

# Guillaume O. Berger

Ph.D. in Mathematical Engineering

Postdoctoral Research Associate at CU Boulder

## EDUCATION

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**Postdoctoral Research Associate at CU Boulder** 2021 –

Programming Languages and Verification Laboratory (CUPLV)

*Advisor:* Sriram Sankaranarayanan

**Ph.D. in Mathematical Engineering at UCLouvain** 2017 – 2021

Institute of Information and Communication Technologies, Electronics and Applied Mathematics (ICTEAM)

FRIA/FNRS Fellow

*Supervisor:* Raphaël Jungers

**Master's Degree in Mathematical Engineering** 2015 – 2017

UCLouvain

*Honours obtained:* summa cum laude, with congratulations of the jury

**Bachelor's Degree in Engineering** 2012 – 2015

UCLouvain

*Honours obtained:* summa cum laude

## TEACHING EXPERIENCE

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**Teacher at CU Boulder (to come)**

Linear and Integer Programming

2023

**Teaching Assistant at UCLouvain**

Matrix Computations, Discrete Mathematics, Introduction to Economy

2017 – 2021

## PUBLICATIONS (PUBLISHED, OR ACCEPTED FOR PUBLICATION)

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### Journal papers

- 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, pp. 319–324, 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, pp. 17–33, 2020.

- GB, Raphaël M. Jungers, **Formal methods for computing hyperbolic invariant sets for nonlinear systems**, *IEEE Control Systems Letters*, vol. 4, no. 1, pp. 235–240, 2020.

### Conference papers

- Alec Reed, GB, Sriram Sankaranarayanan, Christoffer Heckman, **Verified path following using neural control Lyapunov functions**, to appear in *Proceedings of CoRL 2022*, 2022.
- GB, Monal Narasimhamurthy, Kandai Watanabe, Morteza Lahijanian, Sriram Sankaranarayanan, **An algorithm for learning switched linear dynamics from data**, to appear in *Proceedings of NeurIPS 2022*, 2022.
- GB, Sriram Sankaranarayanan, **Learning fixed-complexity polyhedral Lyapunov functions from counterexamples**, to appear in *Proceedings of 2022 61st Conference on Decision and Control*, 2022.
- GB, Raphaël M. Jungers, Zheming Wang, **Data-driven invariant subspace identification for black-box switched linear systems**, to appear in *Proceedings of 2022 61st Conference on Decision and Control*, 2022.
- GB, Raphaël M. Jungers, **Complexity of the LTI system trajectory boundedness problem**, *2021 60th IEEE conference on Decision and Control*, pp. 1832–1837, 2021.
- Zheming Wang, GB, Raphaël M. Jungers, **Data-driven feedback stabilization of switched linear systems with probabilistic stability guarantees**, *2021 60th IEEE conference on Decision and Control*, pp. 4400–4405, 2021.
- GB, Maben Rabi, **Bounds on set exit times of affine systems, using Linear Matrix Inequalities**, *IFAC-PapersOnline*, vol. 54, no. 5, pp. 283–288, 2021.
- GB, Raphaël M. Jungers, Zheming Wang, **Chance-constrained quasi-convex optimization with application to data-driven switched systems control**, *Proceedings of 2021 3rd Annual Learning for Dynamics & Control Conference*, PMLR, vol. 144, pp. 571–583, 2021.
- GB, Raphaël M. Jungers, **Finite data-rate feedback stabilization of continuous-time switched linear systems with unknown switching signal**, *Proceedings of 2020 59th Conference on Decision and Control*, pp. 3823–3828, 2020.
- GB, Raphaël M. Jungers, **Topological entropy and minimal data rate for state observation of LTV systems**, *IFAC-PapersOnLine*, vol. 53, no. 2, pp. 3060–3065, 2020.
- GB, Raphaël M. Jungers, **Worst-case topological entropy and minimal data rate for state observation of switched linear systems**, *Proceedings of 2019 22nd ACM International Conference on Hybrid Systems: Computation and Control*, pp. 1–11, 2020.
- GB, Raphaël M. Jungers, **A converse Lyapunov theorem for  $p$ -dominant switched linear systems**, *Proceedings of 2019 18th IEEE European Control Conference*, pp. 1263–1268, 2019.
- GB, Fulvio Forni, Raphaël M. Jungers, **Path-complete  $p$ -dominant switching linear systems**, *Proceedings of 2018 57th IEEE Conference on Decision and Control*, pp. 6446–645, 2018.

## FELLOWSHIPS AND GRANTS

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<b>FRIA/FNRS Postdoctoral Researcher</b> <i>Organization:</i> Belgian National Fund for Scientific Research	<i>2023 – 2026</i>
<b>WBI Grant</b> for postdoctoral research <i>Organization:</i> Wallonie-Bruxelles International	<i>2022 – 2023</i>
<b>BAEF Fellow</b> for postdoctoral research <i>Organization:</i> Belgian American Educational Foundation	<i>2021 – 2022</i>
<b>FRIA/FNRS Grant</b> for doctoral research <i>Organization:</i> Belgian National Fund for Scientific Research	<i>2017 – 2021</i>

## AWARDS AND DISTINCTIONS

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<b>Research Highlight in Communications of the ACM (CACM)</b> <i>Topic:</i> Worst-case topological entropy and minimal data rate for state observation of switched linear systems.	<i>2021</i>
<b>ACM SIGBED Best Paper Award</b> <i>Paper:</i> Worst-case topological entropy and minimal data rate for state observation of switched linear systems.	<i>2020</i>

## RESEARCH VISITS

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<b>École Polytechnique, Paris, France</b> <i>Hosts:</i> Éric Goubault and Sylvie Putot	<i>November 2022</i>
<b>University of Illinois in Urbana–Champaign, USA</b> <i>Host:</i> Daniel Liberzon	<i>April–May 2019</i>
<b>University of Cambridge, UK</b> <i>Hosts:</i> Fulvio Forni and Rodolphe Sepulchre	<i>February 2018</i>

## EDITORIAL ACTIVITIES

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### Reviewer

*Journals:* SIAM Journal on Matrix Analysis and Applications (SIMAX), Elsevier Automatica, Elsevier Applied Mathematics and Computation, Elsevier Nonlinear Analysis: Hybrid Systems (NAHS), IEEE Transactions on Automatic Control (TAC), IEEE Control Systems Letters (L-CSS)

*Conferences:* IEEE Conference on Decision and Control (CDC), European Control Conference (ECC)

### Conference Program Committees

HSCC 2021 (posters and demos), HSCC 2023 (technical program)

## PH.D. DISSERTATION

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*Topic:* Dominated splitting and quantization of hybrid systems. Towards efficient control of cyber-physical systems and networked control systems

*Thesis committee:* Raphaël Jungers, Julien Hendrickx, Philippe Lefèvre, Sayan Mitra, Sriram Sankaranarayanan, Rodolphe Sepulchre

## MISCELLANEOUS EXPERIENCE

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### **Conference Organization Assistance**

RP 2019, Brussels, Belgium

*September 2019*

HSCC 2021, virtual

*May 2021*

ADHS 2021, virtual

*July 2021*

### **Study Exchange (Erasmus)**

*September 2016 – January 2017*

Royal Institute of Technology (KTH), Stockholm