

# Philip Thompson

## Curriculum Vitae

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🌐 <https://sites.google.com/view/philipthompson2015/>

### Research Interests

- **Robust high-dimensional estimation and statistical learning:**  
estimation, regularization, robust statistics, connections to optimization
- **Stochastic optimization & stochastic approximation:**  
robustness, adaptation, variance-reduction

### Professional Experience

- 2020– **Assistant Professor**, Purdue University, Krannert School of Management.
- 2019 **Research Associate**, University of Cambridge, Centre for Mathematical Sciences, Statistical Laboratory, under supervision of Prof. Richard Samworth.
- 2017–2019 **Fond. Math. Jacques Hadamard Post-doc Fellow**, ENSAE & l'École Polytechnique, Laboratory of Statistics, under supervision of Prof. Arnak Dalalyan.
- 2016–2017 **Post-doc Fellow**, Center for Mathematical Modelling - University of Chile, Optimization and Equilibrium group, under supervision of Prof. Alejandro Jofré.

### Education

- 2011–2015 **Ph.D. in Mathematics**, IMPA.
  - 1 year visit at the Center for Mathematical Modelling (CMM)
  - Qualifying oral exams: Optimization and Probability
  - **Ph.D. Thesis:** "*Stochastic variational inequalities: convergence and complexity analysis*," under supervision of Prof. Alfredo Iusem and Prof. Alejandro Jofré
- 2008–2010 **M.Sc. in Mathematics**, IMPA, under supervision of Prof. Marcelo Viana.
- 2002–2007 **B.Sc. in Electronics Engineering**, ITA, São José dos Campos, Brazil.
  - GPA: 84%, Class position: 5th out of 23 students, Exam admission rate: 1.58%, 131 out of 8287)
  - 1 year visit at the German Aerospace Center (DLR)
  - **B.Sc. Thesis:** "*Target separation in SAR image with the MUSIC algorithm*," under supervision of Dr. Rolf Scheiber (DLR)

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## Publications

- Generalized linear models with label contamination, **in preparation** (with Robert Bassett)
- Sample average approximation with heavier tails II: localization in stochastic convex optimization and persistence results for the Lasso, **under third round revision at Mathematical Programming** (with R.I. Oliveira).
- Sample average approximation with heavier tails I: non-asymptotic bounds with weak assumptions and stochastic constraints, **to appear at Mathematical Programming** (with R.I. Oliveira).
- Outlier-robust sparse/low-rank least-squares regression and robust matrix completion, arXiv:2012.06750, **revise and resubmit to Annals of Statistics**
- Restricted eigenvalue property for corrupted Gaussian designs, submitted, Submitted (with A. Dalalyan).
- Stochastic line-search for stochastic approximation: adaptation to Lipschitz constant, **Stochastic Programming Society Newsletter**.
- Outlier-robust estimation of a sparse linear model using  $\ell_1$ -penalized Huber's  $M$ -estimator, **NeurIPS 2019**, (with A. Dalalyan).
- Variance-based extragradient method with line search for stochastic variational inequalities, **SIAM Journal on Optimization**, (with A. Iusem, A. Jofre and R.I. Oliveira), *Winner of the 2019 Dupaková-Prekopá Student Paper Prize*.
- Incremental constraint projection methods for monotone stochastic variational inequalities, **Mathematics of Operations Research**, (with A. Iusem and A. Jofré).
- On variance reduction for stochastic smooth convex optimization with multiplicative noise, **Mathematical Programming** (with A. Jofré).
- Extragradient method with variance reduction for stochastic variational inequalities, **SIAM Journal on Optimization** (with A. Iusem, A. Jofré and R.I. Oliveira).
- Estimador MUSIC: resolvendo um problema de Probabilidade com Álgebra Linear, **Matemática Universitária**.
- Target separation in SAR image with the MUSIC algorithm, **Proceedings of the IEEE International Geoscience and Remote Sensing Symposium**, (with M. Nannini and R. Sheiber).

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## Referee service

- Annals of Statistics
- Computational Optimization and Applications
- Journal of the American Statistical Association
- Journal of Optimization Theory and Applications
- Journal of the Royal Statistical Society - Series B
- Journal of Machine Learning Research

- Electronics Journal of Statistics
- Management Science
- Mathematical Programming
- Operations Research
- Optimization Methods & Software
- Proceedings of Conference on Learning Theory (COLT)
- SIAM Journal on Optimization
- Set-valued and Variational Analysis

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## Honors & Awards

- 2019 Winner of the 2019 Dupaková-Prekopá Student Paper Prize.
- 2019 Research Associate position at University of Cambridge (hosted by PI with a EPSRC grant).
- 2017 Fondation Mathématique Jacques Hadamard Postdoctoral Fellowship laureation (international competition with 3 placements in the area of mathematics of information).
- 2010 Warwick Postgraduate Research Scholarship (respectfully declined), University of Warwick - UK.
- 2010 CAPES-Fulbright PhD scholarship (respectfully declined).
- 2007 Honors Mention in Mathematics (ITA).
- 2006 Research scholarship (for the best 3 students of ITA's Electronic Engineer class of 2006), German Aerospace Center.

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## Grants

- 2019 Travel Grant from University of Cambridge, NeurIPS 2019, Vancouver, Canada.
- 2019 Travel Grant from Universität Wien, Department of Statistics and Operations Research Seminar, Vienna, Austria.
- 2019 Travel Grant from IMPA, XIII Brazilian Workshop on Continuous Optimization, Rio de Janeiro, Brazil.
- 2019 Travel grant from ICERM-Brown University: Workshop on Optimization Methods for Computer Vision and Image Processing 2019, Providence, USA.
- 2019 Travel grant from Purdue University, Krannert School of Management, Quantitative Methods Seminar.
- 2019 Travel grant from London School of Economics, Department of Mathematics Seminar.
- 2018 Travel grant from CREST: 11th International Conference of the ERCIM WG on Computational and Methodological Statistics, Pisa, Italy.
- 2018 Travel grant from CREST: International Congress of Mathematicians (ICM) 2018 and XXII Brazilian School of Probability (EBP), Rio de Janeiro, Brazil.

- 2018 Travel grant from CREST: International Symposium on Mathematical Programming (ISMP) 2018, Bordeaux, France.
- 2017 Travel grant from CRM-IMPA: 1st CRM-IMPA Joint Workshop (Satellite Meeting of the Mathematical Congress of the Americas), Centre de Recherches Mathématiques, Montréal, Canada.
- 2017 Travel grant from CMM: SIAM Conference on Optimization, Vancouver, Canada.
- 2017 Travel grant from SAMSI: SAMSI Workshop on the Interface between Statistics and Optimization (WISO), Duke University, Durham, USA.
- 2017 Research visiting grant from IMPA: February, IMPA, Rio de Janeiro, Brazil.
- 2016 Research visiting grant from IMPA: May-June, IMPA, Rio de Janeiro, Brazil.
- 2016 Travel grant from IMPA: Workshop on Analysis and Applications of Stochastic Systems, Rio de Janeiro, Brazil.
- 2016 Research visiting grant from IMPA: Jan-Feb, IMPA, Rio de Janeiro, Brazil.
- 2016 Travel grant from IPAM-UCLA: IPAM-UCLA Workshop on Optimization and Equilibrium in Energy Economics, Los Angeles, USA.
- 2014 Travel grant from CIME-EMS: CIME-EMS Summer School, Cetraro, Italy, European Mathematical Society.
- 2008 Travel grant from CNPq: Second Symposium in Scattering and Spectral Theory, Serrambi, Brazil.

## Presentations

- 2022 Workshop “Robustness and Resilience in Stochastic Optimization and Statistical Learning: Mathematical Foundations” ([by invitation](#)) - Erice - Italy.

Sample of speakers:

- Ben Recht, University of California, Berkeley
- Steve Wright, University of Wisconsin
- Laurent El Ghaoui, University of California, Berkeley
- Jose Blanchet, Stanford University
- George Lan, Georgia Institute of Technology
- Jong-Shi Pang, University of Southern California
- Andrzej Ruszczyński, Rutgers University
- Darinka Dentcheva, Stevens Institute of Technology
- Georg Pflug, University of Vienna
- Suvrajeet Sen, University of Southern California
- Mahdi Soltanolkotabi, University of Southern California
- Dmitriy Drusvyatskiy, University of Washington
- Henry Lam, Columbia University
- Raghu Pasupathy, Purdue University
- Krishnakumar Balasubramanian, University of California, Davis
- Damek Davis, Cornell University

2022 2022 ICCOPT ([by invitation](#)) - Lehigh University - USA.

2021 2021 Purdue Probability Seminar ([by invitation](#)) - West Lafayette - USA.

2021 2021 SIAM optimization conference ([by invitation](#)) - Spokane - USA.

- 2021 BIRS Workshop: Optimization under Uncertainty: Learning and Decision Making (Online) ([by invitation](#)) - Banff - Canada.
- 2020 Guang Cheng's research group Statistics Seminar ([by invitation](#)) - Purdue University - West Lafayette - USA.
- 2019 NeurIPS 2019 - Vancouver - Canada.
- 2019 Universität Wien, Department of Statistics and Operations Research ([by invitation](#)) - Vienna - Austria.
- 2019 XIII Brazilian Workshop on Continuous Optimization ([by invitation](#)) - Rio de Janeiro - Brazil.
- 2019 Statmathappli 2019 - Fréjus - France.
- 2019 XV International Conference on Stochastic Programming ([by invitation](#)) - Trondheim - Norway ([Winner of the Dupaková-Prekopá Student Paper Prize](#)).
- 2019 Purdue University, Krannert School of Management - Quantitative Methods Seminar ([by invitation](#)) - West Lafayette - USA.
- 2019 London School of Economics, Department of Mathematics Seminar ([by invitation](#)) - London - UK.
- 2018 11th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics) ([by invitation](#)) - Pisa - Italy. Organizers: Guillaume Lecué, Matthieu Lerasle, Adrien Saumard.
- 2018 PGMO Days - Paris, Saclay - France.
- 2018 International Workshop Machine Learning and AI - Télécom ParisTech - Paris - France.
- 2018 XXII Brazilian School of Probability (EBP) - Rio de Janeiro - Brazil.
- 2018 International Symposium on Mathematical Programming (ISMP) ([by invitation](#)) - Bourdeaux - France. Chair: Jorge Nocedal (Northwestern). Some co-speakers: Léon Bottou, Frank Curtis, Jorge Nocedal, Uday Shanbhag, R. Bollapragada.
- 2018 CREST-CMAP ENSAE-École Polytechnique Statistics Seminar ([by invitation](#)) - Paris, Saclay - France. Organizers: Alexandre Tsybakov, Cristina Butucea, Éric Moulines and Mathieu Rosenbaum.
- 2017 PGMO Days - Paris, Saclay - France.
- 2017 31th Colóquio Brasileiro de Matemática ([by invitation](#)) - Rio de Janeiro - Brazil.
- 2017 SIAM Conference on Optimization - Vancouver - Canada.
- 2017 Optimization and Equilibrium, Two-days Workshop ([by invitation](#)) - Concepción - Chile.
- 2017 Workshop on Variational and Stochastic Analysis ([by invitation](#)) - Santiago - Chile.
- 2017 Workshop on the Interface of Statistics and Optimization (WISO), Poster - Durham - USA.
- 2016 XX Brazilian School of Probability - São Carlos - Brazil.
- 2016 International Conference on Stochastic Programming (ICSP) - Búzios - Brazil.

- 2016 Workshop on Analysis and Applications of Stochastic Systems ([by invitation](#)) - Rio de Janeiro - Brazil.
- 2015 Universidade Federal de São Paulo: Applied Mathematics Seminar - São José dos Campos - Brazil.
- 2015 Center for Mathematical Modelling: Optimization Seminar - Santiago - Chile.
- 2015 University of Southampton: CORMSIS Seminar - Southampton - UK.
- 2015 International Symposium on Mathematical Programming (ISMP) - Pittsburgh - USA.
- 2015 Instituto Nacional de Matemática Pura e Aplicada (IMPA): Optimization Seminar - Rio de Janeiro - Brazil.
- 2014 Instituto Nacional de Matemática Pura e Aplicada (IMPA): Optimization Seminar - Rio de Janeiro - Brazil.
- 2007 IEEE International Geoscience and Remote Sensing Symposium - Barcelona - Spain.
- 2006 German Aerospace Center (DLR), Institut für Hochfrequenztechnik und Radarsysteme - Oberpfaffenhofen - Germany.

## Conference Participation

- 2019 Estimation of entropies and other functionals: Statistics meets information theory - Cambridge - UK.
- 2018 Meeting in Mathematical Statistics 2018 - Fréjus - France.
- 2018 Horizon Math: Intelligence Artificielle - Paris - France.
- 2018 9ème Séminaire Itzykson “Computational and information-theoretic phase transitions in large-scale inference problems” by L. Massoulié, L. Zdeborova and A. Montanari - Paris - France.
- 2018 Journée AFIA-SFdS @ IHP - Paris - France.
- 2018 International Congress of Mathematicians (ICM) - Rio de Janeiro - Brazil.
- 2018 CRITEO Machine Learning in the Real World - Paris - France.
- 2018 LPSM Kick-off Conference - Paris - France.
- 2018 Workshop on Statistical Inference in Energy Markets - Institut Henri Poincaré - Paris - France.
- 2018 Statistics/Learning at Paris-Saclay (3rd Edition) at IHES - Bures-sur-Yvette - France.
- 2017 Journée francilienne d’accueil des Post-Doctorants at IHES - Bures-sur-Yvette - France.
- 2017 XXI Brazilian School of Probability - Rio de Janeiro - Brazil.
- 2017 1st CRM-IMPA Joint Workshop: Challenges at the interface of optimization and stochastic processes (Satellite Meeting of the Mathematical Congress of the Americas) - Montréal - Canada.
- 2017 School and Workshop Equilibria in Games: existence, selection and dynamics, Center for Mathematical Modeling, Uni. Chile - Santiago - Chile.

- 2016 XVIII CLAIO: Latin-Iberoamerican Conference on Operations Research, PUC - Santiago - Chile.
- 2016 Workshop on Analysis and Applications of Stochastic Systems, IMPA - Rio de Janeiro - Brazil.
- 2016 Coloquio Optimización A mediodía de Optimización y análisis variacional, Center for Mathematical Modeling - Santiago - Chile.
- 2016 Coloquio Optimización A mediodía de Optimización y análisis variacional, Center for Mathematical Modeling - Santiago - Chile. Speakers: D. Bertsekas, A. Dontchev and R.T. Rockafellar.
- 2016 Workshop on Optimization and Equilibrium in Energy Economics (IPAM-UCLA) - Los Angeles - USA.
- 2014 High Dimensional Phenomena in Probability, Statistics and Signal Processing, IMPA - Rio de Janeiro - Brazil. Speakers: A. Bandeira, A. Belloni, R. I. Oliveira, H. Rauhut, E. Richard and J. Tropp.
- 2014 Optimization meets General Equilibrium theory, dynamic contract and finance, CMM - Santiago - Chile.
- 2014 Centralized and Distributed Multi-agent Optimization: Models and Algorithms, Centro Internazionale Matematico Estivo/European Mathematical Society Summer School - Cetraro - Italy. Organizers: F. Facchinei and J-S. Pang.
- 2014 International Symposium in Generalized Convexity and Monotonicity, IMPA - Rio de Janeiro - Brazil.
- 2014 2nd International Conference on Variational Analysis and Optimization, CMM - Santiago - Chile.
- 2013 XI International Seminar on Optimization and Related Areas - Lima - Peru.
- 2012 IX Brazilian Workshop on Continuous Optimization - Luiz Correa - Brazil.
- 2012 International Symposium on Mathematical Programming - Berlin - Germany.
- 2012 International Conference on Frontiers of Mathematics - Rio de Janeiro - Brazil.
- 2009 27th Colóquio Brasileiro de Matemática - Rio de Janeiro - Brazil.
- 2009 Conferência em Homenagem ao Prof. Elon Lima em ocasião aos seus 80 anos - Rio de Janeiro - Brazil.
- 2009 Encontro Matemática Brasil-Franca - Rio de Janeiro - Brazil.
- 2009 Conferência em Homenagem ao Prof. Elon Lima em ocasião aos seus 80 anos - Rio de Janeiro - Brazil.
- 2008 Second Symposium on Scattering and Spectral Theory - Recife - Brazil.
- 2008 AMS - SBM First Joint Meeting - Rio de Janeiro - Brazil.
- 2007 26th Colóquio Brasileiro de Matemática - Rio de Janeiro - Brazil.

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## Teaching Experience

Spring 2022 **Assistant Professor**, MGMT 69000 - Stochastic Iterative Algorithms (PhD level), Purdue University, Krannert School of Management, West Lafayette, USA.

- Spring 2022 **Assistant Professor**, MGMT 30500 - Business Statistics (undergraduate level), Purdue University, Krannert School of Management, West Lafayette, USA.
- Summer 2021 **Assistant Professor**, MGMT 5900 - High-Dimensional Data Analysis (masters level), Purdue University, Krannert School of Management, West Lafayette, USA.
- Summer 2021 **Assistant Professor**, MGMT 5900 - High-Dimensional Data Analysis (masters level), Purdue University, Krannert School of Management, West Lafayette, USA.
- Spring 2021 **Assistant Professor**, MGMT 30500 - Business Statistics (undergraduate level), Purdue University, Krannert School of Management, West Lafayette, USA.
- Fall 2020 **Assistant Professor**, MGMT 69900 - Research PhD thesis (PhD level), Purdue University, Krannert School of Management, West Lafayette, USA.
- Summer 2020 **Assistant Professor**, MGMT 69900 - Research PhD thesis (PhD level), Purdue University, Krannert School of Management, West Lafayette, USA.
- Spring 2020 **Assistant Professor**, MGMT 30500 - Business Statistics (undergraduate level), Purdue University, Krannert School of Management, West Lafayette, USA.
- Spring 2020 **Assistant Professor**, MGMT 59000 - PhD Seminar: High-dimensional Statistics and Stochastic Optimization (PhD level), Purdue University, Krannert School of Management, West Lafayette, USA.
- 2018 **Fond. Math. Jacques Hadamard Post-doc Fellow**, PhD Seminar, ENSAE, Laboratory of Statistics, Palaiseau, Paris Area, France.
- 2016 **Post-doc Fellow**, Optimization Methods, Center for Mathematical Modelling, IMPA, Rio de Janeiro, Brazil.
- 2014 **PhD Student TA**, Statistical Methods, IMPA, Rio de Janeiro, Brazil.
- 2014 **PhD Student TA**, Computational Methods in Optimization, IMPA, Rio de Janeiro, Brazil.

## Course Project

### o MGMT 59000 - Multivariate Analysis for Business

Designing a course for the BAIM program in Krannert School's masters program. This course will complement the Data Mining, Machine Learning and Predictive Analytics courses of the BAIM program with additional celebrated methods and algorithms used in machine learning and statistics for the analysis of large data sets.

### o MGMT 59000 - Stochastic iterative methods

Designing a full semester PhD course on stochastic gradient descent and its variants. This will include personal lecture notes and bibliography survey. Motivated students will be encouraged and suggested open questions oriented towards possible publications.

## Complementary education

- 2015 Mini-course: Introduction to Asymptotic Geometric Analysis, Lecturer: C. Hugo Jimenez, IMPA.



- 2014 Centralized and Distributed Multi-agent Optimization: Models and Algorithms, CIME-EMS Summer School in applied mathematics. Speakers: Zhi-Quan Luo, Angelia Nédic, J.-S. Pang and G. Scutari.
- 2014 Mini-course: Randomness, Matrices and High Dimensional Problems, Lecturers: A.Bandeira and R. Oliveira, 10th Regional Meeting on Probability and Mathematical Statistics, IMPA.
- 2014 Mini-course: High-dimensional estimation: Econometric models, Lecturer: A. Belloni, 10th Regional Meeting on Probability and Mathematical Statistics, IMPA.
- 2014 Mini-course: Concentration inequalities with applications, Lecturer: G. Lugosi, 10th Regional Meeting on Probability and Mathematical Statistics, IMPA.

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## Languages

- **English:** Fluent
- **Portuguese:** Native
- **Spanish:** Professional Level
- **French:** A1/A2

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## Computing skills

- **R:** fair
- **Latex:** fair
- **Excel:** basic
- **Minitab:** basic