

# CURRICULUM VITAE OF NICOLETTA DEL BUONO

Last update August, 2024

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## Personal Information

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## Education

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- **1997-1999 - M.Phil. in Numerical Analysis**, University of Bath, U.K., discussing the thesis: “*Multistep approximation of the asymptotic behaviour of dissipative evolution equations*”, supervisor Dr. A.T. Hill.
  - **22-03-1997 - Laurea in Matematica - Indirizzo Applicativo**, Università degli Studi di Bari, Italy, with full marks (**110/110 e Lode**), discussing the thesis entitled: “*Metodi numerici per la risoluzione di sistemi dinamici ortogonali*”, supervisor Prof. L. Lopez.
  - **1992 Maturità scientifica**, Liceo Scientifico Statale “*G. Ferraris*”, Taranto, Italy, with full marks **60/60**.
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## Accademic Posizioni

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- **from 1.12.2008 - Associate Professor** at Department of Mathematics, University of Bari Aldo Moro, Italy, SSD MATH05-Analisi Numerica (ex MAT/08- Analisi Numerica)
  - **22.02.2000-30.11.2008 - Researcher (RDI)** at the Department of Mathematics, University of Bari Aldo Moro, Italy, SSD MAT/08 (ex A04A).
  - **2.08.1999 - 21.02.2000 - Research Fellow** at the Department of Mathematics, University of Bari Aldo Moro, Italy, SSD MAT/08 (ex A04A).
  - **30.04.1999 - 1.08.1999 - Post-doc Fellow** at the Department of Mathematics, University of Bari Aldo Moro, Italy
  - **1.09.1997 - 30.04.1999 - Post-graduate Student** at the Department of Mathematical Sciences, University of Bath, U.K.
  - **1.05.1997 - 31.08.1997, CNR - Fellow** at the Department of Mathematics, University of Bari, Italy
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## Fellowships

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- **Assegno di ricerca per il settore scientifico A04A** (contratto biennale), Università degli Studi di Bari.
- **Borsa di studio CNR per laureati**, Bando n.201.01.129, del 15-6-98
- **Borsa di studio “Ennio De Giorgi” dell’Università di Lecce**, Bando del 1998.
- **Borsa di studio CNR per attività di perfezionamento all’estero**, Bando n.203.01.67 del 19-02-1997.
- **Borsa di studio dell’Università degli Studi di Bari per attività di perfezionamento all’estero**, anno 1997, Legge n. 398 del 30-11-1989.
- **Borsa di studio CNR per laureandi**, Bando n. 209.01.62 del 23-04-1996 Codice n. 09.01.62.

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## Visiting Positions

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- 7–14.06.2024 - Western University, London Ontario Canada, Visiting Professor
- 8–21.01.2006 - North Carolina State University, Raleigh, USA, Visiting Professor
- 6–18.02.2005 - North Carolina State University, Raleigh, USA, Visiting Professor
- 11–16.08.2002- North Carolina State University, Raleigh, USA, Visiting Professor

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## Principal Investigator or Unit Research Coordinator of Scientific Projects

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- 2023-to date: Principal Investigator of PRIN-2022 PNRR- Missione 4- Componente 2 - Investimento 1.1: Progetti di Ricerca di Rilevante Interesse Nazionale (PRIN) Avviso 1409 del 14/09/2022, Codice progetto: P2022BLN38, Titolo progetto: "Computational Approaches for the Integration of Multi-omics data?", CUP: H53D23008870001, Funds: 238900 Euro
- 2023-to date: Coordinator of Research Unit for the project "Development of an immunosenescence-based risk predictor for elderly patients with Diffuse Large B-Cell Lymphoma?", finanziamento indipendente (Bando FIL Club 2023, Fondazione Italiana Linfomi). (Riferimento online <https://filinf.it/intervista-dott-ciavarella-vincitore-bando-fil-club/>) Principal Investigator: Dr. Sabino Ciavarella, Laboratorio di Diagnostica Ematologica e Terapia Cellulare, afferente alla U.O.C. di Ematologia e Terapia Cellulare dell'IRCCS Istituto Tumori "Giovanni Paolo II" Bari. Funds 350.000 Euro
- 2021-to date: Co-Leader del WorkPackage 8 (WP8) per il Progetto internazionale "Repurposing marine by-products or raw materials for the development and production of functional foods and bioactives to improve human health and coastal community sustainability?", finanziato dalla New Frontiers in Research Fund (NFRF), Canada. (Online ref. <https://mbiproject.ca/research-teams/>) Principal Investigator: Prof. Raymond Thomas, della Western University Ontario, Canada, Total Funds: 15.8M \$CAN, Local Funds WP8: 251,563\$ CAN
- 2021-2023: Coordinator of Research Unit for the project "L'intelligenza artificiale a tutela della salute in eta' pediatrica. Implementazione di una piattaforma digitale per il design di farmaci pediatrici sicuri" ? Avviso Horizon Europe Seeds D.R. 1940 del 04/06/2021? Codice identificativo progetto S41, CUP: H99J21017390006, funded by University of Bari Aldo Moro. Principal Investigator: Prof. Orazio Nicolotti, University of Bari Aldo Moro. Funds: 50K Euro
- 2012-2013 Co-Coordinator of Research for the projectt "Modelli Matematici Discontinui per l'Analisi delle Reti di geni: applicazioni al Diabete?", funded by Fondazione Cassa di Risparmio di Puglia FCRP (Bari). Funds 100K Euro

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## Participation in Research Projects

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- **Participation in the activities of the research group related to projects funded by GNCS**
  - Project GNCS 2024 "Modelli con rango basso e algoritmi di ottimizzazione per l'analisi dati", CUP E53C23001670001, finanziato da Bando per Progetti di Ricerca ,scientific coordinator Prof. Margherita Porcelli, Università degli Studi di Firenze.
  - Project GNCS 2023 "Sistemi dinamici e modelli di evoluzione: tecniche funzionali, analisi qualitativa e metodi numerici", finanziato dal GNCS- Gruppo Nazionale per il Calcolo Scientifico, scientific coordinator Dr. Fabio Difonzo, Università degli Studi di Bari Aldo Moro, Bando per Progetti di Ricerca GNCS 2023 - CUP E53C22001930001;
  - Project GNCS 2022 "Metodi numerici avanzati per l'analisi di sistemi dinamici", scientific coordinator Prof. Università degli Studi di Udine;

- Project GNCS 2020 “Analisi numerica di sistemi evolutivi complessi<sup>2</sup>, finanziato dal GNCS- Gruppo Nazionale per il Calcolo Scientifico, scientific coordinator Prof. Dimitri Breda, Università degli Studi di Udine;
  - Project GNCS 2019: “Problemi di evoluzione e loro discretizzazione: questioni di stabilit lineare e non lineare” finanziato dal GNCS, scientific coordinator prof. Raffaele D’Ambrosio, Università dell’Aquila;
  - Project GNCS 2018 “Approssimazione numerica di problemi di evoluzione: aspetti deterministici e stocastici”, scientific coordinator Prof. Raffaele D’Ambrosio, Università dell’Aquila;
  - Project GNCS 2017 “Analisi e sviluppo di metodologie numeriche per certi tipi non classici di sistemi dinamici”, scientific coordinator Prof. Stefano Maset, Università di Trieste;
  - Project GNCS 2011 “Metodi numerici per sistemi differenziali con discontinuit del campo vettoriale”, scientific coordinator Prof. Luciano Lopez, Università degli Studi di Bari Aldo Moro;
- **Participation in research groups related to scientific projects funded on the basis of competitive calls**
- 2018-2020 - Project “Sistema innovativo di monitoraggio e trattamento delle acque reflue per il miglioramento della compatibilità ambientale ai fini di un’agricoltura sostenibile - Smart Water- codice: 5ABY6P0, CUP B37H17005950008, financed by Regione Puglia - POR PUGLIA FESR-FSE 2014-2020, - Azione 1.6, bando INNONETWORK “Sostegno alle attività di R&S per lo sviluppo di nuove tecnologie sostenibili, di nuovi prodotti e servizi”, Principal investigator: Prof. Gaetano Alessandro Vivaldi, Università degli Studi di Bari Aldo Moro.
- 2019-2021 - Project “COMESTO - Community Energy Storage: Gestione Aggregata di Sistemi d’Accumulo dell’Energia in Power Cloud”, ARS01\_01259, finanziato dal Ministero dell’Istruzione, dell’Università e della Ricerca (MIUR), Responsabile scientifico prof. Michelangelo Ceci, Università degli Studi di Bari Aldo Moro.
- 2017-2023 - PRIN 2017-Progetti di Ricerca di Rilevante Interesse Nazionale, Bando 2017. Prot. 2017E844SL “Discontinuous dynamical systems: theory, numerics and applications, Principal Investigator: Nicola Guglielmi, Gran Sasso Science Institute, Associated Investigator: Luciano Lopez, Università degli Studi di Bari Aldo Moro.
- 2018-2020 Progetto MURST Ex-60% “ Sistemi dinamici: aspetti teorici, simulazioni numeriche e applicazioni”, Scientific coordinator Dr. A. Pugliese, Università degli Studi di Bari Aldo Moro.
  - 2014-2015 Progetto MURST Ex-60% “Sistemi dinamici: aspetti teorici, simulazioni numeriche e applicazioni”, Scientific coordinator Prof C.Elia, Università degli Studi di Bari Aldo Moro.
  - 2008-2011 PRIN 2007-Progetti di Ricerca di Rilevante Interesse Nazionale Bando 2007. Prot. 2007AS-RKCJ002, “Metodi numerici per sistemi differenziali con struttura e con struttura variabile”, Principal Investigator: Prof. Alfredo Bellen, Università degli studi di Trieste. Associated Investigator: Prof. Luciano Lopez, Università degli Studi di Bari Aldo Moro.
  - 2010, Progetto MURST Ex-60% “Metodi numerici per sistemi differenziali discontinui”, scientific coordinator Prof Luciano Lopez (University of Bari)
  - 2009, Progetto MURST Ex-60% “Metodi numerici per problemi differenziali discontinui”, scientific coordinator Prof Luciano Lopez (University of Bari)
  - 2008 Progetto MURST Ex-60% “Metodi Numerici per Sistemi Dinamici Discontinui”, Progetti di Ateneo, financed by University of Bari, scientific coordinator Prof Luciano Lopez (University of Bari)
  - 2007, Progetto MURST Ex-60% “Metodi numerici avanzati per sistemi dinamici e questioni di algebra lineare”, scientific coordinator Prof Luciano Lopez (University of Bari)
  - 2006, Progetto MURST Ex-60% “Metodi numerici per sistemi dinamici con vincoli di eguaglianza e diseguaglianza e questioni di algebra lineare connesse”, scientific coordinator Prof Luciano Lopez (University of Bari)
- 2003-2005 PRIN 2003-Progetti di Ricerca di Rilevante Interesse Nazionale ? Bando 2003, Prot. 2003017374\_00, “ Equazioni differenziali ordinarie su manifolds di matrici”; Principal Investigator: Luciano Lopez, Università degli Studi di Bari Aldo Moro.
- 2003-2004 Progetto MURST Ex-60% Metodi per sistemi di equazioni differenziali con vincoli di disuguaglianza ed equazioni integro-differenziali. Scientific coordinator Prof Luciano Lopez (University of Bari)
- 2000 Project MURST Ex-60% Metodi e simulazione numerica di problemi di evoluzione. Founded by Università degli Studi di Bari, anno 2000. Scientific coordinator Prof Luciano Lopez (University of Bari)

- 1997-1999 Project Metodi numerici per sistemi dinamici isospettrali ed ortogonali. Funded by CNR, contributo di ricerca n. 98.01013.CT01. Scientific coordinator Prof Luciano Lopez (University of Bari)
- 1998 Project Metodi e modelli per la Matematica e l'Ingegneria. Funded by CNR for Progetto Strategico contributo di ricerca n. 97.04853.ST74 e n. 98.03648.ST74. Scientific coordinator Prof Luciano Lopez (University of Bari)
- 1997 Project MURST Analisi Numerica: Metodi e Software matematico. Scientific coordinator Prof. V. Ruggiero. Local Coordinator Prof. G. Di Lena.
- 1996 Project MURST Metodi numerici per calcolatori scalari e paralleli. Funded by University of Bari, Scientific coordinator Prof. L. Lopez.

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### Coordinator of scientific studies and research commissioned by public or private institutions

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- 01-10-2023 to date: Scientific Coordinator for the research activities related to the Agreement of Doctoral Fellowships Ministerial Decree no.117/2023 of March 2, 2023 - 39th Cycle- A.. 2023/2024 between the University of Bari Aldo and the industry PIRELLI TYRE S.p.A. (Prot. of 23.10.2023); Title of research project: "Topological Data Analysis and optimization techniques for industrial processes," CUP: H91I23000170007.
- 01-10-2022 to date: Scientific Coordinator for the research activities PNRR - M4C2 pursuant to Ministerial Decree No. 352/2022 National Recovery and Resilience Plan (PNRR), Mission 4, Component 2 "From Research to Enterprise" - Investment 3. "Introduction of innovative doctorates that respond to the innovation needs of enterprises and promote the recruitment of researchers by enterprises," stipulated between the University of Bari Aldo Moro and the Company Planetek Italia Srl (Prot.Pvt 004-668-v1 of 6.2.2023); Title of the research project: "Low-rank models for the analysis of Earth Observation data focusing on coastal and marine environments," CUP: H91/22000410007.
- 01-10-2022 to date: Scientific Coordinator for the research activities related to the Scientific Agreement between the Tumor Institute- IRCCS of Bari "Giovanni Paolo II" and the University of Bari Aldo Moro for the funding of a grant for the PhD in Computer Science and Mathematics -XXXVI cycle (Prot. 102458 of 06/05/2022); Title of Research Project: "Low-rank numerical approaches for deconvolution and analysis of GEP data in oncohematology."
- 01-01-2021 to date: Scientific coordinator for the activities related to the International Academic Cooperation Agreement between the University of Bari Aldo Moro and Koblenz University of Applied Sciences, Germany.
- 02-08-1999 to 22-02-2000: Responsible of the scientific activities of the research program 01.4, project "Metodi numerici per equazioni differenziali ordinarie e per valori singolari di matrici?", Area Scientifica 01, Matematica-Informatica ? Settore Scientifico-disciplinare Analisi Numerica, at the Department of Mathematics, University of Bari (Prot. n. 6363 )

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### Participation as Speaker at national and international scientific meetings

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#### 2024

- Invited Speaker at the Giornata Indam, 19–20 september 2024, Bari, Italy, presenting a communication entitled "*Penalized low rank matrix factorizations: bridging theoretical studies and practical use*"
- Invited Speaker at the 2nd Workshop on MAThematical Challenges to and from new technologiES, MATCHES 2024- 5–6 September 2024 Rome, Italy, presenting a communication entitled "*Penalized low rank matrix factorizations: a bridge between theoretical research and practical applications*"

#### 2023

- Speaker at the Workshop "Mathematical Methods for Image Processing and Understanding", in the 2023 International Conference on Computational Science and its Applications (ICCSA 2023), Athens, Greece, July 3-6, 2023, presenting the communication entitled "*Improving color image binary segmentation using Nonnegative Matrix Factorization*"

- Speaker at the 21st IMACS World Congress, IMACS2023, University La Sapienza, Facoltà di Ingegneria Civile e Industriale, September 11–15, 2023, Rome, Italy, presenting an invited communication in the section "Mathematical and Numerical Modelling of Porous Media in Subsurface environments" entitled "*Understanding the Effects of Irrigation with Different Treatment Reused Waters: a Machine Learning Approach*"

## 2021

- Speaker at 3rd Edition della Summer School Mathematical methods in Data Science?, Department of Mathematics, University of Bari Aldo Moro, 12-16 July 2021, Bari Italy presenting the minicourse "*Analisi delle Componenti Principali*"

- Speaker at the First Meeting of UMI AI & ML "Matematica per l'Intelligenza Artificiale e il Machine Learning", Zoom 9 April 2021, presenting the communication entitled "*Some Mathematical methods in Data Science. Mathematics, Machine Learning and Data Science: branches of a single tree*"

- Invited Speaker at the session "Machine-Learning e Intelligenza Artificiale per una migliore diagnosi e prognosi per i pazienti onco-ematologici", Meeting nazionale AiSDeT: "PNRR e innovazione digitale in Sanita', Nicolaus Hotel - Bari, 24-26 November 2021, presenting the communication entitled "*Mathematics, Artificial Intelligence, Machine Learning, Data Science: all branches of the same tree. How Numerical Methods helped onco-haematological patients?*"

- Invited Speaker at the SIAM Conference on Mathematical & Computational Issues in the Geosciences (GS21), virtual conference, 21-24 June 2021, presenting the talk entitled "*Understanding the Effects of Irrigation with Different Treatment Reused Waters: a Machine Learning Approach* in the session "*Modeling of Flow and Transport in the Soil-Plant-Atmosphere Continuum*"

## 2019

- Speaker at the 2nd Edition della Summer School Mathematical methods in Data Science, Department of Mathematics, University of Bari Aldo Moro, 15-19 July 2019, Bari, Italy, presenting the minicourse: "*Analisi delle Componenti Principali: teoria e applicazioni*".

## 2018

- Speaker at the Summer School Mathematical methods in Data Science, Department of Mathematics, University of Bari Aldo Moro, 16-20 July 2018, Bari, Italy, presenting the minicourse: "*Analisi delle Componenti Principali: teoria e applicazioni*".

## 2017

- Speaker at SciCADE 2017- The International Conference on Scientific Computation and Differential Equations Bath, U.K., 11–15 September 2017, presenting the communication entitled "*A computational approach to locate crossing/sliding regions and their basins of attraction of non-smooth dynamical systems*"

## 2013

- Invited speaker at the workshop "Modelli Matematici Discontinui per l'Analisi delle Reti di Geni: Applicazioni al Diabete", 29 May 2013, Fondazione Cassa di Risparmio di Puglia Bari, Italy presenting the communication entitled "*Modelli matematici discontinui per reti di geni.*"

## 2011

- Speaker at the XIX Congresso dell'Unione Matematica Italiana, Bologna, 12-14 September 2011, presenting a communication entitled "*Detecting crossing and sliding areas in non-smooth dynamical systems*"

- Speaker at the WILF2011 - 9th International Workshop of Fuzzy Logic and Applications, Trani (Italy) 29-31 August 2011, presenting a communication entitled "*Subtractive initialization of nonnegative matrix factorizations for document clustering*" (coauthored with G. Casalino and C. Mencar, University of Bari Aldo Moro)

## 2009

- Speaker at the 9th International Conference on Intelligent Systems Design and Applications - ISDA09, 30 Nov -2 Dec 2009, Pisa, Italy, presenting a communication entitled "*A penalty function for computing orthogonal non-negative matrix factorizations*".

## 2008

- Speaker at the Workshop Structural Dynamical Systems: computational aspects - SDS08, Capitolo-Monopoli, (Bari), 17–20 June 2008, presenting a poster communication entitled "*Gradient Flow approaches for orthogonal non-negative matrix factorization*".

## 2006

- Speaker at the Workshop Structural Dynamical Systems: computational aspects- SDS2006, Capitolo-Monopoli, (Bari), 13–16 Giugno 2006, presenting a poster communication entitled “*Structured quadratic inverse eigenvalue problem, I. Serially linked systems*”.

## 2005

- Speaker at the International Conference on Advances in Pattern Recognition-ICAPR05, Bath U.K., 22-25 August 2005, presenting a communication entitled “*A continuous weighted low-rank approximation for collaborative filtering problem*”.

- Speaker at SDS2005 - Workshop Structural Dynamical Systems: computational aspects, Capitolo-Monopoli, (Bari), 26–29 Giugno 2005, presenting a communication entitled “*Structure Preserving Isospectral Flows for Quadratic Pencils*”

## 2004

- Speaker at the VII Congresso Nazionale della Società Italiana di Matematica Applicata e Industriale, SIMAI 2004 Venezia, Isola di San Servolo, Italy September 20-24, 2004, presenting a communication entitled “*Numerical techniques for approximating matrix ODEs on the general linear group*”

- Invited Speaker at the Workshop on Lie group methods and control theory, Edimburg, Scotland, 26 June- 1 July 2004, presenting the invited (one-hour) communication entitled “*Numerical techniques for approximating the solution of matrix ODEs on the general linear group*”.

- Speaker at the Workshop “Dynamical Systems on Matrix Manifolds Numerical Methods and Applications”, Bari, Department of Mathematics, 27–28 May 2004, presenting the communication entitled “*Numerical integration of matrix differential equations on the general linear group*”.

- Speaker at ICCSA 2004 - The International Conference, on Computational Science and Its Applications - Assisi, Italy, May 14-17, 2004, presenting the communication entitled “*A continuous technique for Weighted Low-Rank Approximation Problem*”.

- Speaker at the International Workshop on the Technological Aspects of Mathematics II, Montecatini, Italia, 1–3 April 2004, presenting the communication entitled “*Exponentials of skew-symmetric matrices and applications*”

- Speaker at Convegno annuale del GNCS, Montecatini, Italia, 9–11 February 2004, presenting the communication entitled “*Integrazione Numerica di una classe di equazioni differenziali con soluzioni quasi singolari*”

## 2003

- Speaker at the Workshop “Numerical Linear Algebra and its Applications”, Capitolo, Monopoli, 22–24 September 2003, presenting the communication entitled “*Numerical integration of a class of ordinary differential equations on the general linear group*”

- Invited Speaker at the XVII Congresso dell'Unione Matematica Italiana, 2003, Milan, 8–12 September 2003, presenting the 30 minutes communication entitled “*Calcolo della funzione esponenziale di matrici sparse anti-simmetriche*”

- Speaker at the Workshop SDS2003, Capitolo-Monopoli, (Bari), 22–25 June 2003, presenting the communication entitled “*On the low rank approximation of data on the unit sphere*”

## 2002

- Speaker at the Second International conference on Neural, Parallel and Scientific computations and ISDA2002 workshop, Atlanta, (USA), 7–10 August 2002, presenting the communication entitled “*Designing a neural network with gradient flow*”

- Speaker at the Conference on Scientific Computation, Geneva (Switzerland), 26–29 June, 2002, presenting the communication entitled “*Differential approaches for computing balanced realizations in control theory*”

- Speaker at the International Conference, on Computational Science and Its Applications, ICCSA2002 Amsterdam, (Netherlands) April 21–24, 2002, presenting two communications entitled “*Some remarks on numerical methods for second order differential equations on the orthogonal matrix group*”, and “*Symplectic methods based on the matrix variational equation for Hamiltonian systems*”

## 2001

- Speaker at the International Conference on Numerical Algorithms, Marrakesh, (Marocco) 1–5 October, 2001, presenting the communications entitled “*Numerical solution of ODEs on the manifold of oblique rotation matrices via the manifold of correlation matrices*”

- Speaker at the HERCMA2001, Athens, (Greece) 20–22 September 2001, presenting two communications entitled “*Geodesics based algorithms for differential systems on the Grassmann manifold*” and “*Numerical methods for solving second order differential equations on the orthogonal group*”
- Speaker at the Workshop on numerical Methods for Evolutionary Problems, Peschici, (Foggia) 17–20 September 2001, presenting the communications entitled “*Numerical methods for isodynamical matrix flows: applications to balanced realization in control theory*”
- Speaker at the Workshop SDS2001, Capitolo-Monopoli, (Bari) 1–4 July 2001, presenting the communications entitled “*Numerical methods for isodynamical matrix flows: applications to balanced realization in control theory*”

## 2000

- Speaker at the Convegno GNIM, Bertinoro 11–13 December 2000, presenting the communications entitled “*Runge Kutta methods for ODEs in control theory*”
- Speaker at the BIT 40th Anniversary Meeting, Lund University, Sweden, August 9–12, 2000, presenting the communication entitled “*Runge Kutta type methods based on geodesic for systems of ODEs on the Stiefel manifold*”
- Speaker at the Ninth International Congress on Computational and Applied Mathematics, Katholieke Universiteit Leuven, Belgium, 17-21 July 2000, presenting the communication entitled “*Explicit four stage fourth order Runge Kutta methods for preserving quadratic conservation laws*”
- Speaker at the V Congresso della Società italiana di Matematica Applicata e Industriale, SIMAI2000, Ischia Porto, Centro Congressi Hotel continental Terme, 5–9 June 2000, presenting the communication entitled “*One-step symplectic methods based on the solution of the matrix variational equation for Hamiltonian systems of ODEs*”
- Speaker at the Convegno Analisi Numerica: Metodi e Software matematico, Dept of Mathematics, University of Ferrara (Italy) 19-21 January 2000, presenting the communication entitled “*Conservative methods for orthogonal differential systems on the Stiefel manifold*”

## 1999

- Speaker at the Workshop Calcolo Matriciale, Florence, 25-26 November 1999, presenting the communication entitled “*Metodi numerici per la soluzione di sistemi di ODE sulla manifold delle matrici di rotazione oblique*”
- Speaker at the Congress of Unione Matematica Italiana- UMI1999, Naples, 13-18 September 1999, presenting the communication entitled “*Metodi conservativi per la soluzione di sistemi differenziali sulla manifold delle matrici di rotazione oblique*”
- Speaker at the SCICADE99, Fraser Island, Australia, 8-13 August 1999, presenting the communication entitled “*Conservative methods for solving differential systems on the manifold of the square oblique rotation matrices*”
- Speaker at the 18<sup>th</sup> Biennial Conference on Numerical Analysis, Dundee University, Scozia, (U.K.) 29 June – 2 July 1999, presenting the communication entitled “*On a multistep approximation of a linear sectorial evolution equation*”

## 1998

- Speaker at the Workshop Metodi Numerici per ODEs, IRMA CNR, Bari, 9-10 June 1998, presenting the communication entitled “*Approssimazione asintotica di un semigrupp settoriale mediante un metodo lineare multistep,  $A(\alpha)$ -stabile*”
- Speaker at the Second Meeting on Numerical Methods for Differential Equations, Coimbra (Portogallo) 25-27 February 1998, presenting the communication entitled “*Numerical methods for Hermitian unitary differential systems*”

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### Participation at Scientific conferences and meeting

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- Workshop “Algorithms’ Impact on Artificial Intelligence”, Bari 24-26 June 2024
- Workshop “Mathematics for Artificial Intelligence and Machine Learning” Bocconi University, Milan - January 17-19, 2024
- Convegno Biennale GNCS, 14-16 February 2024, Hotel Ambasciatori, Rimini (Italy).

- Convegno Biennale GNCS, 27-29 June 2022, Hotel Belvedere, Montecatini Terme (Italy).
- Convegno Biennale GNCS, 11-13 February 2020, Hotel Belvedere, Montecatini Terme (Italy).
- Convegno Biennale GNCS, 14-16 February 2018, , Hotel Belvedere, Montecatini Terme (Italy).
- Convegno Biennale GNCS, 2-4 February 2016, , Hotel Belvedere, Montecatini Terme (Italy).
- International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, IPMU2004, Perugia, Italia, 4–9 July 2004.
- International Workshop on Computational Codes: the Technological Aspects of Mathematics. Advances in Computing and Software Development for Differential Equations, University of Bari, 18–20 December 2002
- Workshop on Dynamical Systems, Milan (Italy) 16-18 June 1999.
- Numerical Analysis Day, Bath (U.K.) 30-1-1998.

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### Editorial activities

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- Editor of the special issue "Computational Approaches for Data Inspection in Biomedicine" (section "Mathematical Biology"), Mathematics, Vol 9, 2021, and 10, 2022. Number of published articles: 8
- Editor of the special issue SDS2016 - Structural Dynamical Systems: Computational aspects of the journal Discrete and Continuous Dynamical Systems - B, Vol 23 Issue 7, 2018, Number of published articles: 16
- Editor dello special issue 8th Workshop Structural Dynamical Systems Computational Aspects , of the journal Mathematics and Computers in Simulation, Vol.125, Issue 1–2, 2016, Number of published articles: 8

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### Conference and Workshop Organization

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- Member of the scientific and organizing committee of the 12th Workshop SDS2024 Structural Dynamical Systems: Computational Aspect, Monopoli, Italy June 11-14, 2024
- Co-organizer and Chair of the 3rd edition of the PRIMO (Post-graduate Researchers in Inverse Problems, Machine Learning, and Optimization) Workshop, Department of Mathematics, University of Bari Aldo Moro, 20-22 September 2023
- Member of the scientific and organizing committee of the congress "Numerical Analysis, porous media and water Resources: a fruitful contamination- INTRUSION2023", Campus Universitario Ernesto Quagliariello, University of Bari e Politecnico-Bari, Italy, 3-5 July 2023
- Member of the scientific and organizing committee of the 11th Workshop SDS2022 Structural Dynamical Systems: Computational Aspect, Rosa Marina Resort, Rosa Marina (BR), June 7-10, 2022
- Co-organizer of the 3rd Edition of the Summer School "Mathematical methods in Data Science", Department of Mathematics, University of Bari Aldo Moro, 12-16 July 2021
- Co-organizer of the Webinar "Waiting the 2021 Edition of the Summer School "Mathematical methods in Data Science", 13 July 2020
- Co-organizer of the 2nd Edition of the Summer School "Mathematical methods in Data Science", Department of Mathematics, University of Bari Aldo Moro, 15-19 July 2019
- Co-organizer of the Summer School "Mathematical methods in Data Science", Department of Mathematics, University of Bari Aldo Moro, 16-20 July 2018
- Member of the scientific and organizing committee of the 10th Workshop "SDS2018 Structural Dynamical Systems: Computational Aspects", Hotel-Villaggio Porto Giardino, Capitolo, Monopoli, Italy, June 12-15, 2018

- Member of the scientific and organizing committee of the 9th Workshop “SDS2016 Structural Dynamical Systems: Computational Aspects”, Hotel-Villaggio Porto Giardino, Capitolo, Monopoli, Italy, June 14-17, 2016
- Member of the scientific and organizing committee of the 8th Workshop “SDS2014 Structural Dynamical Systems: Computational Aspects”, Hotel-Villaggio Porto Giardino, Capitolo, Monopoli, Italy, June 10-13, 2014
- Member of the scientific and organizing committee of the Workshop “SDS2010: Structural Dynamical Systems: Computational Aspects”, 8-11, June 2010, presso l’Hotel Porto Giardino, Capitolo, Monopoli (Bari, Italy)
- Member of the scientific and organizing committee of the workshop “SDS2008: Structural Dynamical Systems: Computational Aspects”, 17-20 June 2008, Hotel Porto Giardino, Capitolo, Monopoli (Bari, Italy)
- Member of the scientific and organizing committee of the workshop “SDS2006: Structural Dynamical Systems: Computational Aspects”, 13-16 June 2006, Hotel Porto Giardino, Capitolo, Monopoli (Bari, Italy)
- Member of the scientific and organizing committee of the workshop “SDS2005: Structural Dynamical Systems in Linear Algebra and Control: Computational Aspects”, 26-29 June 2005, l’Hotel Porto Giardino, Capitolo, Monopoli (Bari, Italy)
- Organizer and member of the scientific committee of the workshop “Dynamical Systems on Matrix Manifolds: Numerical Methods and Applications”, Bari, 27-28 May 2004
- Organizer of the Invited Session “Matrix approximations with applications to science, engineering and computer science” , into the ICCSA2004 conference, 14-17 Maggio 2004, S. Maria degli Angeli, Assisi (PG, Italy)
- Organizer of the Technical Session: “New numerical techniques for DEs and applications to linear algebra, control and engineering”, into the International Conference on Computational Science, ICCS2004 Krakow, Poland, 7-9 June 2004.
- Member of the scientific and organizing committee of the workshop “SDS2003: Structural Dynamical Systems in Linear Algebra and Control: Computational Aspects”, 22-25 June 2003, Hotel Porto Giardino, Capitolo, Monopoli (Italy)
- Organizer of the Technical Session: “Numerical methods for structured systems”, into the International Conference on Computational Science, ICCS2003, 2-4 Giugno 2003 Saint Petersburg, Russian Federation
- Organizer of the Technical Session: “Geometric Numerical Algorithms: theoretical aspects and applications”, into the International Conference on Computational Science, ICCS 2002, Amsterdam, 21-24 April 2002
- Member of the scientific and organizing committee of the Workshop “SDS2001: Structural Dynamical Systems in Linear Algebra and Control: Computational Aspects”, 1-4 July 2001, Hotel Porto Giardino, Capitolo, Monopoli (BA)

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### Participation in PhD Board, PhD courses and PhD supervising

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- Member of the Ph.D. board of the Ph.D in Mathematics, Univerisity of Bari, cicles XIX, XX, XXI, XXII, XXIII, XXIV, XXV, XXVI, XXVII
- Member of the Ph.D. board of the Ph.D in Informatics and Mathematics, Univerisity of Bari Aldo Moro, cicles XXVIII, XIX, XXX, XXXI, XXXII, XXXIII, XXXIV, XXXV, XXXVI, XXXVII, XXXVIII, XXXIX,XL
- PhD Thesis
  - Analysis of Piecewise Linear Equations with Bizarre Dynamics, Pabel Shahrear, PhD in Mathematics, XXV Cicle, University of Bari Aldo Moro, Supervisors: Nicoletta Del Buono, Leon Glass.
  - NMF-based Algorithms for Data Mining and Analysis: Feature Extraction, Clustering, and Maximum Clique Finding, Melisew T. Belachew, PhD in Mathematics, XXVII Cicle, University of Bari Aldo Moro, Supervisors: Nicoletta Del Buono
  - Non-negative factorization methods for extracting semantically relevant features in Intelligent Data Analysis, Gabriella Casalino, PhD in Computer Science, XXVII Cicle, University of Bari Aldo Moro, Supervisor: Corrado Mencar, Co-Supervisor: Nicoletta Del Buono.

- Nonnegative matrix factorizations for knowledge extraction from biomedical and other real-world data, Flavia Esposito, Ph.D in Informatics and Mathematics, XXXI cycle, University of Bari Aldo Moro, Supervisor: Nicoletta Del Buono.
- Bi-Level Optimization for Hyperparameters Tuning in Sparse Low-Rank Learning Algorithms, Laura Selicato, Ph.D in Informatics and Mathematics, XXXV cycle, University of Bari Aldo Moro, Supervisor: Nicoletta Del Buono.
- Courses
  - Dynamical systems and optimization methods for Nonnegative Matrix Factorization, Ph.D in Mathematics XXVII Cycle, 2013/14, 25 hours (June-July 2014).
  - Ottimizzazione, grafi e applicazioni, Ph.D in Informatics and Mathematics, XXXI Cycle, 35 hours (April-May 2016)
- Current PhD Students and projects
  - Serena Grazia De Benedictis Ph.D. in Informatics and Mathematics (curriculum Mathematics) cycle XXXIX (grant D.M. 117/23 co-funded by Pirelli Tyre), research project: Numerical Analysis, Topological Data Analysis and optimization for industrial processes
  - Grazia Gargano, Ph.D. in Informatics and Mathematics (curriculum Mathematics), Cycle XXXVIII (grant funded by IRCCS Giovanni Paolo II -Bari), research project: Biomathematics and computational biology
  - Gaetano Settembre, Ph.D. in Informatics and Mathematics (curriculum Mathematics), Cycle XXXVIII (grant D.M. 352/22 co-funded by Planetek Italia), research project: Scientific Computing and Data Processing
- Ph.D. Admission Board and Exams
  - Chair of the evaluation committee for admission to the doctoral program in Informatics and Mathematics, Cycle XXXVIII (D.R. n. 2722 del 22.07.2022)
  - Member of the evaluation committee for admission to the doctoral program in Informatics and Mathematics, XXXV Cycle (D. Dec. n.776 23.08.2019)
  - Member of the evaluation committee for admission to the doctoral program in Informatics and Mathematics, XXXIII Cycle (D.R. n. 2707 13.09.2017)
  - Member of the evaluation committee for admission to the doctoral program in Informatics and Mathematics, XXXI Cycle (D.R. n. 3097 24.09.2015)
  - Member of the evaluation committee for admission to the doctoral program in Mathematics, XX Cycle (D.R. n. 3097 24.09.2015)

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### Affiliations with Academies

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- 2019 - to date: Affiliated with the UMI Group - Mathematics for Artificial Intelligence and Machine Learning (UMI-Math-AI-ML)
- 2003 -to date: Member of the Italian Mathematical Union - UMI
- 2000 -to date: Affiliated with the National Group for Scientific Computation - GNCS (Numerical Analysis section)

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### Administrative and coordination activities

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- 2022- to date: Vice-Head of the Department of Mathematics, University of Bari Aldo Moro
- 2019- to date: Delegate for the External Relations and Internships of the Department of Mathematics, University of Bari Aldo Moro

- 2015-2018: Member of the Board of the Department of Mathematics, University of Bari Aldo Moro
- 2012-2015: Member of the Board of the Department of Mathematics, University of Bari Aldo Moro
- 2012-2015: Member of the Board of the School of Science and Technology, University of Bari Aldo Moro
- 2004-2007: Member of the Board of the Department of Mathematics, University of Bari Aldo Moro

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## Teaching activities

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- A.A 2024/2025
  - Metodi di Ottimizzazione per la Data Science e l'Intelligenza Artificiale, Laurea Magistrale in Matematica (63 h, CDA)
  - Metodi Matematici per l'Intelligenza Artificiale, Laurea Magistrale in Matematica (15 h, CDA)
  - Modelli Decisionali e Ottimizzazione, Laurea Magistrale Data Science, (48 h, CDI)
  - Metodi Numerici per la Bioinformatica, Laurea Magistrale in Bioinformatica (60 h, CDI)
  - Metodi Numerici per la Data Science, Laurea Triennale in Matematica, (32 h, CDA)
- A.A 2023/2024
  - Metodi di Ottimizzazione per la Data Science e l'Intelligenza Artificiale, Laurea Magistrale in Matematica (63 h, CDA)
  - Metodi Matematici per l'Intelligenza Artificiale, Laurea Magistrale in Matematica (15 h, CDA)
  - Modelli Decisionali e Ottimizzazione, Laurea Magistrale Data Science, (48 h, CDI)
  - Metodi Numerici per la Bioinformatica, Laurea Magistrale in Bioinformatica (32 h, CDI)
  - Metodi Numerici in la Data Science, Laurea Triennale in Matematica, (31 h, CDA)
- A.A 2022/2023
  - Metodi di Ottimizzazione per la Data Science, Laurea Magistrale in Matematica (47 h, CDA)
  - Metodi Numerici per la Data Science, Laurea Magistrale in Data Science (30 h, CDI)
  - Modelli Decisionali e Ottimizzazione, Laurea Magistrale Data Science, (48 h, CDI)
  - Metodi Numerici per la Bioinformatica (integrato con Fondamenti di Matematica per l'analisi dei dati), Laurea Magistrale in Bioinformatica (56 h, CDI)
  - Metodi Numerici in Data Science, Laurea Triennale in Matematica, (32 h, CDA)
- A.A 2021/2022
  - Metodi di Ottimizzazione per la Data Science, Laurea Magistrale in Matematica (60 h, CDA)
  - Metodi Numerici per la Data Science, Laurea Magistrale in Data Science (30 h, CDI)
  - Modelli Decisionali e Ottimizzazione, Laurea Magistrale in Data Science, (48 h, CDI)
  - Metodi Numerici in Data Science, Laurea Triennale in Matematica, (32 h, CDA)
- A.A 2020/2021
  - Metodi di Ottimizzazione per la Data Science, Laurea Magistrale in Matematica (60 h, CDA)
  - Metodi Numerici per la Data Science, Laurea Magistrale in Data Science (62 h, CDI)
  - Modelli Decisionali e Ottimizzazione, Laurea Magistrale in Data Science, (48 h, CDI)
  - Metodi Numerici in Data Science, Laurea Triennale in Matematica, (32 h, CDA)
- A.A 2019/2020
  - Metodi di Ottimizzazione per la Data Science, Laurea Magistrale in Matematica (60 h, CDA)
  - Metodi Numerici per la Data Science, Laurea Magistrale in Data Science (62 h, CDI)
  - Numerical Methods for Computer Science, Laurea Magistrale in Computer Science (in English), (62 h, CDI)
- A.A. 2018/2019
  - Numerical Methods for Computer Science, Laurea Magistrale in Computer Science (in English), (124 h, CDI)
  - Tecniche di Ottimizzazione, Laurea Magistrale in Matematica (30 h, CDA)

- A.A. 2017/2018
  - Numerical Methods for Computer Science, Laurea Magistrale in Computer Science (in English), (124 h, CDI)
  - Tecniche di Ottimizzazione, Laurea Magistrale in Matematica (30 h, CDA)
- A.A. 2016/2017
  - Metodi Numerici in Informatica (124 h, CDI)
  - Metodi Numerici di Ottimizzazione, Laurea Magistrale in Matematica (30 h, CDA)
- A.A. 2015/2016
  - Metodi Numerici in Informatica (124 h, CDI)
  - Metodi Numerici di Ottimizzazione, Laurea Magistrale in Matematica (30 h, CDA)
- A.A. 2014/2015
  - Metodi Numerici in Informatica (124 h, CDI)
  - Metodi Numerici di Ottimizzazione, Laurea Magistrale in Matematica (60 h, CDA)
- A.A. 2013/2014
  - Metodi Numerici in Informatica (Moduli A e B), Laurea Magistrale in Informatica (124 h, CDI)
  - Metodi Numerici di Ottimizzazione, Laurea Magistrale in Matematica (60 h, CDA)
- A.A. 2012/2013
  - Metodi Numerici in Informatica (Moduli A e B), Laurea Magistrale in Informatica (124 h, CDI)
- A.A. 2011/2012
  - Laboratorio di Programmazione e Calcolo, Laurea triennale in Scienza dei Materiali (69 h, CDI)
  - Metodi Numerici per l'Informatica (modulo B), Laurea Magistrale in Informatica (62 ore, CDI)
- A.A. 2010/2011
  - Laboratorio di Programmazione e Calcolo (3cfu), Laurea Triennale in Scienza dei Materiali (45 h);
  - Metodi Numerici per l'Informatica (modulo B), Laurea Magistrale in Informatica (62 ore, CDI)
  - Tecniche Numeriche Avanzate per l'Elaborazione del Segnale (6cfu), Laurea Magistrale in Informatica (60 h, CDA).
- A.A. 2009/2010
  - Metodi Numerici per l'Informatica (modulo B), Laurea Magistrale in Informatica (62 ore, CDI)
  - Tecniche Numeriche Avanzate per l'Elaborazione del Segnale (10cfu), Laurea Magistrale in Informatica (80 h, CDA)
- A.A. 2008/2009
  - Laboratorio Matematico-Informatico, Laurea Triennale in Matematica (32 h)
  - Metodi Numerici per l'Informatica (modulo B), Laurea Magistrale in Informatica (62 h)
  - Metodi Numerici per l'Informatica II, Laurea Magistrale in Informatica (80 h)
- A.A. 2007/2008
  - Laboratorio Matematico-Informatico, Laurea Triennale in Matematica (32 h)
  - Metodi Numerici per l'Informatica, Dottorato di Ricerca in Informatica, XXII ciclo (30 h).
- A.A. 2006/2007
  - Metodi Numerici per le Decisioni, Laurea Specialistica in Informatica (82 h)
- A.A. 2005/2006

- Metodi Numerici per le Decisioni, Laurea Specialistica in Informatica (40 h)
- Calcolo Numerico, Laurea Triennale in Informatica e videoconferenza Brindisi (Corsi B/C) (62 h, affidamento)
- A.A. 2004/2005:
  - Calcolo Numerico, Laurea Triennale in Informatica e videoconferenza Brindisi, (62 h, affidamento);
  - Metodi per le decisioni, Laurea Specialistica in Informatica (40 h)
- A.A. 2003/2004
  - Calcolo Numerico, Laurea Triennale in Informatica e videoconferenza Brindisi, (62 h, affidamento);
  - Calcolo Numerico (Corso B), Laurea Triennale in Informatica (32 h);
  - Metodi per le decisioni, Laurea Specialistica in Informatica e Laurea in Matematica (40 h)
  - Tecniche di Simulazione, Laurea Triennale in Informatica e Comunicazione Digitale, (15 h)
- A.A. 2002/2003
  - Calcolo Numerico, Laurea Triennale in Informatica e videoconferenza Brindisi (62 h, affidamento);
  - Metodi di Approssimazione, Laurea in Informatica e Laurea in Matematica (50 h)
  - Calcolo Numerico, Laurea in Informatica (50 h)
  - Tecniche di Simulazione, Laurea Triennale in Informatica e Comunicazione Digitale (15 h);
- A.A. 2001/2002:
  - Metodi di Approssimazione, Laurea in Informatica, la Laurea in Matematica (50 h)
  - Calcolo Numerico, Laurea in Informatica (50 h);
  - Tecniche di Simulazione, Laurea in Informatica, la Laurea Triennale in Informatica e Comunicazione Digitale (20 h)
  - Series of seminars entitled "Linguaggio Simula e suo utilizzo nella simulazione di sistemi a code", Master in Metodi quantitativi ed Informatica a supporto delle Decisioni economiche, Università degli Studi di Bari (30 h)
- A.A. 2000/2001
  - Laboratorio di Programmazione e Calcolo, Laurea Triennale in Chimica e Tecnologie Farmaceutiche (20 h)
  - Metodi di Approssimazione, Laurea in Informatica e la Laurea in Matematica (50 h)
  - Calcolo Numerico, Laurea in Informatica (50 h)
  - Tecniche di Simulazione, Laurea in Informatica (20 h)
- A.A. 1999/2000
  - Ricerca Operativa, Laurea in Informatica (20 h)
  - Metodi Numerici per l'Ingegneria, Laurea in Ingegneria per l'ambiente ed il territorio, Seconda Facoltà di Ingegneria del Politecnico di Bari (20 h)
- A.A.1998/1999
  - Graduate Teaching Assistant for the course MATH005-Matrices and Multivariable Calculus, Department of Mathematical Sciences, University of Bath, U.K. (20 h)

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### Publications

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## References

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