2021-22

Teaching assistant:

- Estimation and Filtering, *M.Sc. Control Systems Engineering*	2016-17

Supervision:

- Co-supervisor of Ph.D. students: Umberto Casti, Simone Betteti.	2022-present

University of Cambridge:

Teaching assistant:

- Signals and systems (3F1), *M. Eng. Degree, Department of Engineering*	2015-16

PUBLICATIONS

Journal Papers:

(J1) **G. Baggio** and A. Ferrante, "On the Factorization of Rational Discrete-Time Spectral Densities", *IEEE Transactions on Automatic Control*, vol. 61, no. 4, pp. 969-981, 2016.

(J2) **G. Baggio** and A. Ferrante, "On Minimal Spectral Factors with Zeroes and Poles lying on Prescribed Regions", *IEEE Transactions on Automatic Control*, vol. 61, no. 8, pp. 2251-2255, 2016.

(J3) N. Bof, **G. Baggio**, and S. Zampieri, "On the Role of Network Centrality in the Controllability of Complex Networks", *IEEE Transactions on Control of Network Systems*, vol. 4, no. 3, pp. 643-653, 2017.

(J4) **G. Baggio**, "Further Results on the Convergence of the Pavon–Ferrante Algorithm for Spectral Estimation", *IEEE Transactions on Automatic Control*, vol. 63 , no. 10, pp. 3510-3515, 2018.

(J5) **G. Baggio** and A. Ferrante, "Parametrization of Minimal Spectral Factors of Discrete-Time Rational Spectral Densities", *IEEE Transactions on Automatic Control*, vol. 64, no. 1, pp. 396-403, 2019.

(J6) B. Zhu and **G. Baggio**, "On the Existence of a Solution to a Spectral Estimation Problem *à la* Byrnes–Georgiou–Lindquist", *IEEE Transactions on Automatic Control*, vol. 64 , no. 2 , pp. 820-825, 2019.

(J7) **G. Baggio**, A. Ferrante, and R. Sepulchre, "Conal Distances Between Rational Spectral Densities", *IEEE Transactions on Automatic Control*, vol. 64 , no. 5, pp. 1848-1857, May 2019.

(J8) **G. Baggio**, V. Katewa and F. Pasqualetti, "Data-Driven Minimum-Energy Controls for Linear Systems", *IEEE Control Systems Letters*, vol. 3, no. 3, pp. 589-594, July 2019.

(J9) T. Menara, **G. Baggio**, D. S. Bassett, and F. Pasqualetti, "Stability Conditions for Cluster Synchronization in Networks of Heterogeneous Kuramoto Oscillators", *IEEE Transactions on Control of Network Systems*, vol. 7 , no. 1, pp. 302-314, March 2020.

(J10) T. Menara, **G. Baggio**, D. S. Bassett, and F. Pasqualetti, "Conditions for Feedback Linearization of Network Systems", *IEEE Control Systems Letters*, vol. 4, no. 3, pp. 578-583, July 2020.

(J11) **G. Baggio**, V. Rutten, G. Hennequin, and S. Zampieri, "Efficient Communication in Complex Dynamical Networks: The Role of Matrix Non-Normality", *Science Advances*, vol. 6, no. 22, eaba2282, 2020.

(J12) **G. Baggio**, D. S. Bassett, and F. Pasqualetti, "Data-driven Control of Complex Networks", *Nature Communications*, vol. 12, no. 1, pp. 1-13, 2021.

(J13) **G. Baggio**, F. Ticozzi, P. D. Johnson, and L. Viola, "Dissipative Encoding of Quantum Information", *Quantum Information & Computation*, vol. 21, no. 9&10, pp. 737-770, 2021.

(J14) **G. Baggio**, and S. Zampieri, "Non-normality Improves Information Transmission Performance of Network Systems", *IEEE Transactions on Control of Network Systems*, vol. 8, no. 4, pp. 1846-1858, 2021.

(J15) **G. Baggio**, F. Pasqualetti, and S. Zampieri, "Energy-Aware Controllability of Complex Networks", *Annual Review of Control, Robotics, and Autonomous Systems*, vol. 5, pp. 465-489, 2022.

(J16) T. Menara, **G. Baggio**, D. S. Bassett, and F. Pasqualetti, "Functional Control of Oscillator Networks", *Nature Communications*, vol. 13, no. 1, pp. 1-13, 2022.

(J17) **G. Baggio**, A. Carè, A. Scampicchio, and G. Pillonetto, "Bayesian Frequentist Bounds for Machine Learning and System Identification", *Automatica*, vol. 146, pp. 110599, 2022.

(J18) F. Celi, **G. Baggio**, and F. Pasqualetti, "Distributed Data-Driven Control of Network Systems", *IEEE Open Journal of Control Systems*, vol. 2, pp. 93-107, 2023.

(J19) **G. Baggio** and S. Zampieri, "Controllability of Large-Scale Networks: The Control Energy Exponents", *IEEE Transactions on Control of Network Systems*, 2023 (to appear).

Conference Papers:

(C1) **G. Baggio**, F. Ticozzi, and L. Viola, "Quantum State Preparation by Controlled Dissipation in Finite Time: From Classical to Quantum Controllers", *IEEE Conference on Decision and Control (CDC)*, 2012.

(C2) **G. Baggio**, "On the Convergence of a Matricial Fixed-Point Iteration Connected with Spectral Estimation", *20th IFAC World Congress*, 2017.

(C3) **G. Baggio** and R. Sepulchre, "LTI Stochastic Processes: a Behavioral Perspective", *20th IFAC World Congress*, 2017.

(C4) G. Michieletto, S. Milani, A. Cenedese, and **G. Baggio**, "Improving Consensus-based Distributed Camera Calibration via Edge Pruning and Graph Traversal Initialization", *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2018.

(C5) **G. Baggio** and S. Zampieri, "On the Relation between Non-normality and Diameter in Linear Dynamical Networks", *European Control Conference (ECC)*, 2018.

(C6) **G. Baggio**, V. Rutten, G. Hennequin, and S. Zampieri, "Information Transmission in Dynamical Networks: The Normal Network Case", *IEEE Conference on Decision and Control (CDC)*, 2018.

(C7) T. Menara, **G. Baggio**, D. S. Bassett, and F. Pasqualetti, "Exact and Approximate Stability Conditions for Cluster Synchronization of Kuramoto Oscillators", *American Control Conference (ACC)*, 2019.

(C8) **G. Baggio**, V. Katewa, F. Pasqualetti, and S. Zampieri, "The Shannon Capacity of Linear Dynamical Networks", *European Control Conference (ECC)*, 2019.

(C9) F. Ticozzi, **G. Baggio**, and L. Viola, "Quantum Information Encoding from Stabilizing Dynamics", *IEEE Conference on Decision and Control (CDC)*, 2019.

(C10) **G. Baggio**, S. Zampieri, and C. W. Scherer, "Gramian Optimization with Input-Power Constraints", *IEEE Conference on Decision and Control (CDC)*, 2019.

(C11) T. Menara, **G. Baggio**, D. S. Bassett, and F. Pasqualetti "A Framework to Control Functional Connectivity in the Human Brain", *IEEE Conference on Decision and Control (CDC)*, 2019.

(C12) **G. Baggio** and F. Pasqualetti, "Learning Minimum-Energy Controls from Heterogeneous Data", *American Control Conference (ACC)*, 2020.

(C13) F. Celi, **G. Baggio**, and F. Pasqualetti, "Distributed Learning of Optimal Controls for Linear Systems", *IEEE Conference on Decision and Control (CDC)*, 2021.

(C14) **G. Baggio** and S. Zampieri, "Worst-Case Control Energy of Single-Input Network Systems", *IFAC Conference on Networked Systems (NecSys)*, 2022.

(C15) F. Celi, **G. Baggio**, and F. Pasqualetti, "Closed-Form Estimates of the LQR Gain from Finite Data", *IEEE Conference on Decision and Control (CDC)*, 2022.

(C16) **G. Baggio** and S. Zampieri, "Reachable Volume of Large-Scale Linear Network Systems: The Single-Input Case", *IEEE Conference on Decision and Control (CDC)*, 2022.

(C17) **G. Baggio**, A. Carè, and G. Pillonetto, "Finite-Sample Guarantees for State-Space System Identification under Full State Measurements", *IEEE Conference on Decision and Control (CDC)*, 2022.

(C18) D. Benozzo, G. Baron, **G. Baggio**, A. Gozzi, M. Corbetta, A. Chiuso, S. Zampieri, and A. Bertoldo, "Single Region Contribution to the Brain Dynamic (In)stability", *Eighth National Congress of Bioengineering, GNB2023*, 2023.

(C19) F. Celi, **G. Baggio**, and F. Pasqualetti, "Data-driven Eigenstructure Assignment for Sparse Feedback Design", *IEEE Conference on Decision and Control (CDC)*, 2023 (to appear).

(C20) U. Casti, **G. Baggio**, D. Benozzo, S. Zampieri, A. Bertoldo, and A. Chiuso, "Dynamic Brain Networks with Prescribed Functional Connectivity", *IEEE Conference on Decision and Control (CDC)*, 2023 (to appear).