

POSITION & CONTACT INFORMATION	<b>Lecturer</b> ( $\simeq$ US Assistant Professor)  School of Mathematics University of Bristol, UK Office 2.13, Fry Building	October 2018 – Date Open-ended Contract  <a href="mailto:farhad.babae@bristol.ac.uk">farhad.babae@bristol.ac.uk</a> <a href="http://bristol.ac.uk/maths/people/farhad-babae">bristol.ac.uk/maths/people/farhad-babae</a>
PAST POSITIONS	<b>Postdoctoral Research Fellow</b> Département de Mathématiques Université de Fribourg, Switzerland  <b>Postdoctoral Research Fellow</b> Département de Mathématiques et applications, Ecole Normale Supérieure Paris, France  <b>Postdoc / Research Assistant Professor</b> Department of Mathematics and Statistics Concordia University, Montréal, Canada	October 2016 - August 2018  September 2015 - August 2016  September 2014 - August 2015
RESEARCH INTERESTS	• Approximability problems in the Theory of Currents and Tropical Geometry • Holomorphic Dynamics • Stratified Morse Theory • Stratified Morse Theory • Geometry of Amoebas • Geometric and Topological Data Analysis	
EDUCATION	<b>Université de Bordeaux, France – Università di Padova, Italy</b> Ph.D. in Pure Mathematics, funded by ALGANT‡ consortium, February 2011 – July 2014 <ul style="list-style-type: none"> <li>• Dissertation Title: Complex Tropical Currents</li> <li>• Advisors: Prof. Alain Yger (Bordeaux), Prof. Andrea D'Agnolo (Padova)</li> <li>• Note: Très Honorable (Highest honours)</li> </ul> <b>Universiteit Leiden, Holland – Università di Padova, Italy</b> M.Sc. in Mathematics, under ALGANT consortium, September 2008 – September 2010 <ul style="list-style-type: none"> <li>• Thesis Title: Integral Transforms of Constructible Functions</li> <li>• Advisor: Prof. Andrea D'Agnolo</li> <li>• Note: 110/110</li> </ul> <b>Sharif University of Technology, Iran</b> M.Sc. in Mathematics, October 2004 – January 2007 <ul style="list-style-type: none"> <li>• Thesis Title: Global Dynamics of Certain ODE Models in Population Biology</li> <li>• Advisor: Prof. Mohammad Reza Razvan</li> </ul> <b>University of Tehran, Iran</b> Bachelor of Mathematics, October 2000 – September 2004	

\*Full family name: Babae Ghasemabadi

†Last update: January 16, 2024.

‡[www.algant.eu](http://www.algant.eu)

CERTIFICATES	October 2021	MIT Schwarzman College of Computing, online certificate on <i>Data Science and Machine Learning: Making Data-Driven decisions</i> , an eight-week-long course
	2018–ongoing (expected 2022)	CREATE: Staff Development Scheme
	Fall 2017	InnoSuisse (CTI) Entrepreneurship & Start-Up Training, Fribourg. Organized by Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
HONORS AND AWARDS	2015–2016	Postdoctoral Grant from the Laboratory of Excellence of Paris Sciences & Lettres
	2011–2014	ALGANT-DOC's grant, full funding for PhD studies in mathematics.
	2008–2010	ALGANT Masters Scholarship, Erasmus Mundus Scholarship of €42,000 for two years
	March 2004	Rank 12, among all 8500 participants holding BSc degree in Mathematics, Iranian National Entrance Examination for Masters degree, Held by Sazman Sanjesh Institute, Iran.
	April 2002 & 2003	Two Bronze medals of the Iranian National Mathematics competitions for University Students, Held by Iranian Mathematical Society, Iran.
	August 2003	Honorable Mention, International Mathematics Competitions, Cluj-Napoca, Romania. (IMC 2003)

TEACHING  
EXPERIENCE

2022–2023	Lecturer and Director of Algebraic Geometry, University of Bristol • Masters course • Designing new module • 10 students in total • Writing the lecture notes • Delivering the lectures in-person or pre-recorded or live online as required
2018–2022	Lecturer of Linear Algebra TB2, University of Bristol • Teaching mode: face-to-face/live online/pre-recorded videos • Devised Online Discussion Forums • Made extracurricular videos discussing the applications • Liaised with total of $\approx 40$ tutors • Devised PollEverywhere for interactive Problem Class • Course director in 2020 and 2021 • Total of $\approx 1500$ students • Devised interactive non-assessed daily quizzes • Set online three assessed quizzes • Set final written exam, and liaised with internal and external exam checkers • Made a few extra-curricular videos on applications of Linear Algebra in Machine Learning and Graph Theory
2018–2022	Tutor of 20 Linear Algebra tutorial classes, University of Bristol. Total of $\approx 300$ students.
2020–2022	Lecturer of Mathematical Investigations, University of Bristol, this first-year course content includes <ul style="list-style-type: none"> <li>• Discussing time management, teamwork, careers in mathematics</li> <li>• Teaching <math>\text{\LaTeX}</math></li> <li>• Supervised introductory projects on <ul style="list-style-type: none"> <li>– Machine Learning – Game Theory – Hypothesis Testing</li> <li>– Statistics in society – Voting Systems – Cryptography</li> </ul> </li> <li>• Total of <math>\approx 26</math> students</li> <li>• Assessment based on two group project reports</li> </ul>
2016–2018	Teaching Assistant (in English and French) Analysis III, IV Université de Fribourg, Switzerland. Course content included Complex Analysis, Analysis in several variables, Integration on Manifolds, Total of $\approx 60$ students.
2014–2015	Instructor of Math 208: An introductory course on Linear Algebra and Finance, University of Concordia, Montreal, Canada. Total of $\approx 120$ students.
2002–2008	Instructor of Problem Solving Strategies for Highschool Students (Preperations for IMO), Tehran.
2007–2008	Instructor for Foundations of Mathematics, Calculus, Alamé Tabataba-ii University, Iran.
Fall 2004	Instructor for Combinatorics and Linear Algebra Problems of International Mathematics Competitions for University Students (IMC) University of Tehran, Iran.

*Dynamical tropicalisation*, Journal of Geometric Analysis, A Special Edition in Memory of Nessim Sibony. **33**, 74. (2023).arXiv:2112.09112

with Karim Adiprasito (Einstein Institute of Mathematics/Copenhagen), *Convexity of complements of tropical varieties, and approximations of currents*, Math. Ann. (2019), 373: 237. arXiv:1711.02045

with June Huh (Princeton), *A tropical approach to a generalized Hodge conjecture for positive currents*, Duke Mathematical Journal **166** (2017), 2749-2813. arXiv:1502.00299

**Related Event.** *A two-day workshop on works of Babaee-Huh*, Centre de Mathématique Laurent Schwartz, Ecole Polytechnique, France. (September 2015)  
<http://www.math.polytechnique.fr/~favre/Babaee-Huh.html>

### Work in Progress

with Tien-Cuong Dinh (National University of Singapore), *Intersection theory of tropical currents*

with Tien-Cuong Dinh (National University of Singapore), *Dynamical tropicalisation for families, and lifting tropical intersections*

with Roberto Gualdi (Regensburg), *Cohomological implications of dynamical tropicalisation*

with Roberto Gualdi (University of Regensburg) and Daniele Turchetti (University of Warwick), *Dynamical Tropicalisation on Berkovich Spaces*

with Sean Dewar (University of Bristol) and James Maxwell (University of Bristol), *Tropical Extremality, Rigidity, and Graphical Networks*,

with Karim Adiprasito (Einstein Institute of Mathematics/Copenhagen), *Henriques Conjecture on Convexity of Complements of Amoebas*

with Alexander Rashkovskii (University of Stavanger) and Yue Ren (University of Durham), *Computational aspects of dynamical tropicalisation*

## PROFESSIONAL ACTIVITIES

Referee	Transactions of AMS Proc. of the London Mathematical Society Math. Zeitschrift
Reviewer	zbMATH Mathematical Reviews (MathSciNet)
Organizer	with James Maxwell, LMS Tropical Meeting in Bristol

Cohomology of toric arrangement complement III, Heilbronn Focused Research Workshop, Budget £4,500, 6 Participants – July 2022

Cohomology of toric arrangement complement II, Focused Research Workshop, Queen Mary University of London

with Kevin Grace, Cohomology of toric arrangement complement I, Heilbronn Focused Research Workshop, Budget £10,000 (September 2019). More info: <https://sites.google.com/view/toric-bristol/home>

Mini-course on Combinatorial Hodge Theory, by Omid Amini, University of Fribourg (October 2017)

## SUPERVISION

### Masters

- co-supervised with Tobias Kley (University of Göttingen), Shashwat Upadhyay, Department of Mathematical Engineering *Empirical Analysis of Forecasting Techniques for Prices of Tradable Financial Assets*
- co-supervised with Tobias Kley (University of Göttingen), Sneha Ramesh, Department of Mathematical Engineering *COVID-19 Spread: Comparative study of forecasting techniques from Traditional time series models to Machine Learning models*
- Max Jaworski, *Real Algebraic Geometry and Viro's Patchworking*, 2020.
- Jack Southgate, *Toric and Tropical Geometry*, 2020. Now PhD student at St. Andrews University

### Undergraduate

- Arun Steward, *Tropical geometry in Neural Networks*, 2021
- Joshua Cowling, *Tropical Geometry, Amoebas, and Complexity Theory*, 2020

### Summer Projects

- Ruta Sliazkaite, *Quantile Regression and Tropical Geometry*, co-supervision with Tobias Kley, Summer 2020.

### PhD

- Danny Williams, COMPASS CDT mini-project, *Probability density estimation on a Riemannian manifold*, co-supervision with Song Liu, 2021
- MENTORING PHD STUDENTS
- Xichen Chao • Luke Neville • Alberto Toffano • Emilia Alvarez
  - Peter Bradshaw • Alec Chamberlain Cann • Jordan Frost
  - Ian Gallagher • Christopher Jones • Alex Little (Graduated in October 2021)
- SELECTED TALKS/INVITATIONS
- Tropical Geometry from Complex Dynamics Standpoint*, Conference on Recent Developments in Algebraic Geometry, Arithmetic and Dynamics, National University of Singapore, Singapore (August 2023)
- Dynamical tropicalisation*, University of Warwick, UK (June 2023)
- Dynamical tropicalisation*, University of Bristol, UK (May 2023)
- Dynamical tropicalisation*, University of King's College of London, UK (March 2023)
- Dynamical tropicalisation*, National University of Singapore, Singapore (August 2022)
- Dynamical tropicalisation*, Tropical Mathematics & its Applications/London Mathematical Society meetings, Durham, UK (May 2022)
- Dynamical tropicalisation*, Bristol's Ergodic Theory and Dynamical Systems Seminars, Bristol, UK. (March 2022)
- Dynamical tropicalisation*, Latin American Geometria Algebraica Real y TrOpical Seminar (LAGARTOS), Online Seminars, (March 2022), Recording on BlueJeans
- Tropical currents*, Quantitative aspects in complex analysis, geometry and dynamics, University of Lille (Hybrid), France. (October 2021)
- Tropical Geometry via Currents*, University of Isphahan, Iran (December 2019)
- Approximability of tropical currents*, University of Swansea, UK (December 2018)
- Two Lectures on Tropical Currents and Toric Varieties*, Université Paris-Sud, Orsay, France (May 2018)
- Tropical currents*, Séminaire de topologie, géométrie et algèbre, Université de Nantes, France (May 2017)
- Tropical currents*, *Winter School on Geometry*, Algebra and Combinatorics of Moduli Spaces and Configurations, Toblach, Italy (February 2017)
- Tropical intersection theory*, Bern-Fribourg-Neuchatel Intercity Seminars, Bern, Switzerland (November 2016)
- A tropical approach to a generalized Hodge conjecture for positive currents*, 7th European Congress of Mathematics, Mini-Symposium, Berlin, Germany. (July 2016)

*A tropical approach to a generalized Hodge conjecture for positive currents*, Seminario Geometria Algebraica, University of Barcelona, Spain. (April 2016)

*On approximability of extremal tropical currents*, Séminaire Géométrie, University of Bordeaux, France. (March 2016)

*Complex tropical currents*, Weekly Seminars on Arrangements: Combinatorics & Topology, University of Fribourg, Switzerland. (January 2016)

*On approximability of extremal tropical currents*, Géométrie et Théorie des Modèles, Monthly Seminars, Ecole Normale Supérieure, Paris, France. (January 2016)

*On approximability of extremal tropical currents*, Analyse et Géométrie, Department of Mathematics of Pierre and Marie Curie University, Paris, France. (January 2015)

*A tropical approach to the strongly positive Hodge conjecture*, Università degli Studi di Padova, Italy. (November 2015)

*A tropical approach to the strongly positive Hodge conjecture*, Weekly Seminars in Tropical Geometry, Department of Mathematics of Pierre and Marie Curie University, Paris, France. (October 2015)

*A non-approximable tropical current*, Ecole Normale Supérieure, Paris, France. (September 2015)

*Complex Tropical Currents*, PhD defense, Université de Bordeaux, France. (June, 11, 2014)

*Combinatorics of extremal currents*, Séminaire Géométrie, Université de Bordeaux, France (June 2014)

*Complex Tropical Currents*, Università di Padova, Italy. (February 2014)

*Amoebas and Coamoebas*, ALGANT-DOC annual meeting, Université de Bordeaux, France. (February 2012)

*Geometry of Amoebas*, Geometry Workgroup, Université de Bordeaux, France. (October 2012)

*Integral transforms of constructible function*, Masters thesis discussion, Università di Padova. (September 2010)

*Global Analysis of Certain Models in Biology*, Sharif University of Technology, Iran. (January 2007)

*Geometrical Aspects in Stability Analysis*, Sharif University of Technology, Iran. (September 2006)

*Discrete Laplacian*, University of Tehran, Iran, (March 2006)

*Cycle Index and Applications to Graph Theory*, Sharif University of Technology, Iran. (March 2005)

*A Topological Proof for van der Waerden Theorem*, Sharif University of Technology, Iran. (January 2005)

*A Proof of Bruck-Ryser Theorem in Combinatorics*, University of Tehran, Iran. (June 2003)

*A Proof of Matrix-Tree Theorem*, University of Tehran, Iran. (November 2002)

*Symbolic Dynamics and Entropy*, University of Tehran, Iran. (June 2002)

*Graph Compositions and Combinatorics of Words*, Iranian Annual Seminars in Mathematics, University of Shiraz, Iran. (April 2002)

ADMINISTRATIVE  
DUTIES

- Library representative for the School of Mathematics

RELEVANT  
SKILLS

Languages:    Farsi:    Native  
                  English: Fluent  
                  French:    Upper Intermediate, B1-B2 (European Framework)  
                  Italian:    Basic, A1-A2 (European Framework)

Softwares:      $\text{\LaTeX}$ , Python, Maple, Matlab, C++