Guillaume O. Berger

Ph.D. in Mathematical Engineering

Postdoctoral Researcher at UCLouvain

FNRS Fellow

EDUCATION

Postdoctoral Researcher at UCLouvain *Started October 2023*
Data-Driven Verification and Control of Cyber-Physical Systems
Advisor: Raphaël Jungers

Postdoctoral Researcher at the University of Colorado Boulder *2021 – 2023*
Verification and Control of Cyber-Physical Systems
Advisor: Sriram Sankaranarayanan

Ph.D. in Mathematical Engineering at UCLouvain *2017 – 2021*
Dominated splitting and quantization of hybrid systems
Supervisor: Raphaël Jungers

Master in Mathematical Engineering at UCLouvain *2015 – 2017*
Honours obtained: summa cum laude, congratulations of the jury

Undergraduate in Engineering at UCLouvain *2012 – 2015*
Honours obtained: summa cum laude

TEACHING EXPERIENCE

Teacher at UCLouvain
Undergraduate course on Calculus *Fall 2023*
Master course on Stochastic Optimal Control and Reinforcement Learning *Fall 2024*

Teacher at the University of Colorado Boulder
Graduate course on Linear and Integer Programming (9 students, 27 × 75 min) *Spring 2023*

Teaching Assistant at UCLouvain
Advanced Linear Algebra, Discrete Mathematics, Functional Analysis, etc. *2017 – 2021*

PUBLICATIONS

Journal Papers

- GB, Sriram Sankaranarayanan, **Template-based piecewise affine regression**, *Research Directions: Cyber-Physical Systems*, 2024.
- Zheming Wang, GB, Raphaël M. Jungers, **Data-driven control of unknown switched linear systems using scenario optimization**, *IEEE Transactions on Automatic Control*, 2024.
- GB, Sriram Sankaranarayanan, **Counterexample-guided computation of polyhedral Lyapunov functions for piecewise linear systems**, *Automatica*, vol. 155, 111165, 2023.
- GB, Raphaël M. Jungers, **Worst-case topological entropy and minimal data rate for state observation of switched linear systems**, *Communications of the ACM*, vol. 65, no. 2, 2022.
- GB, Zheming Wang, **Comments on "Data driven stability analysis of black-box switched linear systems"**, *Automatica*, vol. 142, 110412, 2022.
- GB, P.-A. Absil, Lieven De Lathauwer, Raphaël M. Jungers, Marc Van Barel, **Equivalent polyadic decompositions of matrix multiplication tensors**, *Journal of Computational and Applied Mathematics*, vol. 406, 113941, 2022.

- GB, Raphaël M. Jungers, **p-dominant switched linear systems**, *Automatica*, vol. 132, 109801, 2021.
- GB, Raphaël M. Jungers, **Quantized stabilization of continuous-time switched linear systems**, *IEEE Control Systems Letters*, vol. 5, no. 1, 2021.
- GB, P.-A. Absil, Raphaël M. Jungers, Yurii Nesterov, **On the quality of first-order approximation of functions with Hölder continuous gradient**, *Journal of Optimization Theory and Applications*, vol. 185, 2020.
- GB, Raphaël M. Jungers, **Formal methods for computing hyperbolic invariant sets for nonlinear systems**, *IEEE Control Systems Letters*, vol. 4, no. 1, 2020.

Conference Papers

- Alexis Vuille, GB, Raphaël M. Jungers, **Data-driven stability analysis of switched linear systems using adaptive sampling**, *ADHS 2024*, 2024.
- GB, Monal Narasimhamurthy, Sriram Sankaranarayanan, **Algorithms for identifying flagged and guarded linear systems**, *HSCC 2024*, 2024.
- GB, Masoumeh Ghanbarpour, Sriram Sankaranarayanan, **Cone-based abstract interpretation for nonlinear positive invariant synthesis**, *HSCC 2024*, 2024.
- GB, Sriram Sankaranarayanan, **Template-based piecewise affine regression**, *L4DC 2023*, 2023.
- Alec Reed, GB, Sriram Sankaranarayanan, Christoffer Heckman, **Verified path following using neural control Lyapunov functions**, *CoRL 2022*, 2022.
- GB, Monal Narasimhamurthy, Kandai Watanabe, Morteza Lahijanian, Sriram Sankaranarayanan, **An algorithm for learning switched linear dynamics from data**, *NeurIPS 2022*, 2022. [**Acceptance rate:** 26 %]
- GB, Sriram Sankaranarayanan, **Learning fixed-complexity polyhedral Lyapunov functions from counterexamples**, *CDC 2022*, 2022.
- GB, Raphaël M. Jungers, Zheming Wang, **Data-driven invariant subspace identification for black-box switched linear systems**, *CDC 2022*, 2022.
- GB, Raphaël M. Jungers, **Complexity of the LTI system trajectory boundedness problem**, *CDC 2021*, 2021.
- Zheming Wang, GB, Raphaël M. Jungers, **Data-driven feedback stabilization of switched linear systems with probabilistic stability guarantees**, *CDC 2021*, 2021.
- GB, Maben Rabi, **Bounds on set exit times of affine systems, using Linear Matrix Inequalities**, *ADHS 2021*, 2021.
- GB, Raphaël M. Jungers, Zheming Wang, **Chance-constrained quasi-convex optimization with application to data-driven switched systems control**, *L4DC 2021*, 2021. [**In the** 14 **out of** 138 **submissions accepted for oral presentation**]
- GB, Raphaël M. Jungers, **Finite data-rate feedback stabilization of continuous-time switched linear systems with unknown switching signal**, *CDC 2020*, 2020.
- GB, Raphaël M. Jungers, **Topological entropy and minimal data rate for state observation of LTV systems**, *IFAC World Congress 2020*, 2020.
- GB, Raphaël M. Jungers, **Worst-case topological entropy and minimal data rate for state observation of switched linear systems**, *HSCC 2020*, 2020. [**Won the HSCC Best Paper Award**]
- GB, Raphaël M. Jungers, **A converse Lyapunov theorem for p-dominant switched linear systems**, *ECC 2019*, 2019.
- GB, Fulvio Forni, Raphaël M. Jungers, **Path-complete p-dominant switching linear systems**, *CDC 2018*, 2018.

Ph.D. Dissertation

- GB, **Dominated splitting and quantization of hybrid systems**, UCLouvain, 2023

FELLOWSHIPS AND GRANTS

FNRS Postdoctoral Researcher Fellowship *2023 – 2026*
Organization: Belgian National Fund for Scientific Research

WBI Postdoctoral Research Grant *2022 – 2023*
Organization: Wallonie-Bruxelles International

BAEF Postdoctoral Researcher Fellowship *2021 – 2022*
Organization: Belgian American Educational Foundation

FRIA/FNRS Ph.D. Fellowship *2017 – 2021*
Organization: Belgian National Fund for Scientific Research

AWARDS AND DISTINCTIONS

Research Highlight in Communications of the ACM (CACM) *2021*
Quantized control of switched linear systems.

ACM SIGBED Best Paper Award (HSCC 2020) *2020*
Worst-case topological entropy and minimal data rate for state observation of switched linear systems

RESEARCH VISITS

École Polytechnique, Paris, France *November 2022*
Hosts: Éric Goubault and Sylvie Putot

University of Illinois in Urbana–Champaign, USA *April–May 2019*
Host: Daniel Liberzon

University of Cambridge, UK *February 2018*
Hosts: Fulvio Forni and Rodolphe Sepulchre

EDITORIAL ACTIVITIES

Reviewer
Journals: SIOPT, SIMAX, Automatica, NAHS, IEEE TAC, IEEE L-CSS
Conferences: NeurIPS, HSCC, TACAS, CDC, ECC

Conference Technical Committee Member
HSCC 2023, HSCC 2021 (posters and demos)

MISCELLANEOUS EXPERIENCE

Conference Organization Committee Member
RP 2019, Brussels, Belgium
HSCC 2021, virtual
ADHS 2021, virtual

Study Exchange (Eramsus)
Royal Institute of Technology (KTH), Stockholm *2016 – 2017*

Last updated: August 24, 2024