

Curriculum Vitae

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Born the 27/12/1985 in Toulouse, France Nationality: French 1 child, born in March 2023
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Education

- 2021 Habilitation thesis, LAAS-CNRS, Univ. Paul Sabatier. *The quest of modeling, certification and efficiency in polynomial optimization* [T2]
- 2010-2013 PhD in computer science, [Ecole Polytechnique](#). *Formal Proofs for Global Optimization – Templates and Sums of Squares*. This bi-disciplinary PhD thesis was pursued under the supervision of B. Werner (Computer science Dept., École Polytechnique) & S. Gaubert (Applied Math. Dept., École Polytechnique) at INRIA Saclay in Palaiseau. The motivation behind my PhD was to propose efficient optimization methods with the ambitious goal of certifying thousand of nonlinear inequalities involved in the formal proof of the Kepler conjecture, the so-called “Flyspeck project” [T1]
- 2008-2010 Ms. Thesis in computer science (rank A), [Tokyo Univ.](#), Dept. of Systems Innovation. *Time Dependent Magnetic Structural Coupled Analysis of MRI Model with Hierarchical Domain Decomposition Methods*, obtained with rank A, under the supervision of S. Yoshimura
- 2006-2010 [École Centrale de Paris](#). Double diploma (Ms. Eng. degree) with Tokyo Univ. Training in Mathematics, Mechanics, Computer Science, Economics and Automatic Control
- 2003 French HS diploma, Science major, with highest honors

Positions

- 2022 → [CNRS](#): *chargé de recherche de classe normale* at [LAAS](#), Polynomial OPTimization (**POP**) team
- 2020 → Associate member of the Institute of Mathematics in Toulouse (**IMT**)
- 2019-2022 CNRS researcher at [LAAS](#), Methods & Algorithms for Control (**MAC**) team, Toulouse

Previous positions

- 2018 CNRS researcher at [L2S Centrale Supélec](#), Gif-sur-Yvette, France
- 2017-2018 Associate member at LIP6, **PolSys** Team, Paris
- 2015-2018 [CNRS](#): *chargé de recherche de seconde classe*, **VERIMAG**, Grenoble, France
- 2016 **Ensimag**, teaching assistant in a compiler project course for Master students (60 hr of classes)
- 2014–2015 [Imperial College, Dept. of Electrical & Electronic Eng.](#), research assistant in the Circuits and Systems group. Automatic precision tuning with certified polynomial optimization
- 2014 [LAAS](#), Postdoc in the **MAC** team, with J.-B. Lasserre and D. Henrion
- 2010–2013 [École Polytechnique](#): teaching assistant in the Department of Computer science for Undergraduate and Master students. Fundamentals of Programming and Algorithms, Principles of Programming Language, Algorithms and Programming. (64 hr of classes per year)
- 2007,2008 Short internships (4 months) at École Centrale de Paris on polishing algorithms for domain decomposition methods and development of a web interface for Kanji learning
- 2007 summer internship as operating intern at Thales Alenia Space, Toulouse, on waveguide assembling and on-site inventory management

Fellowships and awards

- 2023 Mathematical Programming Meritorious Service Award
- 2023 CNRS Bronze medal (INS2I)
- 2018 Best Software Demo Award with M. Safey El Din. RealCertify: a Maple package for certifying non-negativity. *ISSAC'18: Proceedings of the ACM International Symposium on Symbolic and Algebraic Computation* [C9]
- 2017 Best Paper Award with A. Rocca & T. Dang. Certified Roundoff Error Bounds using Bernstein Expansions and Sparse Krivine-Stengle Representations. *ARITH'17: 24th IEEE Symposium on Computer Arithmetic* [C6]
- 2014-2015 Postdoc position funded by EPSRC grant EP/I020457/1 (Challenging Engineering Project)

2014 Postdoc position funded by fellowship of Simone and Cino del Duca foundation of the France Institute
 2010-2013 PhD funded by INRIA Grant **Formath** EU FP7 Project
 2008-2010 Ms. funded by Monbukagakusho (Japanese Government Fellowship)

Training Schools

2023 Training on *Media Interview and Workplace First-Aider*, CNRS, Toulouse, France
 2022 Training on the topic of *Sexist and Sexual Violence*, Théâtre-Forum of the band **De(s)amorce(s)**, LAAS, Toulouse, France
 2022 QMATH Masterclass on *Entropy Inequalities in Quantum Information Science*, Univ. of Copenhagen, Denmark
 2022 Summer school on *The mathematics of quantum entanglement via nonlocal games*, Univ. of Copenhagen, Denmark
 2016 Three days Course on *Diffusion of Scientific Knowledge*, CNRS, Paris, France
 2015 Summer school on *Automatic Control, Invariant sets*, GIPSA-lab, Grenoble, France
 2013 Summer school on *Polynomial Optimization*, Isaac Newton Institute, Cambridge, UK
 2012 Summer school on *Semidefinite Optimization*, Kirchberg/Hunsrück, Haus Karrenberg, Germany
 2012 Spring school on *Formalization of Mathematics*, INRIA Sophia-Antipolis, France

Research topics and mobilities

Research topics. My scientific interests have mainly evolved around the use of moment-sums of squares hierarchies for polynomial optimization, and have been structured in 3 interconnected layers:

- (1) **Modeling.** I relied on polynomial optimization to analyze sets defined by polynomial inequalities, handle problems involving noncompact constraints and noncommuting variables.
Tools: moment-sums of squares hierarchy, noncommutative algebra, semidefinite programming, Liouville equation
- (2) **Certification.** I designed algorithms which output exact certificates for either unconstrained or constrained optimization problems.
Tools: hybrid numeric-symbolic algorithms, computer algebra, bit complexity analysis, rational sums of squares
- (3) **Efficiency.** I improved the scalability of polynomial optimization by exploiting the specific sparsity and symmetry structure of the polynomials involved in real-world problems.
Tools: sparsity and symmetry exploitation, chordal graph extension, matrix block diagonalisation

Mobilities. My thematic mobilities have been naturally motivated by the development of new efficient schemes to solve larger-scale instances of polynomial optimization problems, as such schemes can be applied to a wide class of problems (not necessarily static nor commutative). The first application was in computer arithmetic during my Postdoc at Imperial College. Later on I broadened the application scope of my research methodologies to quantum information theory, optimal power-flow and deep learning. Most of these thematic mobilities came together with geographic mobilities supported by [project grants](#).

2021 → Application to energy networks, via an industrial collaboration with **RTE**, supported by the project FastOPF
 2021 → Application to deep learning, supported by the ANITI chaire on polynomial optimization led by J.-B. Lasserre
 2020 → Application to quantum information theory, with researchers from the group of A. Acín at ICFO Barcelona, supported by the project FastQI
 2020-2021 Application to the stability analysis of control systems under deadline constraints. This came together with a geographic mobility of two 6 months stays at the Department of Automatic Control (LTH Lund), with researchers from the group of A. Rantzer, supported by the projects EPIQCS and POPSIC
 2019-2022 Extension to noncommutative optimization. I did multiple short research stays (2 weeks in 03/2019, 08/2019, 11/2022) at Univ. Ljubljana to work mainly with I. Klep, supported by the projects EPICS and QUANTPOP. Conversely, I. Klep spent one month in 02/2023 as an invited Prof. supported by the International Centre for Mathematics and Computer Science in Toulouse (CIMI)
 2018 Certified optimization in collaboration with computer algebra teams. I was an associate member of LIP6 in the PolSys team during one year with M. Safey El Din and I did a one week research stay at TU Berlin with T. de Wolff

Other research stays and invitations.

01/2020 Mosek Aps Science Park, Copenhagen & Anders Rantzer, LTH Lund (2 weeks)
 10/2019 Stefan Streif, U. Chemnitz (1 week)
 07/2019 Marek Kaluba, TU Berlin (1 week)
 10/2018 Sabine Burgdorf, Igor Klep & Markus Schweighofer, U. Konstanz (1 week)
 05/2018 Khalil Ghorbal, INRIA Rennes (1 week)
 02/2018 Simone Naldi, XLIM Limoges (1 week)
 08/2016 Mituhiro Fukuda, Tokyo Institute of Technology (1 week)
 11/2014 Thao Dang, VERIMAG Grenoble (1 week)

12/2014 Markus Schweighofer, U. Konstanz (1 week)

08/2014 Masakazu Muramatsu, Tokyo Institute of Technology (1 week)

Summary of scientific production since 2010

49 Articles published in international peer-reviewed journals

26 Articles published in proceedings of peer-reviewed international conferences

1 Book 1 Book section 10 Articles submitted in peer-reviewed international journals or conferences

4 Software libraries ~110 Talks and lectures in France or abroad

Exhaustive list of scientific productions

NB: The order of authors in a given publication depends on the related scientific field (most often alphabetical in applied mathematics). An article published in the NeurIPS conference does not have a DOI.

Software libraries. Below I provide the list of my main software developments. Links to other scripts and smaller software libraries are available either from the [Publications](#) tab of my website or directly in the main text of my research articles. I took inspiration from the [document](#) produced by the scientific board of INS2I to present software contributions.

TSSOS: A sparse polynomial optimization tool based on block moment-SOS hierarchies

Summary: A3 SO4 SM2 EM4 SDL4 DA3 CD3 MS2 TPM4

Objective: Improve the scalability of polynomial optimization for real-world problems with sparse input data. TSSOS is an autonomous library. To the best of my knowledge, TSSOS is the most scalable tool in polynomial optimization, compared to the existing software libraries [YALMIP](#), [GloptiPoly](#), [SparsePOP](#), [SumOfSquares](#) and [MomentTools](#), [NCSOS-tools](#). TSSOS is a Julia package implementing a new moment-SOS hierarchy, for solving large-scale sparse polynomial optimization problems. Its novelty is to exploit simultaneously correlative sparsity and term sparsity, by combining advantages of two existing frameworks for sparse polynomial optimization. The former is due to Waki et al. while the latter was initially proposed by Wang et al. and later exploited in the TSSOS hierarchy. In doing so we obtain a two-level hierarchy of semidefinite programming relaxations with (i), the crucial property to involve quasi block-diagonal matrices and (ii), the guarantee of convergence to the global optimum. TSSOS can handle several large-scale instances of the celebrated Max-Cut problem, the important industrial optimal power flow problem, involving up to several thousands of variables and ten thousands of constraints. Beyond classical static polynomial optimization in commuting variables, TSSOS is able to model various types of static and dynamical polynomial problems, involving complex and noncommutative variables

Users community and impact: Main users are academic researchers (~100 explicit citations), interested in applications to energy networks (e.g. our industrial partner RTE), quantum information theory, dynamical system analysis

Language, size and publications: 100% Julia library, ~9k lines of code, MIT license [\[C15\]](#) [\[J24\]](#) [\[J33\]](#) [\[B1\]](#)

Contribution: I supervised the development during J. Wang's Postdoc and partially contributed to the code

RealCertify: a Maple package for certifying non-negativity

Summary: A3 SO4 SM2 EM2 SDL4 DA4 CD4 MS4 TPM4

Objective: The package RealCertify aims at providing a full suite of hybrid algorithms for computing certificates of nonnegativity based on numerical software for solving linear matrix inequalities. RealCertify is an autonomous library. There are specific modules to handle the univariate and multivariate cases

Users community and impact: Main users are academic researchers from the fields of optimization and control, interested in obtaining exact certificates

Language, size and publications: 100% Maple library, ~10k lines of code, CeCILL license [\[C9\]](#) [\[S2\]](#) [\[J15\]](#) [\[J20\]](#)

Contribution: I was the main developer, programmer and maintainer

Real2Float: a tool for certified roundoff error bounds using semidefinite programming

Summary: A3 SO4 SM2 EM2 SDL4 DA4 CD4 MS4 TPM4

Objective: Real2Float is a framework to provide upper bounds of absolute roundoff errors of numerical programs. RealCertify is built in top of NLCertify (see below). This tool is based on optimization techniques employing semidefinite programming and sparse sums of squares certificates, which can be formally checked inside the Coq theorem prover. The tool can analyze a wide range of nonlinear programs, including polynomials and transcendental operations as well as conditional statements

Users community and impact: Main users are academic researchers from the fields of computer arithmetic and program verification (~100 explicit citations), interested in obtaining certified roundoff error bounds

Language, size and publications: ~25k lines of OCaml code and ~5k lines of Coq code [J8]

Contribution: I was the main developer, programmer and maintainer

NLCertify: a tool for formal nonlinear optimization

Summary: A3 SO4 SM2 EM2 SDL4 DA4 CD4 MS4 TPM4

Objective: NLCertify is a software package for handling formal certification of nonlinear inequalities involving transcendental multivariate functions. The tool exploits sparse semialgebraic optimization techniques with approximation methods for transcendental functions, as well as formal features. Given a box and a function as input, NLCertify provides OCaml libraries that produce nonnegativity certificates for the function over the box, which can be ultimately proved correct inside the Coq proof assistant. NLCertify is an autonomous library. The package solves successfully non-trivial inequalities (essentially tight ones, involving both semialgebraic and transcendental expressions of 6-12 variables) from the Flyspeck project aiming at formalizing the proof of the Kepler conjecture as well as significant global optimization benchmarks.

Users community and impact: Main users are academic researchers from the field of certified optimization, interested in adaptive techniques to produce certificates with a reduced complexity

Language, size and publications: ~15k lines of OCaml code and ~4k lines of Coq code [C4] [T1]

Contribution: I was the main developer, programmer and maintainer

Preprints submitted in peer-reviewed international journals or conferences.

- [S1] R. E. Curto, P. J. di Dio, M. Korda, and V. Magron. Time-dependent moments from partial differential equations and the time-dependent set of atoms (2023). arXiv: [2211.04416](https://arxiv.org/abs/2211.04416).
- [S2] G. Devadze, V. Magron, and S. Streif. Computer-assisted proofs for Lyapunov stability via Sums of Squares certificates and Constructive Analysis (2023). arXiv: [2006.09884](https://arxiv.org/abs/2006.09884).
- [S3] I. Klep, V. Magron, and J. Volčič. Sums of squares certificates for polynomial moment inequalities (2023). arXiv: [2306.05761](https://arxiv.org/abs/2306.05761).
- [S4] N. H. A. Mai, J.-B. Lasserre, V. Magron, and K.-C. Toh. Tractable hierarchies of convex relaxations for polynomial optimization on the nonnegative orthant (2023). arXiv: [2209.06175](https://arxiv.org/abs/2209.06175).
- [S5] N. H. A. Mai and V. Magron. Sums of squares representations on singular loci (2023). arXiv: [2303.05081](https://arxiv.org/abs/2303.05081).
- [S6] Y. Ebihara, N. Sebe, H. Waki, D. Peaucelle, S. Tarbouriech, V. Magron, and T. Hagiwara. Induced Norm Analysis of Linear Systems for Nonnegative Input Signals (2024). arXiv: [2402.01288](https://arxiv.org/abs/2402.01288).
- [S7] H. Gytoku, T. Yuno, Y. Ebihara, V. Magron, D. Peaucelle, and S. Tarbouriech. On Dual of LMIs for Absolute Stability Analysis of Nonlinear Feedback Systems with Static O’Shea-Zames-Falb Multipliers (2024). arXiv: [2411.14339](https://arxiv.org/abs/2411.14339).
- [S8] D. Henrion, A. L. Franc, and V. Magron. Slow convergence of the moment-SOS hierarchy for an elementary polynomial optimization problem (2024). arXiv: [2403.08329](https://arxiv.org/abs/2403.08329).
- [S9] F. Huber, V. Magron, and J. Volčič. Positivity of state, trace, and moment polynomials, and applications in quantum information (2024). arXiv: [2409.](https://arxiv.org/abs/2409.)
- [S10] J. Yang, S. Đurašinović, J.-B. Lasserre, V. Magron, and J. Zhao. Verifying Properties of Binary Neural Networks Using Sparse Polynomial Optimization (2024). arXiv: [2405.17049](https://arxiv.org/abs/2405.17049).

Publications in international peer-reviewed journals.

- [J1] V. Magron. Error bounds for polynomial optimization over the hypercube using Putinar type representations. English. *Optimization Letters* 8.7 (2014), pp. 1–9. DOI: [10.1007/s11590-014-0797-8](https://doi.org/10.1007/s11590-014-0797-8). arXiv: [1404.6145](https://arxiv.org/abs/1404.6145).
- [J2] V. Magron, D. Henrion, and J.-B. Lasserre. Approximating Pareto curves using semidefinite relaxations. *Operations Research Letters* 42.6–7 (2014), pp. 432–437. DOI: <https://www.sciencedirect.com/science/article/pii/S0167637714001084>. arXiv: [1404.4772](https://arxiv.org/abs/1404.4772).
- [J3] V. Magron, X. Allamigeon, S. Gaubert, and B. Werner. Certification of real inequalities: templates and sums of squares. English. *Mathematical Programming* 151.2 (2015), pp. 477–506. DOI: [10.1007/s10107-014-0834-5](https://doi.org/10.1007/s10107-014-0834-5). arXiv: [1403.5899](https://arxiv.org/abs/1403.5899).
- [J4] V. Magron, X. Allamigeon, S. Gaubert, and B. Werner. Formal proofs for Nonlinear Optimization. *Journal of Formalized Reasoning* 8.1 (2015), pp. 1–24. DOI: [10.6092/issn.1972-5787/4319](https://doi.org/10.6092/issn.1972-5787/4319). arXiv: [1404.7282](https://arxiv.org/abs/1404.7282).
- [J5] V. Magron, D. Henrion, and J.-B. Lasserre. Semidefinite Approximations of Projections and Polynomial Images of Semi-Algebraic Sets. *SIAM Journal on Optimization* 25.4 (2015), pp. 2143–2164. DOI: [10.1137/140992047](https://doi.org/10.1137/140992047). arXiv: [1507.06143](https://arxiv.org/abs/1507.06143).
- [J6] A. Adgé, P.-L. Garoche, and V. Magron. A Sums-of-Squares extension of policy iterations. *Nonlinear Analysis: Hybrid Systems* 25 (2017), pp. 60–78. DOI: [10.1016/j.nahs.2017.03.001](https://doi.org/10.1016/j.nahs.2017.03.001). arXiv: [1503.08090](https://arxiv.org/abs/1503.08090).

- [J7] T. Hales, M. Adams, G. Bauer, D. T. Dat, J. Harrison, L. T. Hoang, C. Kaliszyk, V. Magron, S. Mclaughlin, T. T. Nguyen, Q. T. Nguyen, T. Nipkow, S. Obua, J. Pleso, J. Rute, A. Solovyev, T. H. A. Ta, N. T. Tran, T. D. Trieu, J. Urban, K. K. Vu, and R. Zumkeller. A Formal Proof of the Kepler Conjecture. *Forum of Mathematics, Pi* 5 (2017). DOI: [10.1017/fmp.2017.1](https://doi.org/10.1017/fmp.2017.1). arXiv: [1501.02155](https://arxiv.org/abs/1501.02155).
- [J8] V. Magron, G. Constantinides, and A. Donaldson. Certified Roundoff Error Bounds Using Semidefinite Programming. *ACM Trans. Math. Softw.* 43.4 (2017), pp. 1–34. DOI: [10.1145/3015465](https://doi.org/10.1145/3015465). arXiv: [1507.03331](https://arxiv.org/abs/1507.03331).
- [J9] J.-B. Lasserre and V. Magron. Optimal Data Fitting: A Moment Approach. *SIAM Journal on Optimization* 28.4 (2018), pp. 3127–3144. DOI: [10.1137/18M1170108](https://doi.org/10.1137/18M1170108). arXiv: [1802.03259](https://arxiv.org/abs/1802.03259).
- [J10] V. Magron. Interval Enclosures of Upper Bounds of Roundoff Errors Using Semidefinite Programming. *ACM Trans. Math. Softw.* 44.4 (2018), 41:1–41:18. DOI: [10.1145/3206430](https://doi.org/10.1145/3206430). arXiv: [1611.01318](https://arxiv.org/abs/1611.01318).
- [J11] J.-B. Lasserre and V. Magron. In SDP relaxations, inaccurate solvers do robust optimization. *SIAM Journal on Optimization* 29.3 (2019), pp. 2128–2145. DOI: [10.1137/18M1225677](https://doi.org/10.1137/18M1225677). arXiv: [1811.02879](https://arxiv.org/abs/1811.02879).
- [J12] V. Magron, M. Forets, and D. Henrion. Semidefinite Approximations of Invariant Measures for Polynomial Systems. *Discrete & Continuous Dynamical Systems - B* 24.12 (2019), pp. 6745–6770. DOI: [10.3934/dcdsb.2019165](https://doi.org/10.3934/dcdsb.2019165). arXiv: [1807.00754](https://arxiv.org/abs/1807.00754).
- [J13] V. Magron, P.-L. Garoche, D. Henrion, and X. Thirioux. Semidefinite Approximations of Reachable Sets for Discrete-time Polynomial Systems. *SIAM Journal on Control and Optimization* 57.4 (2019), pp. 2799–2820. DOI: [10.1137/17M1121044](https://doi.org/10.1137/17M1121044). arXiv: [1703.05085](https://arxiv.org/abs/1703.05085).
- [J14] V. Magron, A. Rocca, and T. Dang. Certified Roundoff Error Bounds Using Bernstein Expansions and Sparse Krivine-Stengle Representations. *IEEE Transactions on Computers* 68.7 (2019), pp. 953–966. DOI: [10.1109/TC.2018.2851235](https://doi.org/10.1109/TC.2018.2851235).
- [J15] V. Magron, M. Safey El Din, and M. Schweighofer. Algorithms for weighted sum of squares decomposition of non-negative univariate polynomials. *Journal of Symbolic Computation* 93 (2019), pp. 200–220. DOI: [10.1016/j.jsc.2018.06.005](https://doi.org/10.1016/j.jsc.2018.06.005). arXiv: [1706.03941](https://arxiv.org/abs/1706.03941).
- [J16] J.-B. Lasserre and V. Magron. Computing the Hausdorff boundary measure of semi-algebraic sets. *SIAM Journal on Applied Algebra and Geometry* 4.3 (2020), pp. 441–469. DOI: [10.1137/20M1314392](https://doi.org/10.1137/20M1314392). arXiv: [2001.07598](https://arxiv.org/abs/2001.07598).
- [J17] V. Magron and C. Prieur. Optimal Control of Linear PDEs using Occupation Measures and SDP Relaxations. *IMA Journal of Mathematical Control and Information* 37.1 (2020), pp. 159–174. DOI: [10.1093/imamci/dny044](https://doi.org/10.1093/imamci/dny044). arXiv: [1710.04520](https://arxiv.org/abs/1710.04520).
- [J18] Y. Ebihara, H. Waki, V. Magron, N. H. A. Mai, D. Peaucelle, and S. Tarbouriech. l2 Induced Norm Analysis of Discrete-Time LTI Systems for Nonnegative Input Signals and Its Application to Stability Analysis of Recurrent Neural Networks. *European Journal of Control* 62 (2021), pp. 99–104. DOI: [10.1016/j.ejcon.2021.06.022](https://doi.org/10.1016/j.ejcon.2021.06.022). arXiv: [2011.12726](https://arxiv.org/abs/2011.12726).
- [J19] J.-B. Lasserre, V. Magron, S. Marx, and O. Zahm. Minimizing rational functions: a hierarchy of approximations via pushforward measures. *SIAM Journal on Optimization* 31.3 (2021), pp. 2285–2306. DOI: [10.1137/20M138541X](https://doi.org/10.1137/20M138541X). arXiv: [2012.05793](https://arxiv.org/abs/2012.05793).
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- [J21] N. H. A. Mai, J.-B. Lasserre, and V. Magron. Positivity certificates and polynomial optimization on non-compact semialgebraic sets. *Mathematical Programming* 194 (2021), pp. 443–485. DOI: [10.1007/s10107-021-01634-1](https://doi.org/10.1007/s10107-021-01634-1). arXiv: [1911.11428](https://arxiv.org/abs/1911.11428).
- [J22] J. Wang and V. Magron. Exploiting term sparsity in Noncommutative Polynomial Optimization. *Computational Optimization and Applications* 80 (2021), pp. 483–521. DOI: [10.1007/s10589-021-00301-7](https://doi.org/10.1007/s10589-021-00301-7). arXiv: [2010.06956](https://arxiv.org/abs/2010.06956).
- [J23] J. Wang, V. Magron, and J.-B. Lasserre. Chordal-TSSOS: a moment-SOS hierarchy that exploits term sparsity with chordal extension. *SIAM Journal on Optimization* 31.1 (2021), pp. 114–141. DOI: [10.1137/20M1323564](https://doi.org/10.1137/20M1323564). arXiv: [2003.03210](https://arxiv.org/abs/2003.03210).
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- [J25] T. Chen, J.-B. Lasserre, V. Magron, and E. Pauwels. A Sublevel Moment-SOS Hierarchy for Polynomial Optimization. *Computational Optimization and Applications* 81 (2022), pp. 31–66. DOI: [10.1007/s10589-021-00325-z](https://doi.org/10.1007/s10589-021-00325-z). arXiv: [2101.05167](https://arxiv.org/abs/2101.05167).
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- [J28] I. Klep, V. Magron, and J. Volčič. Optimization over trace polynomials. *Annales Henri Poincaré* 23 (2022), pp. 67–100. DOI: [10.1007/s00023-021-01095-4](https://doi.org/10.1007/s00023-021-01095-4). arXiv: [2006.12510](https://arxiv.org/abs/2006.12510).
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- [C3] X. Allamigeon, S. Gaubert, V. Magron, and B. Werner. Certification of Inequalities involving Transcendental Functions: combining SDP and Max-plus Approximation. *Proceedings of the European Control Conference (ECC)* (2013), 2244–2250. DOI: [10.23919/ECC.2013.6669514](https://doi.org/10.23919/ECC.2013.6669514). arXiv: [1307.7002](https://arxiv.org/abs/1307.7002).
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- [C5] A. Adjé, P.-L. Garoche, and V. Magron. Property-based Polynomial Invariant Generation using Sums-of-Squares Optimization. *Static Analysis Symposium (SAS), Lecture Notes in Computer Science* 9291 (2015), pp. 235–251. DOI: [10.1007/978-3-662-48288-9_14](https://doi.org/10.1007/978-3-662-48288-9_14). arXiv: [1503.07025](https://arxiv.org/abs/1503.07025).
- [C6] A. Rocca, V. Magron, and T. Dang. Certified Roundoff Error Bounds using Bernstein Expansions and Sparse Krivine-Stengle Representations. *24th IEEE Symposium on Computer Arithmetic, Best Paper Award* (2017), pp. 74–81. DOI: [10.1109/ARITH.2017.36](https://doi.org/10.1109/ARITH.2017.36). arXiv: [1610.07038](https://arxiv.org/abs/1610.07038).
- [C7] A. Rocca, M. Forets, V. Magron, E. Fanchon, and T. Dang. Occupation measure methods for modelling and analysis of biological hybrid systems. *6th IFAC Conference on Analysis and Design of Hybrid Systems ADHS 2018* 51.16 (2018), pp. 181–186. DOI: [10.1016/j.ifacol.2018.08.031](https://doi.org/10.1016/j.ifacol.2018.08.031). arXiv: [1710.03158](https://arxiv.org/abs/1710.03158).
- [C8] V. Magron and M. S. E. Din. On Exact Polya and Putinar’s Representations. *ISSAC’18: Proceedings of the ACM International Symposium on Symbolic and Algebraic Computation* (2018), pp. 279–286. DOI: [10.1145/3208976.3208986](https://doi.org/10.1145/3208976.3208986). arXiv: [1802.10339](https://arxiv.org/abs/1802.10339).
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- [C10] V. Magron, H. Seidler, and T. de Wolff. Exact Optimization via Sums of Nonnegative Circuits and Arithmetic-geometric-mean-exponentials. *ISSAC’19: Proceedings of the ACM International Symposium on Symbolic and Algebraic Computation* (2019), pp. 291–298. DOI: [10.1145/3326229.3326271](https://doi.org/10.1145/3326229.3326271). arXiv: [1902.02123](https://arxiv.org/abs/1902.02123).
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- [C15] V. Magron and J. Wang. TSSOS: a Julia library to exploit sparsity for large-scale polynomial optimization. *Proceedings of MEGA’21: Effective Methods in Algebraic Geometry* (2021). arXiv: [2103.00915](https://arxiv.org/abs/2103.00915).
- [C16] N. H. A. Mai, A. Bhardwaj, and V. Magron. The Constant Trace Property in Noncommutative Optimization. *ISSAC’21: Proceedings of the ACM International Symposium on Symbolic and Algebraic Computation* (2021), pp. 297–304. DOI: [10.1145/3452143.3465516](https://doi.org/10.1145/3452143.3465516). arXiv: [2102.02162](https://arxiv.org/abs/2102.02162).
- [C17] J. Wang, M. Maggio, and V. Magron. SparseJSR: A Fast Algorithm to Compute Joint Spectral Radius via Sparse SOS Decompositions. *Proceedings of the American Control Conference (ACC)* (2021), pp. 2254–2259. DOI: [10.23919/ACC50511.2021.9483347](https://doi.org/10.23919/ACC50511.2021.9483347). arXiv: [2008.11441](https://arxiv.org/abs/2008.11441).
- [C18] Y. Ebihara, H. Waki, N. Sebe, V. Magron, D. Peaucelle, and S. Tarbouriech. L_2+ Induced Norm Analysis of Continuous-Time LTI Systems Using Positive Filters and Copositive Programming. *Proceedings of the European Control Conference (ECC)* (2022), pp. 1385–1390. DOI: [10.23919/ECC55457.2022.9838085](https://doi.org/10.23919/ECC55457.2022.9838085). arXiv: [2401.03242](https://arxiv.org/abs/2401.03242).
- [C19] M. Korda, A. Lazarev, J.-B. Lasserre, V. Magron, and S. Naldi. Urysohn in action: separating semialgebraic sets by polynomials. *Proceedings of the final POEMA Workshop* (2022). Extended Abstract. arXiv: [2207.00570](https://arxiv.org/abs/2207.00570).
- [C20] V. Magron, M. S. E. Din, M. Schweighofer, and T.-H. Vu. Exact SOHS decompositions of trigonometric univariate polynomials with Gaussian coefficients. *ISSAC’22: Proceedings of the ACM International Symposium on Symbolic and Algebraic Computation* (2022), pp. 325–332. DOI: [10.1145/3476446.3535480](https://doi.org/10.1145/3476446.3535480). arXiv: [2202.06544](https://arxiv.org/abs/2202.06544).
- [C21] V. Magron, N. H. A. Mai, Y. Ebihara, and H. Waki. Tractable semidefinite bounds of positive maximal singular values. *Proceedings of the 25th International Symposium on Mathematical Theory of Networks and Systems (MTNS)* (2022). Invited Session Extended Abstract, pp. 360–363. DOI: [10.15495/EPub_UBT_00006809](https://doi.org/10.15495/EPub_UBT_00006809). arXiv: [2202.08731](https://arxiv.org/abs/2202.08731).
- [C22] V. Magron, P. Koprowski, and T. Vaccon. Pouchet’s theorem in action: decomposing univariate nonnegative polynomials as sums of five squares. *ISSAC’23: Proceedings of the ACM International Symposium on Symbolic and Algebraic Computation* (2023), pp. 425–433. DOI: [10.1145/3597066.3597072](https://doi.org/10.1145/3597066.3597072). arXiv: [2302.02202](https://arxiv.org/abs/2302.02202).
- [C23] J. Miller, M. Korda, V. Magron, and M. Sznaier. Peak Estimation of Time Delay Systems using Occupation Measures. *Proceedings of the Control and Decision Conference (CDC)* (2023). DOI: [10.1109/CDC49753.2023.10384165](https://doi.org/10.1109/CDC49753.2023.10384165). arXiv: [2303.12863](https://arxiv.org/abs/2303.12863).

- [C24] Y. Ebihara, X. Dai, V. Magron, D. Peaucelle, and S. Tarbouriech. Local Lipschitz Constant Computation of ReLU-FNNs: Upper Bound Computation with Exactness Verification. *Proceedings of the European Control Conference (ECC)* (2024). arXiv: [2310.11104](#).
- [C25] I. Klep, V. Magron, G. Massé, and J. Volčič. Upper bound hierarchies for noncommutative polynomial optimization. *Proceedings of the 26th International Symposium on Mathematical Theory of Networks and Systems (MTNS)* (2024). Invited Session Extended Abstract. arXiv: [2402.02126](#).
- [C26] S. Nishinaka, R. Saeki, T. Yuno, Y. Ebihara, V. Magron, D. Peaucelle, S. Zoboli, and S. Tarbouriech. Stability Analysis of Feedback Systems with ReLU Nonlinearities via Semialgebraic Set Representation. *Proceedings of the 4th IFAC Conference of Modelling, Identification and Control of nonlinear systems (MICNON)* (2024). arXiv: [2403.04016](#).

Book.

- [B1] V. Magron and J. Wang. *Sparse Polynomial Optimization: theory and practice*. WORLD SCIENTIFIC (EUROPE), 2023. DOI: [10.1142/q0382](#). arXiv: [2208.11158](#).

Book section.

- [BS1] A. Bhardwaj, I. Klep, and V. Magron. Noncommutative Polynomial Optimization. *Encyclopedia of Optimization*, Springer (2022), pp. 1–13. DOI: [10.1007/978-3-030-54621-2_742-1](#). arXiv: [2109.00786](#).

Theses.

- [T1] V. Magron. “Formal Proofs for Global Optimization – Templates and Sums of Squares”. Theses. Ecole Polytechnique X, 2013. HAL: [paste1-00917779](#).
- [T2] V. Magron. “The quest of modeling, certification and efficiency in polynomial optimization”. Habilitation à diriger des recherches. Université Toulouse 3 Paul Sabatier, 2021. HAL: [te1-03246038](#).

Supervision

Postdoctoral fellows.

- 2025 → [Tobias Metzloff](#), Noncommutative polynomial optimization for quantum network correlations, funded by the QUANTERA project COMPUTE
- 2024 [Perla Azzi](#), Polynomial optimization for sensor location, funded by the CREATE project DesCartes
- 2023-2024 [Jianting Yang](#), Polynomial optimization for binary neural networks analysis, funded by the CREATE project DesCartes. Now Postdoc at AMSS CAS Beijing [[S10](#)]
- 2022-2024 [Adrien Le-Franc](#), Fast polynomial optimization for optimal power-flow, funded by AMIES & RTE. Now project manager at Bureau des ENR hydrauliques et marines (DGEC) [[J36](#), [S8](#)]
- 2023 [Gaël Massé](#), Polynomial optimization and upper bounds for quantum information, funded by Inst. Quantique Occitan. Now Postdoc at LIP6 [[C25](#)]
- 2021 [Pierre-Emmanuel Emeriau](#), Fast polynomial optimization for quantum information, funded by Inst. Quantique Occitan. Now researcher at Quandela
- 2021-2022 [Philipp di Dio](#), Moment-SOS hierarchies for optimal transport and partial differential equations, funded by ANITI. Now Zukunftskolleg research fellow at the Univ. of Konstanz [[S1](#)]
- 2021-2023 [Rodolfo Rios-Zertuche](#), Convergence rate of Lasserre’s hierarchy, funded by MAC and ANITI. Now Postdoc at the Univ. of Tromsø [[J47](#)]
- 2021-2022 [Nicolas Augier](#), Quantum optimal control funded by CIMI. Now CNRS junior researcher at LAAS [[J46](#)]
- 2020-2021 [Abhishek Bhardwaj](#), Positivity certificates for noncommutative polynomials, funded by the COPS project. Now Postdoc at the Australian National Univ. [[BS1](#)] [[C16](#)]
- 2019-2021 [Jie Wang](#), Certificates for sparse nonnegative polynomials, funded by the COPS project. Now associate researcher at Academy of Sciences (AMSS-CAS) Beijing [[J24](#)] [[J23](#)] [[C15](#)] [[J32](#)] [[J34](#)] [[J29](#)] [[J22](#)] [[C17](#)] [[J45](#)] [[J31](#)] [[B1](#)] [[J38](#)] [[J33](#)] [[C12](#)] [[J41](#)] [[J48](#)] [[J49](#)]

PhD candidates.

- 2025 → [Younes Naceur](#), Tensor and polynomial optimisation for quantum information networks, with A. Acín (ICFO) and P.E. Emeriau (Quandela)
- 2024 → [Jonas Britz](#), Approximation hierarchies for quantum entanglement detection, with M. Laurent (CWI) and M. Almeida (Quantinuum)
- 2022 → [Srećko Đurašinović](#), Sparse polynomial optimization with applications to deep networks, with J.-B. Lasserre (LAAS) and J. Zhao (NTU) [[S10](#)]

- 2021-2023 [Alexey Lazarev](#), Advanced data-driven techniques for the Lasserre hierarchy, with M. Korda (LAAS) and J.-B. Lasserre (LAAS). Now PhD candidate at Institut de Mathématiques de Toulouse [C19]
- 2019-2022 [Hoang Ngoc Anh Mai](#), Practical polynomial optimization through positivity certificates with and without denominators, with J.-B. Lasserre (LAAS). **Recipient of the PGMO PhD Prize 2023**. Now Postdoc at ENS Lyon [J42] [J29] [C16] [J32] [C14] [J18] [J21] [J43] [J30] [C21] [S5] [S4]
- 2019-2022 [Tong Chen](#), Polynomial optimization for certification of deep networks, with J.-B. Lasserre (LAAS) and E. Pauwels (TSE). Now Postdoc at Univ. of Copenhagen [J25] [C11] [C13]
- 2019-2022 [Vu Trung Hieu](#), Certified polynomial optimization based on exact sum of squares decompositions, with M. Safey El Din (Sorbonne Univ.). Now Postdoc at Norwegian Univ. of Science and Technology [J40] [C20]

Graduate students.

- 2022 One Master 2 student from Toulouse School of Economics, co-supervised with J.-B. Lasserre (LAAS)
- 2019 Two Master 2 students from Univ. of Limoges, respectively co-supervised with J.-B. Lasserre (LAAS) and K. Ghorbal (INRIA Rennes)
- A Master 2 student from Univ. of Versailles, co-supervised at LIP6 with M. Safey El Din (INRIA/LIP6 PolSys)
- A Master 2 student from Univ. Paris-Sud, co-supervised at IRT with E. Pauwels (TSE) & J.-B. Lasserre (LAAS)
- 2015-2017 Non-official co-supervision of the Postdoc of M. Forets at VERIMAG
- 2015-2017 Non-official co-supervision of the PhD thesis of A. Rocca, with T. Dang (VERIMAG)
- 2016 Two Master 1 students from Ensimag Grenoble France, supervised at VERIMAG
- 2015 One Master 2 student from Konstanz Univ., co-supervised at É. Polytechnique with B. Werner (LIX)

Organization of scientific events

- 11/2023 **POP23** Workshop *Future trends in Polynomial Optimization* at LAAS Toulouse. Co-organized with D. Henrion (LAAS), M. Laurent (CWI), J. Nie (UCSD) & E. Pauwels (TSE)
- 05/2023 GdR MACS **Summer school** *Convex optimization for analysis and control of dynamical systems*, Aussois. Co-organized with G. Alpan (INP Grenoble) & D. Peaucelle (LAAS)
- 02/2023 1st Day **POP-IMT** on quantum information theory and polynomial optimization. Co-organized with I. Nechita (FERMI) & C. Pellegrini (IMT)
- 06/2022 **MINT** Summer school *Moments & positive polynomials* at Institute of Mathematics in Toulouse. Co-organized with M. Korda & J.-B. Lasserre (LAAS)
- 03/2022 2nd Edition of **MAS-MODE** Days 10/2021 **Workshop DO** (Decision and Optimization department at LAAS)
- 09/2021 **POEMA Learning Week 2**, Le Village, Toulouse
- 08/2021 Two sessions on polynomial optimization at **SIAM Conference on Optimization, SIAM Conference on Applied Algebraic Geometry**
- 06/2021 Minisymposium *Computational aspects of commutative and noncommutative positive polynomials* at the **European Congress of Mathematics**
- 06/2021 Minisymposium *Optimization over measures and positive polynomials* at the **SMAI** Conference
- 04/2021 **General Online Julia Training** in the context of the POEMA project
- 2020 → **BrainPOP** group: workshops and discussions about measure and polynomial optimization
- 2020 → Member of the local organizing committee scientific of **SPOT**: Multidisciplinary optimization seminar in Toulouse
- 2018 Local organization committee of the **SMAI-MODE** optimization conference
- 2016-2017 Co-organizer of the **Reading group in Optimization and Control** of Univ. Grenoble Alpes focusing on the interplay between convex optimization and optimal control
- 2015-2019 Organizer of five sessions at optimization conference (**BFG'15, FGI'17, PGMO'17-18', SMAI**), dedicated to the application of polynomial optimization to the fields of static analysis, control and computer arithmetic

Scientific vulgarization

- 2022 Organization committee **Mois de l'optimisation**, ENSEEIHT Toulouse. Co-organized with J. Bolte (TSE), S. Gratton (ENSEEIHT) & E. Pauwels (TSE)
- 2014 Techniques de preuve formelle en science : le défi, Semaines Sociales de France. Session: **L'Homme et les Technosciences, le défi**. Univ. Catholique de Lille. [Text](#)

Scientific management, commissions of trust

PhD thesis committees.

- 2025 Jury member for the PhD thesis of G. Devadze, *Constructive analysis and computer-certified formal proofs for selected control-theoretical aspects*, TU Chemnitz
- 10/2023 Reviewer of A. Oustry, *Global optimization of nonlinear semi-infinite programming problems: Applications in power systems and control*, École Polytechnique
- 12/2022 Reviewer of T. C. Metzloff, *Crystallographic Groups and Chebyshev Polynomials in Global Optimization*, Université Côte d'Azur
- 10/2022 Reviewer of A. Ferguson, *Exact algorithms for polynomial optimisation*, Sorbonne Univ.
- 12/2021 Reviewer of D. Anoman, *Contributions relatives à la génération relative d'aléa*, Univ. of Limoges
- 11/2021 Jury member of M. Gunde, *Development of IRA: a shape matching algorithm, its implementation, and utility in a general off-lattice kMC kernel*, LAAS

Commissions of trust.

- 2025 Program committee member of the 39th Conference on Artificial Intelligence **AAI 2025**
- 2025 Program committee member of the 18th International Symposium on Operations Research in Slovenia **SOR'25**
- 2024 → Associate editor for *Journal of Approximation Software* **JAS**
- 2024 → Associate editor for the journal *Computational Optimization and Applications* **COAP**
- 2024 Guest editor for the special issue *Future trends in Polynomial Optimization* of the journal Numerical Algebra, Control and Optimization **NACO**
- 2023 Program committee member of the International Symposium on Symbolic and Algebraic Computation **ISSAC**
- 2023 Program committee member of ANR CES23 (Intelligence artificielle et science des données): evaluation of 12 grant proposals
- 2022 Program committee member of the 15th Conference on Intelligent Computer Mathematics **CICM**
- 2022 Jury member of the **Prix Dodu** at the **SMAI-MODE** conference
- 2022 → Program committee member of the Doctoral school **EDMITT**, Toulouse
- 2021-2022 Referee for 2 grant proposals submitted to the Czech Science Foundation and 1 grant submitted to the Swiss National Science Foundation
- 2020 Referee for a grant proposal submitted to the IDEX Univ. Grenoble Alpes
- 2015-2019 Reviewer for Mathematical Reviews (AMS)
- 2012 → Reviewer for international peer-reviewed international conferences and journals.
Optimization and control: Automatica, CAMSAP, CoDIT, ECC, European Journal of Operational Research, HSCC, IEEE Access, IEEE Control Systems Letters, IEEE Transactions on Automatic Control, IMA Journal of Mathematical Control and Information, Iranian Journal of Science and Technology, Transactions A: Science, Circuits Systems & Signal Processing, Journal of Global Optimization, Journal of the Franklin Institute, Journal of Pure and Applied Algebra, Mathematical Programming, Mathematics of Computation, MTNS, Optimization Letters, Optimization Methods & Software, Revista de la Unión Matemática Argentina, SIAM Review, SIAM Journal on Control and Optimization, SIAM Journal on Optimization
Computer science: AAAI, AISTATS, CADE, CAV, Formal Methods in System Design, ICLR, ICML, ISSAC, INFORMS Journal on Computing, Journal on Complexity, Journal of Formalized Reasoning, Journal of Symbolic Computation, LATA, Mathematics of Operations Research, MEGA, NeurIPS, POPL, Quantum Information Processing, SYNASC, TACAS

Collective responsibilities.

- 06/2022 → Head of the **POP** team 01-06/2022 Co-head of the **MAC** team 2020 → Scientific committee member of Decision & Optimization department (**DO**)
- 2024 → Member of the **AOC** team, supported by CNRS **PRIME**
- 2021 → Member of the GdRs **MACS**, **MOA** & **SMAI**
- 2017-2022 French Society on the Mathematics of Optimization and Decision **SMAI-MODE** Committee

Project grants

- 2024-2025 CIMI grant for Visiting Expert Scientist: PhD secondment of M. Martínez Antón (U. Grenada). Topic: complexity analysis of conic programs. Other participants: V. Blanco (U. Grenada), P. Moustrou (IMT).
My role: PI Budget = 6 k€
- 2024-2028 POPML4PS **ANITI 2** (Artificial and Natural Intelligence Toulouse Institute) chair. Topic: Combining Polynomial Optimization and Machine Learning: Application to Power System Decision Support Tools. Other PIs: J.-B. Lasserre (LAAS) & P. Panciatici (RTE)
My role: PI Budget = 30 M€

- 2024-2026 QUANTERA project **COMPUTE** (nonCommutative polynOMial oPtimisation for qUanTum nEtworks). PI: M.-0. Renou (INRIA Saclay). Other participants: X. Xu (INRIA Saclay), M. Gachechiladze, D. Gross, A. Schroeder (TU Darmstadt), I. Klep, A. Zalar (Univ. Ljubljana), A. Acín, E. Oudot & H. Dourdent (ICFO)
My role: PI of the CNRS node Budget = 985 k€
- 2023-2024 CALMIP project **FastPOP** (Fast Polynomial OPTimization). Allocation of 120 000 CPU hours on the computing platform **CALMIP**. Other participants: A. Le Franc (LAAS), J. Wang (Academy of Sciences, Beijing)
My role: PI
- 2024-2027 European Commission Marie Skłodowska-Curie Doctoral Network **TENORS** (Tensor modEliNg, geOmetRy and op-timiSation). PI: B. Mourrain (INRIA Sophia, Nice). Partners: M. Laurent (CWI), S. Kuhlmann (Univ Konstanz), B. Sturmfels (MPI Leipzig), A. Bernardi (Univ. Trento), G. Ottaviani (Univ. Florence), C. Riener (Univ. Tromsø), D. Henrion (LAAS), Jakub Marecek (Czech Tech. Univ. Prague), A. Acín (ICFO Barcelona) & M. Gabay (Artelys France)
My role: co-PI of the CNRS node Budget = 4 M€
- 2023 PNRIA **1stOrder** (First-order convex optimization for deep learning). Funded by the national program of research in artificial intelligence (PNRIA). Project co-supervised with J.-B. Lasserre (LAAS) & E. Pauwels (TSE). Other participants: E. Maitre (IRIT, supporting research engineer)
My role: PI
- 2021-2023 CIMI Research Project **EPOQCS** (Efficient Polynomial Optimization for Quantum and Control Systems). Funded by the International Centre for Mathematics and Computer Science in Toulouse (CIMI). Other participants: Y. Ebihara (U. Kyushu), I. Klep (U. Ljubljana), M. Maggio (LTH), I. Nechita (FERMI), D. Peaucelle (LAAS), J. Povh (U. Ljubljana), A. Rantzer (LTH), H. Waki (U. Kyushu) & J. Wang (Chinese Academy of Sciences)
My role: PI Budget = 20 k€
- 2021-2026 Hybrid AI project between France and Singapore **DesCartes** (A CREATE Programme on AI-based Decision making in Critical Urban Systems). Project Director: F. Chinesta. Related WP3 Topic: Polynomial and stochastic optimization with applications to deep networks
My role: co-PI of WP3 Budget = 50 M SGD \simeq 35.8 M €
- 2021-2023 Postdoctoral Fellowship **FastQI** (Fast Polynomial optimization techniques for Quantum Information). Funded by the institute Quantum technologies in Occitanie. Other participants: A. Acín (ICFO)
My role: PI Budget = 18 months Postdoc
- 2021-2023 CIMI Postdoctoral Fellowship **QOC** (Quantum Optimal Control). Funded by the International Centre for Mathematics and Computer Science in Toulouse (CIMI). PI: N. Augier. Other participants: M. Korda, D. Henrion (LAAS)
My role: Postdoc Advisor Budget = 2 years Postdoc
- 2021-2023 PEPS2 research collaboration between LAAS and RTE **FastOPF** (FAST polynomial optimization techniques for Optimal Power Flow). Funded by AMIES. Other participants from LAAS: J.-B. Lasserre, J. Wang. Participants from RTE: P. Panciatici & M. Ruiz
My role: PI Budget = 2 years Postdoc
- 2021-2022 Bilateral research collaboration between France and Slovenia **QUANTPOP** (QUANTum information with noncom-mutative Polynomial OPTimization). Funded by PHC Proteus. Other participants from France: I. Nechita (FERMI). Participants from Slovenia: I. Klep & J. Povh (Univ. of Ljubljana)
My role: PI Budget = 10 k€
- 2021 International mobility grant at LTH, Sweden **POPSIC** (Polynomial OPTimization for Scalability In Control). Funded by CIMI. Participants from LTH: A. Rantzer, M. Maggio, R. Pates & P. Kergus
My role: PI Budget = 6 k€
- 2019-2023 Polynomial optimization for Machine Learning **ANITI** (Artificial and Natural Intelligence Toulouse Institute) chair. Topic: Optimization for Machine Learning and the Christoffel function for data analysis. Senior Chair: J.-B. Lasserre (LAAS). Other Junior Chair: M. Korda (LAAS)
My role: Junior Chair Budget = 80 M€
- 2019-2022 European Commission Marie Skłodowska-Curie Innovative Training Network **POEMA** (Polynomial Optimization, Ef-ficiency through Moments and Algebra). PI: B. Mourrain (INRIA Sophia, Nice). Partners: M. Safey El Din (Sorbonne Univ, Paris), M. Laurent (CWI-NWO Amsterdam), E. de Klerk (Tilburg Univ), M. Schweighofer (Univ Konstanz), G. Ot-taviani (Univ. Florence), M. Stingl (Univ. Erlangen Nurnberg), C. Riener (Univ. Tromsø), A. Renaud (Artelys France), M. Mevissen (IBM Research Ireland), D. Henrion (LAAS), M. Dewar (Numerical Algorithms Group) & J. Maeght (RTE France)
My role: co-PI of the CNRS node Budget = 4 M€
- 2019-2020 ANR Tremplin-ERC Starting Grant **COPS**. Topic: "Certification and Modeling of Polynomial Optimization Problems"
My role: PI Budget = 120 k€

- 2018-2020 PGMO (Projet Gaspard Monge for Optimization) **EPICS**. Funded by fondation Jacques Hadamard. Other participants: T. Dang (VERIMAG) & J.-C. Faugère (INRIA Polsys, Paris). Topic: “Efficient Exact Polynomial optimization with Innovative Certified Schemes”
My role: PI Budget = 24 k€
- 2016-2017 Exploratory Project Persyval-Lab AEPS. Funded by the French program Investissement d’avenir (ANR-11-LABX-0025-01). Other participants: B. Gaujal & P. Mertikopoulos (LIG). Topic: Algorithmes efficaces de programmation semidéfinie pour l’optimisation stochastique
My role: PI Budget = 6 k€
- 2016 PEPS-JCJC (Pluridisciplinary Exploratory Project Young researchers) ACE. Funded by INS2I. Led together with D. Bresch-Pietri (Mines Paris) & C. Prieur (Gipsa-lab). Topic: Analysis and Control of Partial Differential Equations
My role: PI Budget = 6 k€

Selection of talks and lectures

The full list together with slides is available [here](#).

- (37) **Invited talk:** 2025 March 11-14, [WE-Heraeus-Seminar: Operator Theory and Polynomial Optimization in Quantum Information Theory](#), Physikzentrum Bad Honnef, Germany
- (36) *Collaborations between POP and RTE: sparse polynomial optimization for electrical networks*, 2024 November 25-26, [ANITI DAYS](#), Toulouse, France
- (35) **Plenary talk:** *State polynomial optimization*, 2024 July 29 - August 2, [Effective Methods in Algebraic Geometry \(MEGA\)](#), Leipzig, Germany
- (34) **Invited talk:** *State polynomial optimization for nonlinear Bell inequalities*, 2024 February 5, [Séminaire Parisien d’Optimisation \(SPO\)](#) IHP, Paris, France
- (33) *Moment polynomials for nonlinear Bell inequalities*, 2023 October 30, [ICFO Seminar](#), Barcelona
- (32) **Plenary talk:** *Sparse polynomial optimization: theory and practice*, 2023 September 21, [17th International Symposium on Operations Research in Slovenia](#)
- (31) **Invited mini-course:** *Exploiting sparsity in polynomial optimization*, 2023 March 6-10, [Journées Nationales de Calcul Formel](#), CIRM Marseille
- (30) **Invited lecture:** *Trace polynomial optimization with applications in quantum information*, 2022 September 1, CWI workshop on “Semidefinite and polynomial optimization Science Park”, Amsterdam
- (29) **Invited mini-course:** *The Moment-SOS hierarchy for polynomial optimization: theory and practice* in the group of Bernardo González Merino, 2022 May 18, Univ. of Murcia
- (28) **Feature tutorial lecture:** [Conic programming for certified polynomial optimization](#), 2022 April 11, Oberwolfach workshop “Conic Linear Optimization for Computer-Assisted Proofs”
- (27) **Invited mini-course:** [Sparse polynomial optimization POEMA Learning Week 2](#), 2021 September 16, Le Village, Toulouse
- (26) *Exact Polynomial Optimization via SOS Decompositions*, 2021 August 17, SIAM Conference on Applied Algebraic Geometry, Zoom
- (25) *Exploiting correlative and term sparsity in noncommutative polynomial optimization*, 2021 July 23, SIAM Conference on Optimization, Washington/Zoom
- (24) *Optimization over trace polynomials*, 2021 June 21, 8th ECM, Portoroz/Zoom
- (23) *The quest of modeling, certification and efficiency in polynomial optimization*, Habilitation defense, 2021 May 25, LAAS Toulouse
- (22) **Invited mini-course:** *Polynomial, Moment and SDP data*, 2021 April 16, General online Julia training POEMA Workshop, visio
- (21) *The quest of efficiency and certification in polynomial optimization*, 2021 March 29, Symbolic Computation Seminar NC State University, US
- (20) *Large-scale noncommutative optimization and applications to quantum information*, 2021 March 10, Workshop Technologies Quantiques LAAS Toulouse
- (19) *Sparse (Non)commutative Polynomial Optimization*, 2020 March 6, Real Algebraic Geometry with a View Toward Hyperbolic Programming and Free Probability Oberwolfach
- (18) **Invited talk after poster presentation:** *Polynomial Optimization for Bounding Lipschitz Constants of Deep Networks*, 2020 February 28, Intersections between Control, Learning and Optimization IPAM, Los Angeles
- (17) *Certified and efficient polynomial optimization via conic programming*, 2020 January 28, Department of Automatic Control seminar, LTH Lund
- (16) *Two-player games between polynomial optimizers and semidefinite solvers*, 2020 January 21, Mosek Aps Science Park, Copenhagen

- (15) *The quest of efficiency and certification in polynomial optimization*, 2019 November 4, [Séminaire Pluridisciplinaire d'Optimisation de Toulouse \(SPOT\)](#) Enseeiht, Toulouse, France
- (14) **Invited mini-course:** *Semidefinite Programming and the Moment-SOS Hierarchy*, at TU Chemnitz Fakultät für Elektrotechnik und Informationstechnik [Systems and Control Seminar](#), 2019 October 21-22, Germany
- (13) *Exact polynomial optimization via SOS, SONC and SAGE decompositions*, 2019 June 25, EURO, UCD Dublin
- (12) *Two-player games between polynomial optimizers and semidefinite solvers*, 2019 July 11, SIAM Conference on Applied Algebraic Geometry Bern, Switzerland & 2020 January 21, Mosek Aps Science Park, Copenhagen
- (11) **Invited mini-course:** *Certifying Non-negativity with Lasserre's Hierarchy and Semidefinite Programming*, seminar [SPA Solvers, Principles and Architectures](#), 2018 November 05, ENS Rennes
- (10) *RealCertify: a Maple package for certifying non-negativity*, 2018 July 17, ISSAC 2018 (Software Demonstration) New-York, US.
- (9) *On Exact Polya and Putinar's Representations*, 2018 July 17, ISSAC 2018 New-York, USA
- (8) *Enclosures of Roundoff Errors using SDP*, 2017 September 27, 18th French-German-Italian Conference on Optimization, Paderborn, Germany
- (7) *Semidefinite Approximations of Reachability Sets for Discrete-time Polynomial Systems*, 2017 August 3, SIAM Conference on Applied Algebraic Geometry, Atlanta, Georgia Tech, USA
- (6) *Nichtnegativstellensätze for Univariate Polynomials*, 2017 January 17, JNCF 2017 CIRM, Marseille, France
- (5) *Convergent Robust SDP Approximations for Semialgebraic Optimization*, 2016 August 10, ICCOPT 2016 GRIPS, Tokyo
- (4) *Automated Precision Tuning using Semidefinite Programming*, 2015 June 15, 17th British-French-German Conference on Optimization, Imperial College, London, UK
- (3) *Semidefinite approximations of projections and polynomial images of semialgebraic sets*, 2014 November 5, JNCF 2014 CIRM, Marseille, France
- (2) *Formal Nonlinear Optimization via Templates and Sum-of-Squares*, 2013 April 23, TYPES 2013 Toulouse
- (1) *Certification of Inequalities involving Transcendental Functions using Semidefinite Programming*, 2012 August 24, ISMP 2012 Berlin