
Personal data

- **Born** January 1, 1983 in Treviglio (BG), Italy. Italian citizen.
- **Current work address** Dipartimento di Informatica; L.go Pontecorvo, 3; 56127 Pisa; Italy.
- **Contact info** E-mail: fpoloni@di.unipi.it.

Academic positions

- 2017–present **Professore associato**, *University of Pisa, department of Computer Science*, Pisa, Italy.
- 2012–2017 **Ricercatore universitario**, *University of Pisa, department of Computer Science*, Pisa, Italy. Research-oriented position at the assistant professor level. Permanent after a tenure-track period ended in 2014.
- 2011–2012 **A. von Humboldt Postdoctoral Fellow**, *Technische Universität Berlin, institute of Mathematics*, Berlin, Germany.
Info: http://en.wikipedia.org/wiki/Humboldt_Foundation.
- 2011 **Wissenschaftlicher Mitarbeiter**, *Technische Universität Berlin, institute of Mathematics*, Berlin, Germany.
Temporary research assistant position.

Education

- 2008–2010 **Perfezionamento (Ph.D.) in Mathematics**, *Scuola Normale Superiore*, Pisa, Italy.
Thesis *Algorithms for Quadratic Matrix and Vector Equations*.
Advisors D. A. Bini and B. Meini.
Legally equivalent to a European PhD and to the Italian title of *dottore di ricerca*.
- 2002–2008 **Diploma del corso ordinario**, *Scuola Normale Superiore*, Pisa, Italy.
Five-year honours programme, complementing the bachelor/master studies at the University of Pisa. The Scuola Normale is a public higher learning institution on the model of the French *grandes écoles*.
Info: http://en.wikipedia.org/wiki/Scuola_normale.
- 2005–2007 **Laurea Specialistica (M.Sc.) in Mathematics**, *Università di Pisa*, Pisa, Italy.
- 2002–2005 **Laurea (B.Sc.) in Mathematics**, *Università di Pisa*, Pisa, Italy.

Research interests

Field: numerical linear algebra. Main topic: **matrix equations: numerical algorithms** for their solution and theoretical aspects. In particular, **algebraic Riccati equations** and other nonlinear equations related to generalized eigenvalue and invariant subspace problems.

After my studies in pure and computational mathematics, I have expanded my horizons by participating in **multidisciplinary collaborations** with several researchers from **applications** in which these equations appear (**control theory**, applied probability and **queuing theory, econometric time series**), getting familiar with the problems and language of these fields.

Publications

Over 30 papers in peer-reviewed journals, including top journals in the field such as Mathematics of Computation, Numerische Mathematik, SIAM Journal on Matrix Analysis and Applications.

Scopus profile: <http://www.scopus.com/authid/detail.url?authorId=56071560300>.
Researcherid (Thomson Reuters): <http://www.researcherid.com/rid/G-9700-2012>
Google Scholar: <https://scholar.google.com/citations?user=Sc-AccMAAAAJ>.
One **research book** based on my PhD thesis: *Algorithms for Quadratic Matrix and Vector Equations* <http://www.springer.com/it/book/9788876423833>.

Other scientific activities

Conference organization

- 2019 **10th International Conference on Matrix-Analytic Methods in Stochastic Models (MAM)**, Hobart, Australia, Program co-chair. (upcoming)
- 2017 **7th Workshop on Matrix Equations and Tensor Techniques (METT)**, Pisa, local organizing committee.
- 2016 **Mathematical Models and Computational Methods for Complex Networks**, Pisa, local organizing committee.
- 2015 **Minisymposium on Numerical Methods for Markov Chains and Stochastic Models**, SIAM conference on applied Linear Algebra, Atlanta, USA, invited minisymposium organizer.
- 2011 **Young Researchers Minisymposium on algebraic Riccati equations**, 17th ILAS Conference, Braunschweig, Germany, minisymposium co-organizer with T. Reis.
- 2010 **16th ILAS Conference**, Pisa, Italy, local organizing committee.

Research visits

- 2014, '15, '18 **University of Adelaide**, Australia, hosts: G. Nguyen, N. Bean.
- 2017 **École Polytechnique Fédérale**, Lausanne, Switzerland, hosts: R. Luce, D. Kressner.
- 2017 **J. Strossmayer University of Osijek**, Croatia, host: N. Truhar.
- 2014 **Federal University of Rio De Janeiro**, Brazil, host: I. Nisoli.
- 2013 **University of Manchester**, UK, host: V. Noferini.
- 2012 & 2013 **Rouen Business School**, France, host: G. Sbrana.
- 2010 & 2013 **Technische Universität Berlin**, Germany, host: V. Mehrmann.

Grants

- 2015 & 2017 **Progetto di Ricerca di Ateneo**, Università di Pisa.
Participant to two research projects funded by the university (1-year and 2-year respectively, ca. 15 people each).
- 2014, **Progetto di Ricerca**, GNCS/INDAM.
- 2016–2018 Participant to four 1-year research projects funded by an Italian funding agency, INDAM (ca. 8 people each).
- 2013 **Progetto di Ricerca**, GNCS/INDAM.
Principal investigator of a 1-year research project (8 people).
- 2012 & 2014 **Progetto Giovani Ricercatori**, GNCS/INDAM.
Recipient of a small single-person grant for young researchers, in two separate years.

Teaching activities

Video recordings of my lectures are available for several courses; links on <http://fph.altervista.org/dida/index.html>.

- 2017–18 **Computational Methods for Learning and Data Analysis**, Università di Pisa, graduate course for Computer Science students, main instructor of the numerical linear algebra module. Taught in English.

- 2016–2018 **Modelli Matematici Ambientali (laboratorio)**, *Università di Pisa*, graduate course on modelling with differential equations for environmental science students, lab classes supporting the course.
- 2018 **Metodi di Approssimazione**, *Università di Pisa*, graduate course for Mathematics students on several research topics in numerical linear algebra, main instructor.
- 2013–2017 **Calcolo Numerico (esercitazioni)**, *Università di Pisa*, undergraduate course on numerical computing for biomedical engineering students, exercise classes supporting the course.
- 2016 **Numerical Methods and Optimization**, *Università di Pisa*, graduate course for Computer Science students, main instructor of the numerical linear algebra module. Taught in English.
- 2015 & 16 **Matematica Discreta e Algebra Lineare (lezioni)**, *Università di Pisa*, undergraduate course for computer science students, main instructor of the linear algebra module.
- 2014 **Laboratorio di Matematica Computazionale (lezioni)**, *Università di Pisa*, graduate lab course on applications of numerical mathematics and linear algebra, main instructor.
- 2008,09,10,12 **Laboratorio di Analisi Numerica (laboratorio)**, *Università di Pisa*, computer lab classes supporting an undergraduate numerical analysis course for maths students.
- 2008–10 **Complementi di Analisi (tutorato)**, *Scuola Normale Superiore, Pisa*, weekly tutoring activities and advanced exercises for a group of first-year Maths and Physics honours students of the Scuola Normale.

Awards

- 2011 **Shortlisted for the XIV Householder Award.**
Shortlist = qualified in the top 6. The Householder award is a prize for the best dissertation in numerical linear algebra in a 3-year period. Nominations are gathered worldwide.
- 2007 **2nd Matrix Prize for Young Speakers**, *International Conference in Matrix Methods and Operator Equations*, Moscow.
- 2003 **Championnat International de Jeux Mathématiques**, *1st place*, category L2 (undergrad).
The CIJM is an international contest in elementary and recreational mathematical problems.
- 2002 **43rd International Mathematical Olympiad**, *Bronze Medal (17 points)*.
Highest score *ex aequo* among the 6-people Italian team. The IMO, held annually, is the most important international problem-solving contest in mathematics for pre-collegiate students.
- 2001 **42nd International Mathematical Olympiad**, *Honorable Mention (9 points)*.
- 2001–2002 **National scientific Olympiads** Italian Math Olympiad: 2nd place in 2002, 3rd place in 2001. Finalist in the Italian physics (2002) and informatics (2001) Olympiads.

Other relevant activities

- 2009–present **Member, Commissione Olimpiadi**, *Unione Matematica Italiana*.
Since 2003, I take part actively in the training activities, the organization, and the grading of the Italian Mathematical Olympiad, after several participations as a contestant (see *Awards*). Since 2009, I am a member of the organizing board. I was **deputy leader** of the Italian team in the 2014 International Mathematical Olympiad, and followed the Italian team to several other international competitions as a member of the scientific staff. I taught in over 25 local and national **training camps** for high-school students and teachers.
- 2017–present **Supervisor for museum educational activities**, *Museum of Computing Instruments, Pisa*.
Appointed responsible for organizing the educational and outreach activities for children in this museum of the University of Pisa.
- 2010 **Referee, CISIA admission tests**, reviewer for the Mathematics part.
Unified entry test used for admission in the schools of engineering of many Italian universities.

Last update: 2018-10-05.

Full list of publications

Pdf files and a more up-to-date list are available on <http://fph.altervista.org/>.

The most common practice in mathematics is that the author order is alphabetical and does not reflect a difference in contribution.

Journal papers

- 2019 E Jarlebring and F Poloni. "Iterative methods for the delay Lyapunov equation with T-Sylvester preconditioning". In: *Appl. Numer. Math.* 135, pp. 173–185. DOI: 10.1016/j.apnum.2018.08.011.
- 2018 F De Terán, B Iannazzo, F Poloni, and L Robol. "Corrigendum to "Solvability and uniqueness criteria for generalized Sylvester-type equations"". In: *Linear Algebra Appl.* 542, pp. 522–526. DOI: 10.1016/j.laa.2017.10.018.
- F De Terán, B Iannazzo, F Poloni, and L Robol. "Solvability and uniqueness criteria for generalized Sylvester-type equations". In: *Linear Algebra Appl.* 542, pp. 501–521. DOI: 10.1016/j.laa.2017.07.010.
- F Poloni and G Sbrana. "Closed-form results for vector moving average models with a univariate estimation approach". In: *Econometrics and Statistics*. DOI: <https://doi.org/10.1016/j.ecosta.2018.06.003>.
- 2017 GA Di Luna, P Flocchini, S Gan Chaudhuri, F Poloni, N Santoro, and G Viglietta. "Mutual Visibility by Luminous Robots Without Collisions". In: *Information and Computation* 254.3, pp. 392–418. DOI: 10.1016/j.ic.2016.09.005.
- T Haqiri and F Poloni. "Methods for verified stabilizing solutions to continuous-time algebraic Riccati equations". In: *J. Comput. Appl. Math.* 313, pp. 515–535. DOI: 10.1016/j.cam.2016.09.021.
- F Poloni and GM Del Corso. "Counting Fiedler pencils with repetitions". In: *Linear Algebra Appl.* 532, pp. 463–499. DOI: 10.1016/j.laa.2017.06.042.
- 2016 V Mehrmann and F Poloni. "An inverse-free ADI algorithm for computing Lagrangian invariant subspaces". In: *Numer. Linear Algebra Appl.* 23.1, pp. 147–168. DOI: 10.1002/nla.2018.
- F Poloni and T Reis. "A structure-preserving doubling algorithm for Lur'e equations". In: *Numer. Linear Algebra Appl.* 23.1, pp. 169–186. DOI: 10.1002/nla.2019.
- F Poloni and G Sbrana. "Multivariate trend-cycle extraction with the Hodrick-Prescott filter". In: *Macroeconomic Dynamics*, pp. 1–25. DOI: 10.1017/S1365100515000887.
- F Poloni and N Strabić. "Principal pivot transforms of quasidefinite matrices and semidefinite Lagrangian surfaces". In: *Electron. J. Linear Algebra* 31, pp. 200–231. DOI: 10.13001/1081-3810.3132.
- 2015 V Noferini and F Poloni. "Duality of matrix pencils, Wong chains and linearizations". In: *Linear Algebra Appl.* 471, pp. 730–767. DOI: 10.1016/j.laa.2015.01.015.
- F Poloni and G Sbrana. "A note on forecasting demand using the multivariate exponential smoothing framework". In: *Int. J. of Prod. Econ.* 162, pp. 143–150. DOI: 10.1016/j.ijpe.2015.01.017.
- 2014 GT Nguyen and F Poloni. "Componentwise accurate fluid queue computations using doubling algorithms". In: *Numer. Math.* 130.4, pp. 763–792. DOI: 10.1007/s00211-014-0675-4.
- F Poloni and G Sbrana. "Feasible generalized least squares estimation of multivariate GARCH(1,1) models". In: *J. Multivariate Anal.* 129, pp. 151–159. DOI: 10.1016/j.jmva.2014.04.015.
- 2013 B Iannazzo and F Poloni. "A subspace shift technique for nonsymmetric algebraic Riccati equations associated with an M-matrix". In: *Numer. Linear Algebra Appl.* 20.3, pp. 440–452. DOI: 10.1002/nla.1836.
- V Mehrmann and F Poloni. "A generalized structured doubling algorithm for the numerical solution of linear quadratic optimal control problems". In: *Numer. Linear Algebra Appl.* 20.1, pp. 112–137. DOI: 10.1002/nla.1828.

- V Mehrmann and F Poloni. "Using permuted graph bases in \mathcal{H}_∞ control". In: *Automatica J. IFAC* 49.6, pp. 1790–1797. DOI: 10.1016/j.automat.2013.02.039.
- F Poloni. "An algorithm for solving systems of quadratic equations in branching processes". In: *Boll. Unione Mat. Ital. (9)* 6.2, pp. 481–486.
- F Poloni. "Quadratic vector equations". In: *Linear Algebra and its Applications* 438.4, pp. 1627–1644. DOI: 10.1016/j.laa.2011.05.036.
- G Sbrana and F Poloni. "A closed-form estimator for the multivariate GARCH (1, 1) model". In: *J. Multivariate Anal.* 120, pp. 152–162. DOI: 10.1016/j.jmva.2013.05.005.
- 2012 F Greco, B Iannazzo, and F Poloni. "The Padé iterations for the matrix sign function and their reciprocals are optimal". In: *Linear Algebra Appl.* 436.3, pp. 472–477. DOI: 10.1016/j.laa.2011.04.016.
- V Mehrmann and F Poloni. "Doubling Algorithms with Permuted Lagrangian Graph Bases". In: *SIAM J. Matrix Anal. Appl.* 33.3, pp. 780–805. DOI: 10.1137/110850773.
- F Poloni and T Reis. "A Deflation Approach for Large-Scale Lur'e Equations". In: *SIAM J. Matrix Anal. Appl.* 33.4, pp. 1339–1368. DOI: 10.1137/120861679.
- 2011 DA Bini, B Meini, and F Poloni. "On the solution of a quadratic vector equation arising in Markovian binary trees". In: *Numer. Linear Algebra Appl.* 18.6, pp. 981–991. DOI: 10.1002/nla.809.
- B Meini and F Poloni. "A Perron iteration for the solution of a quadratic vector equation arising in Markovian binary trees". In: *SIAM J. Matrix Anal. Appl.* 32.1, pp. 248–261. DOI: 10.1137/100796765.
- 2010 DA Bini, B Meini, and F Poloni. "An effective matrix geometric mean satisfying the Ando-Li-Mathias properties". In: *Math. Comp.* 79.269, pp. 437–452. DOI: 10.1090/S0025-5718-09-02261-3.
- DA Bini, B Meini, and F Poloni. "Transforming algebraic Riccati equations into unilateral quadratic matrix equations". In: *Numer. Math.* 116.4, pp. 553–578. DOI: 10.1007/s00211-010-0319-2.
- F Poloni. "A note on the $O(n)$ -storage implementation of the GKO algorithm and its adaptation to Trummer-like matrices". In: *Numer. Algorithms* 55.1, pp. 115–139. DOI: 10.1007/s11075-010-9361-5.
- F Poloni. "Constructing matrix geometric means". In: *Electron. J. Linear Algebra* 20, pp. 419–435.
- 2009 DA Bini, B Meini, and F Poloni. "Fast solution of a certain Riccati equation through Cauchy-like matrices". In: *Electron. Trans. Numer. Anal.* 33, pp. 84–104.
- 2008 DA Bini, B Iannazzo, and F Poloni. "A fast Newton's method for a nonsymmetric algebraic Riccati equation". In: *SIAM J. Matrix Anal. Appl.* 30.1, pp. 276–290. DOI: 10.1137/070681478.
- Book chapters, proceedings, preprints and other publications**
- 2018 N Bean, GT Nguyen, and F Poloni. *Doubling Algorithms for Stationary Distributions of Fluid Queues: A Probabilistic Interpretation*. arXiv.org eprint. eprint: arXiv:1801.05981. URL: <http://arxiv.org/abs/1801.05981>.
- 2017 B Meini and F Poloni. *Perron-based algorithms for the multilinear pagerank*. arXiv.org eprint. eprint: arXiv:1704.08072. URL: <http://arxiv.org/abs/1704.08072>.
- FD Terán, B Iannazzo, F Poloni, and L Robol. *Nonsingular systems of generalized Sylvester equations: an algorithmic approach*. arXiv.org eprint. eprint: arXiv:1709.03783. URL: <http://arxiv.org/abs/1709.03783>.
- 2016 GT Nguyen and F Poloni. *Componentwise accurate Brownian motion computations using Cyclic Reduction*. eprint: arXiv:1605.01482. URL: <https://arxiv.org/abs/1605.01482>.
- 2015 F Poloni. "Permuted Graph Matrices and Their Applications". In: *Numerical Algebra, Matrix Theory, Differential-Algebraic Equations and Control Theory*. Ed. by P Benner, M Bollhöfer, D Kressner, C Mehl, and T Stykel. Springer International Publishing, pp. 107–129. ISBN: 978-3-319-15259-2. DOI: 10.1007/978-3-319-15260-8_5.

- 2014 GA Di Luna, P Flocchini, F Poloni, N Santoro, and G Viglietta. "The Mutual Visibility Problem for Oblivious Robots". In: *Proceedings of the 26th Canadian Conference on Computational Geometry*. URL: <https://projects.cs.dal.ca/cccg2014/proceedings/>.
- 2013 T Brüll, F Poloni, G Sbrana, and C Schröder. *Enforcing solvability of a nonlinear matrix equation and estimation of multivariate ARMA time series*. Tech. rep. Matheon Preprint #1027. DFG-Forschungszentrum Matheon. URL: <http://nbn-resolving.de/urn:nbn:de:0296-matheon-12409>.
- 2010 DA Bini, B Iannazzo, B Meini, and F Poloni. "Nonsymmetric algebraic Riccati equations associated with an M-matrix: recent advances and algorithms." In: *Matrix Methods: Theory, Algorithms and Applications*. Ed. by V Olshevsky and E Tyrtyshnikov. World Scientific Publishing. Chap. 10, pp. 176–209. ISBN: 978-981-283-601-4. DOI: 10.1142/9789812836021_0010.
- 2006 DA Bini and F Poloni. *A note on the location of polynomial roots*. arXiv.org eprint. Never submitted to a peer-reviewed journal. eprint: arXiv:math/0609297. URL: <http://arxiv.org/abs/math/0609297>.

Books

- 2011 F Poloni. *Algorithms for quadratic matrix and vector equations*. Vol. 16. Theses of Scuola Normale Superiore di Pisa (New Series). Book based on my Ph.D. Thesis. Publications of the Scuola Normale Superiore, Pisa (distributed by Birkhäuser), pp. xvi+239. ISBN: 978-88-7642-383-3. URL: <http://www.springer.com/birkhauser/mathematics/scuola+normale+superiore/book/978-88-7642-383-3>.

Software

- 2012 F Poloni. *PGDoubling – A MATLAB package to solve algebraic Riccati equations and optimal control problems using permuted graph bases*. URL: <https://bitbucket.org/fph/pgdoubling>.

List of conference talks (since 2011)

- 2011 Householder Symposium (Tahoe City, CA, USA), "Algorithms for nonnegative quadratic vector equations".
- 2011 XIX congresso dell'unione matematica italiana (Bologna), "Un nuovo algoritmo per un sistema di equazioni quadratiche nei branching processes".
- 2011 Matrix methods conference (Moscow), "Two numerical methods for the solution of Lur'e equations".
- 2011 Workshop on matrix and tensor equations (Aachen), "The benefits of changing identity - in Lagrangian subspaces and doubling algorithms".
- 2011 ILAS conference (Braunschweig), "There is no free mean".
- 2012 Structured Linear Algebra Problems (Leuven), "Robust control with doubling and permuted Lagrangian bases".
- 2012 When Probability Meets Computation (Varese), "Model estimation through matrix equations in financial econometrics".
- 2012 SIAM Conference on Applied Linear Algebra (Valencia), "A duality relation for matrix pencils with applications to linearizations".
- 2012 83rd GAMM conference (Darmstadt), "A projection method for the solution of large-scale Lur'e equations".
- 2013 Due Giorni di Algebra Lineare Numerica (Roma), "Modelling queues and buffers: Probabilistic interpretation and accurate algorithms".
- 2013 ILAS Meeting (Providence, RI, USA), "Duality of matrix pencils, singular pencils and linearizations".
- 2013 FUN13 (advances in matrix functions and matrix equations) (Manchester), "Perturbing Palindromic Matrix Equations to Make Them Solvable".
- 2013 Workshop on Matrix Equations and Tensor Techniques (Lausanne), "Modelling queues and buffers: Probabilistic interpretation and accurate algorithms".
- 2014 First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI (Bilbao), "Multivariate time series estimation via projections and matrix equations".
- 2014 4th IMA Conference on Numerical Linear Algebra and Optimisation (Birmingham), "Permuted graph bases for structured subspaces and pencils".
- 2014 Householder Symposium (Spa), "Triplet representations for matrix equations in queuing theory". Poster + poster blitz.
- 2014 Structured Numerical Linear and Multilinear Algebra (Kalamata), "Multivariate time series estimation via projections and matrix equation".
- 2014 Convegno GNCS 2014 (Montecatini Terme), "Algorithms for matrix functions and equations". Conclusive relation on a research project.
- 2015 Congresso UMI (Siena), "A new representation of Fiedler pencils".
- 2015 Numerical Algebra, Matrix Theory, Differential-Algebraic Equations, and Control Theory (Berlin), "Cyclic reduction and index reduction/shifting for a second-order probabilistic problem".
- 2015 SIAM LA15 Conference (Atlanta), "Using Inverse-free Arithmetic in Large-scale Matrix Equations".
- 2016 Congresso GNCS 2016 (Montecatini Terme), "Permuted bases for algebraic Riccati equations".
- 2016 MAM9 (Budapest), "Componentwise accurate numerical methods for Markov-modulated Brownian motion".

- 2016 ILAS (Leuven), "Interval arithmetic methods to verify the stabilizing solution of an algebraic Riccati equation".
- 2016 7th European Congress of Mathematics (Berlin), "Inverse-free and permuted bases methods for algebraic Riccati equations".
- 2017 88th GAMM conference (Weimar), "Counting Fiedler pencils using diagrams". Keynote lecture.
- 2017 Householder Symposium (Blacksburg, VA, USA), "Rigorous invariant measure computation with a two-grid strategy for matrix norms". Plenary.
- 2017 Workshop: Networks: from Matrix Functions to Quantum Physics (Oxford), "Quadratic Vector Equations and Multilinear Pagerank".
- 2017 INdAM Meeting Structured Matrices in Numerical Linear Algebra: Analysis, Algorithms and Applications (Cortona), "Counting Fiedler pencils using diagrams". Poster + poster blitz.
- 2017 Workshop on Matrix Equations and Tensor Techniques (Pisa), "Solving nonsingular systems of star-Sylvester equations".
- 2018 Calcolo Scientifico e Modelli Matematici (Como), "Rigorous computation of invariant measures with a two-grid approach". Invited talk.
- 2018 89th GAMM conference (Munich), "Solution analysis and continuation algorithms for multilinear pagerank".
- 2018 Due Giorni di Algebra Lineare Numerica (Padova), "From block Fiedler companion matrices to scalar ones".