Giovanni Barbarino

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EXECUTIVE SUMMARY
: Postdoc researcher in Mathematics at UMONS, Faculté Polytechnique, Mathematics and Operational Research Unit. Fifteen published articles and nine preprints. Advanced knowledge of linear algebra, clustering methods for community detection, perturbation theory on matrices, asymptotic symbols for matrix sequences, analysis of structured linear systems, spectral theory of random matrices and signal processing, acquired during work for master degree, Ph.D. and research activity.

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: 0000-0003-0504-7361

WEB OF SCIENCE RESEARCHERID
: P-2201-2019

EDUCATION AND RESEARCH

2023 – present — **Postdoc Researcher in Mathematics at UMONS,**
Faculté Polytechnique de Mons,
Mathematics and Operational Research Unit.

2020 – 2023 — **Postdoc Researcher in Mathematics at Aalto University, Helsinki.**
Department of Mathematics and Systems Analysis.

2016 – 2020 — **Ph.D. in Mathematics at Scuola Normale Superiore, Pisa.**
Thesis: *Spectral symbols for matrix sequences*,
Advisor Prof. Stefano Serra-Capizzano, co-Advisor prof. Michele Benzi.

2011 – 2016 — **Master Degree at Scuola Normale Superiore, Pisa.**
4th year colloquium: *Quasi-Birth and Death Stochastic Processes with an infinite number of phases: asymptotic decay properties*,
Advisor Prof. Beatrice Meini.

2014 – 2016 — **Master Degree in Mathematics at University of Pisa.**
Thesis: *Nonnegative Matrix Factorization: Theory with an application to translations invariant image processing*,
Advisor Prof. Luca Gemignani, Co-advisor Prof. Luca Romani
Final grade: 110/110 with honours.

2011 – 2014 — **Bachelor Degree in Mathematics at University of Pisa.**
Expander Graphs: Spectral Properties and Applications,
Advisors Prof. Dario Andrea Bini
Final grade: 110/110 with honours.

GRANTS AND FUNDS

Jun 2023 — Conference Support for Foundations of Computational Mathematics FoCM in Paris.
Jun 2023 — ILAS LAA Early Career Award, Early Career Speakers for the 25th ILAS Conference.

Feb 2022 – Jan 2023   Grant awarded by Alfred Kordelinin säätiö, Finland, no. 210122

Project: *Decorrelation Methods for Multi-Input Nonstationary Signals.*

PUBLICATIONS

Sep 2023   *On the Rellich eigendecomposition of para-Hermitian matrices and the sign characteristics of ∗-palindromic matrix polynomials* j/w Vanni Noferini, Linear Algebra and its Applications.

Nov 2022   *On role extraction for digraphs via neighborhood pattern similarity* j/w Paul Van Dooren and Vanni Noferini, Physical Review E.

Aug 2022   *Conjectures on spectral properties of ALIF algorithm*, j/w Antonio Cicone, Linear Algebra and Its Applications.

Jul 2022   *An extension of the theory of GLT sequences: sampling on asymptotically uniform grids*, j/w Carlo Garoni, Linear and Multilinear Algebra.

Jun 2022   *Rectangular GLT sequences* j/w Carlo Garoni, Mariarosa Mazza, Stefano Serra-Capizzano, Electronic Transactions on Numerical Analysis.

Feb 2022   *The limit empirical spectral distribution of Gaussian monic complex matrix polynomials*, j/w Vanni Noferini, Journal of Theoretical Probability.

Dec 2021   *Constructive monotone rearrangement of almost everywhere continuous functions through quasi-uniform samples.* j/w Davide Bianchi and Carlo Garoni, Expositiones Mathematicae.

Sep 2021   *The limit empirical spectral distribution of complex matrix polynomials*, j/w Vanni Noferini, Random Matrices: Theory and Applications.

Sep 2021   *A systematic approach to reduced GLT*, BIT Numerical Mathematics

Mar 2020   *Non-Hermitian perturbations of Hermitian matrix-sequences and applications to the spectral analysis of approximated PDEs*, j/w Stefano Serra-Capizzano, Numerical Linear Algebra with Applications.

Jan 2020   *Block Generalized Locally Toeplitz Sequences: Theory and Applications in the Multidimensional Case* j/w Stefano Serra-Capizzano and Carlo Garoni, Electronic transactions on numerical analysis.

Jan 2020   *Block Generalized Locally Toeplitz Sequences: Theory and Applications in the Unidimensional Case* j/w Stefano Serra-Capizzano and Carlo Garoni, Electronic transactions on numerical analysis.

Feb 2019   *Spectral Measure*, Proceedings of Cortona Meeting, Springer INdAM Series.

Dec 2017   *From convergence in measure to convergence of matrix-sequences through concave functions and singular values*, j/w Carlo Garoni, Electronic Journal of Linear Algebra.

Sep 2017   *Equivalence between GLT sequences and measurable functions*, Linear Algebra and its Applications.

Dic 2016   *Grafi Expanders: Proprietà Spettrali e Applicazioni*, Edizioni Accademiche Italiane.

PREPRINTS

Apr 2023   *Properties and Structure of the Analytic Singular Value Decomposition*, j/w Stephan Weiss, Ian Proudler, Jennifer Pestana, John G. McWhirter.

Jul 2022   *Theoretical results for eigenvalues, singular values, and eigenvectors of (flipped) Toeplitz matrices and related computational proposals*, j/w Ekström Sven-Erik, Stefano Serra-Capizzano, Paris Vassalos.

Nov 2021   *Stabilization and Variations to the ALIF Algorithm: the Fast Resampled Iterative Filtering Method* j/w Antonio Cicone.

Aug 2021   *Matrix-less eigensolver for large structured matrices* j/w Melker Claesson, Ekström Sven-Erik, Carlo Garoni, David Meadon, Technical Report, Uppsala University.

Jul 2018   *Notes on asymptotic eigenvalues distribution on complex circles*.

Aug 2018	*Conjectures on Perturbations of Hermitian Sequences*.
Jun 2018	*Normal Form for GLT Sequences*.
Oct 2017	*Diagonal Matrix Sequences and their Spectral Symbols*.
Aug 2016	*Permutation NMF*.

TALKS AND PRESENTATIONS

Sep 2023	*The Fast Resampled Iterative Filtering Method* - XXII Congresso dell'Unione Matematica Italiana (Pisa).
Jun 2023	*Role Extraction for Digraphs via Neighbourhood Pattern Similarity* - Invited Speaker at Foundations of Computational Mathematics FoCM (Paris).
Jun 2023	*On the eigendecomposition of para-Hermitian matrices* - 25th Conference of the International Linear Algebra Society ILAS (Madrid).
May 2023	*New stability results for IF Methods* - Invited Speaker at Mathematics for Signal processing and Applications in Geophysics and other fields MaSAG23 (Rome).
May 2023	*Reduced GLT and Applications* - Numerical Linear Algebra Days (L'Aquila).
Feb 2023	*On the Rellich eigendecomposition of para-Hermitian matrices on the unit circle* - Online SEminar on Linear algebra and Operator Theory OSELOT, online
Jun 2022	*Approximation of the Laplace-Beltrami operator by its symbol* - Linear Algebra, Matrix Analysis, and Applications j/w Due giorni di Algebra Lineare Numerica (Alcalá de Henares).
Apr 2022	*The limit empirical spectral distribution of complex matrix polynomials* - Nordic numerical linear algebra meeting 2022 (Helsinki).
Jul 2021	*Iterative Filtering Algorithms* - Invited Speaker at Mathematics for Nonstationary Signals and applications in Geophysics and other fields (L'Aquila).
Nov 2020	*The limit empirical spectral distribution of complex matrix polynomials* - Communications in NLA, online.
Oct 2019	*Symbols for matrix-sequences: Application-Driven Structure* - University of Aalto.
Nov 2018	*Higher order spectral symbols and eigenvalues approximation for Toeplitz matrices* - University of Pisa.
Feb 2018	*Perturbations of Hermitian Matrices and Applications to Spectral Symbols* - Two days of Linear Algebra and Applications (Padua).
Oct 2017	*Generalized Locally Toeplitz Sequences: a Link between Measurable Functions and Spectral Symbols* and *Ordering the Eigenvalues: GLT Symbols and Spectral Measures* - Como, University of Insubria.
Jul 2017	*Equivalence between GLT sequences and measurable functions* - CIME-EMS Summer School on Splines and PDEs (Cetraro).
Aug 2016	*Permutation NMF* - Rome-Moscow Summer School.

OTHER CONFERENCES

Feb 2019	Two days of Linear Algebra and Applications (Rome).
Jan 2019	Intelligent Machines and Mathematics (Bologna).
Feb 2018	GNCS Indam Assembly (Montecatini).
Sep 2017	INdAM Meeting Structured Matrices in Numerical Linear Algebra: Analysis, Algorithms and Applications (Cortona).
Jul 2017	FoMICS Summer school, (Lugano).
Feb 2017	Two days of Linear Algebra (Como).

Jul 2011	*International Mathematical Summer School* for talented students in their last two years of high school. The program featured plenary talks and mini-courses by leading international mathematicians at Jacobs University.

TEACHING AND VISITING

2022	Co-advisor for Bachelor Thesis.
2020	TA for the course "Combinatorial Network Analysis" at Aalto University.
2019 – 2020	Visiting PhD at Department of Mathematics and Systems Analysis, Aalto University, Helsinki, Finland, 09/09/2019-09/02/2020 Host: Prof. Vanni Noferini.
2017 – 2019	Teacher at Stages of preparation for Mathematics Olympiad for UMI. I have taught kids from 13 to 19 years old and I have held lessons for high school teachers.
2017/2018	Visiting to University of Insubria, Department of Science and High Technology, Como, Italy, 22/10/2017-25/10/2017, 10/11/2017-15/11/2017, 11/12/2017-20/12/2017, 25/09/2018-06/10/2018. Host: Prof. Stefano Serra-Capizzano.
2017	Visiting to University of Perugia, Department of Mathematics and Computer Science, Perugia, Italy, 20/10/2017-22/10/2017. Host: Prof. Bruno Iannazzo.
2016 – 2017	Tutor, Scuola Normale Superiore, Pisa. I have tutored students in their first year of university.

REFEREE WORK AND MEMBERSHIPS

	Reviewer at ZbMATH (Zentralblatt MATH), MathSciNet and for scientific journals:
	Applied and Computational Harmonic Analysis
	Linear and Multilinear Algebra
	Electronic Journal of Linear Algebra
	Applied Mathematics and Computation
	Journal of Mathematics
	Mathematical Methods in the Applied Sciences
	BIT Numerical Mathematics
	SIAM Journal on Matrix Analysis and Applications (SIMAX)
2023 – present	Member of Unione Matematica Italiana (UMI).
2019 – present	Member of SIAG on Linear Algebra (SIAM).
2018 – present	Member of GNCS Indam (Italian Scientific Computing National Group).
2011 – present	Organizer of National Mathematics Olympiad for UMI.
	Preparation and evaluation of tests at several levels (local and national).

PERSONAL SKILLS

Languages	Italian: mother tongue.
	English: advanced (C1).
Computer skills	- software development (Phyton, C/C++, OCaml, Qtcreator, Javascript);
	- website development (HTML, CSS, Wordpress);
	- mathematical software (Mathematica, MATLAB, Octave, Singular, CoCoA, Fortran);
	- document preparation, especially for scientific works (LaTeX, Word, Excel, Jupyter).

PERSONAL INTERESTS

2015 – present	I'm interested in developing software for artificial intelligence.
Sports	I am a swimmer and an amateur chess player.

Awards   – Italian Mathematical Olympiad, Gold medal (2009 and 2011), Silver medal (2008 and 2010).

– Kangaroo (mathematical italian competition), First place (2009).

– Mathematical Games of Bocconi (mathematical italian competition), First place(2010), Third place(2009).

– "Albo Nazionale delle Eccellenze - Albo dei Diplomati con 100 e lode": National registry for perfect mark 100/100 with honours in high school.

– "Albo Nazionale delle Eccellenze - Albo dei Premiati in competizioni": National registry for prizes in 12 mathematics, physics and computer science competitions .