Paola Lecca

Curriculum Vitae

Personal information

First name Paola Last name Lecca



Education

12/2006 PhD In Computer Science and Telecommunications, IECS (former ICT) **Doctoral School, University of Trento, Italy**

Thesis: Modelling and simulating system biology with stochasticity (Advisor: Prof. C. Priami, currently at the Department of Computer Science of University of Pisa, Italy and The Microsoft Research - University of Trento, Centre for Computational and Systems Biology (COSBI), Italy.)

06/1997 M. Sc. Theoretical Physics, Italy

Thesis: Thermodynamical properties of black holes Contribution of the electromagnetic field to the entropy of a Schwarzschild black hole. (Supervisor Dr. G. Cognola - University of Trento, Italy)

07/1992 **Diploma**

Liceo Scientifico Galileo Galilei, Trento, Italy.

Habilitation

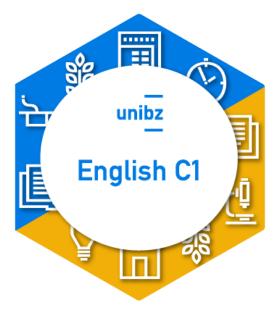
Abilitazione Scientifica Fisica Applicata, Didattica e Storia della Fisica

Nazionale 02/D1 - FIS/07: Fisica applicata (a beni culturali, ambientali, biologia e medicina) Valid from 10/07/2020 to 10/07/2032.

Languages

Italian Mother tongue

English C1 level of the CEFR, in oral, and written production and in reading and listening. Open badge from University of Bozen-Bolzano available at https://bestr.it/verify/ONQNTQ5KZK



German B1 level of the CEFR, in oral, and written production and in reading and listening. Open badge from University of Bozen-Bolzano available at https://bestr.it/verify/1HCEOA2GAO



Spanish A2 on test of Sprachtest.de of Provinz Bozen

Recent work experience

From July 2019 to Assistant Professor (RTD-A) at the Faculty of Computer Engineering (ex June 2025 Faculty of Computer Science) of the Free University of Bozen-Bolzano, Italy

At the Faculty of Computer Science of the Free University of Bozen-Bolzano, where I carried on research activity on mathematical modelling of complex systems. In particular, I focused on the developing of innovative theoretical frameworks and computational methods to understand and forecast the behavior of systems with numerous interrelated parts and emergent properties. Typical applications of my research concern the dynamics of non-linear physical systems (such as incompressible and non-stationary flow fluids mainly for bioengineering application and medical device implementation), the dynamics of biological networks (such as gene networks, metabolic, biochemical and protein-protein networks), the dynamics of virus-host interactions, and drug metabolism. This includes model inference from experimental data (through techniques of high dimensional statistics), analyzing their behaviour, and using them for simulation and prediction. My research relied on the innovation of the theoretical foundations and computational aspects of graph theory, dynamical networks inference, modelling and analysis, control theory, and statistical inference. As far as the modelling part is concerned, I focused on the development of numerical and deep learning methods (e.g. Physical Informed Neural Network) for solving systems of differential equations (including partial and fractional), in particular for the simulation of reaction-diffusion systems in compartmentalised and complex geometry (e.g. intra- and inter-cellular environment).

Regarding the analysis of static and dynamic properties of networks describing complex systems, I have developed innovative analysis precedures that integrate concepts and approaches typical of information theory (such as transfer entropy) with concepts derived from geometry (such as the latent metric space of a network). Of particular relevance in my research activities has been the development of theoretical frameworks and implementation procedures for the determination of the latent geoemtria of a network, an inherent property of a complex system that I have shown to determine its dynamics.

In parallel with pure and applied research activities I carried out technology transfer activities at the Smart Data Factory (SDF) laboratory of the Faculty of Engineering, University of Bozen/Bolzano. I worked to promote technology transfer of the research products of the Faculty to the industrial world in the regional and national territory. As SDF member I have been also engaged in teaching courses for companies and promoting the activities of the Bozen Engineering Faculty also to schools visiting the SDF laboratory.

Bibliometric indices

Update as of July 30 2025

Please refer to the web page of the indexing databases for any update of the values reported here. If the link to the database does not work, copy and paste it into a browser.

Google Scholar

Number of documents: 190

Since 1998 Since 2020 555 Citations 1338 19 h-index 12 i10-index 38 16 Google Scholar web page

https://scholar.google.com/citations?user=MH6tZcUAAAAJ&hl=en

Since 1998 Scopus

Documents 108 Citations 822 h-index 15

Author position first: 62% (from 2015 to 2024) last: 13%

coauthor: 6% single author: 19%

Scopus web page

https://www.scopus.com/authid/detail.uri?authorId=55929331600

Since 1998 Web of Science (WoS)

Documents 71 indexed by WoS,

68 WoS Core Collection publications

h-index 12 Author position first: 70% last: 15%

corresponding: 64%

Web of Science web page

https://www.webofscience.com/wos/author/record/AAJ-2457-2021

Since 1998 Loop (Frontiers)

Documents151Total views66116Profile view2776Publication downloads12897Publication views63340Networks20Editorial contributions20

Loop web page

https://loop.frontiersin.org/people/201561/overview

Work experience list

July 2019 - June 2025 Assistant Professor

Faculty of Engineering (ex Faculty of Computer Science), Free University of Bozen-Bolzano, Italv.

Feb 2019 - Dec 2019 Teaching assistant (see "Teaching section")

University of Trento, Italy.

Feb 2018 - Feb 2019 Research fellow

Department of Mathematics of University of Trento, Italy, and Scholarship holder at the Dept. of Medicine of University of Verona.

Dec 2017 - Feb 2018 Research fellow

eCrime, ITC, Law and Criminology of the Law Faculty of University of Trento, Italy, and Scholarship holder at the Dept. of Medicine of University of Verona, Italy.

Dec 2016 - 2017 Research fellow

Department of Mathematics of University of Trento, Italy, and Scholarship holder at the Dept. of Medicine of University of Verona.

Dec 2015 – 2016 Research fellow

Research Group OptHySys at the Department of Mathematics, University of Trento, Italy

Nov 2012 - Sept 2015 Research fellow

Centre for Integrative Biology (CIBIO), University of Trento

Jan 2011 - Oct 2012 Researcher / Principal Investigator

Leader of the "Network Identification" group, The Microsoft Research - University of Trento, Centre for Computational and Systems Biology (COSBI).

2007 Visiting scientist

Institute for Systems Biology, Seattle, USA.

2006 - 2010 Researcher

Researcher, The Microsoft Research - University of Trento, Centre for Computational and Systems Biology (COSBI).

Oct 2003 - 2006 PhD Student

Ph. D. Student in Bioinformatics, Department of Information Engineering and Computer Science, University of Trento (Italy).

2003 Research assistant

Bioinformatics research unit, Department of In-formation Engineering and Computer Science, University of Trento (Italy).

2001 - 2002 Research assistant

Nuclear and sub-nuclear physics research unit, Department of Physics of University of Trento, Italy.

1998 - 2000 Researcher

Predictive Models for Biomedicine and Environment research unit, Fondazione Bruno Kessler - Scientific and Technological Research (Trento, Italy),

Visiting affiliation and affiliate membership

2007 Visiting scientist

Institute for Systems Biology, Seattle, USA.

From 2019 to the **Affilaite Member**

present Member of the National Group for Mathematical Analysis, Probabilityand their Applications, Francesco Severi National Institute of High Mathematics, Città Universitaria - P.le Aldo Moro 5, 00185 Rome, Italy - Research Unit of University of Trento, Italy (https://www.maths.unitn.it/111/indam-a-trento.)

From 2019 to the **Affiliate Member**

present Member of the IoT Digital Innovation Hub, of AIR Institute, Salamanca, Spain. Web page: https://innovationhub.es/team, https://air-institute.com/.

Teaching

The average duration of each course listed here is 45 hours. Courses of Teaching assigned by Free University of Bozen-Bolzano have a duration of 60 hours.

2002/2003 **Teaching assistant**

Computer Science Methods, for Masters students in Physics, University of Trento, Italy

2004/2005 Lecturer

Computational Biology, for Masters students in Bioinformatics, University of Trento, Italy

2005/2006 Lecturer

Computational Biology, for Masters students in Bioinformatics, University of Trento, Italy

2006/2007 Lecturer

Simulation of Biological Systems, for Masters students in Bioinformatics, University of Trento, Italy

2007/2008 Lecturer

Simulation of Biological Systems, for Masters students in Bioinformatics, University of Trento, Italy

2007 Lecturer

Stochastic chemical kinetics, for Masters students in Bioinformatics at COSBI, Trento, Italy

2008/2009 Lecturer

Simulation of Biological Systems, for Masters students in Bioinformatics, University of Trento, Italy

2012/2013 **Teaching assistant**

Mathematical Analysis and Statistics II, for Bachelors students in Biomolecular Sciences and Technology, University of Trento, Italy

2013/2014 Teaching assistant

Mathematical Analysis and Statistics II, for Bachelors students in Biomolecular Sciences and Technology, University of Trento, Italy

2014/2015 **Teaching assistant**

Mathematical Analysis and Statistics II, for Bachelors students in Biomolecular Sciences and Technology, University of Trento, Italy

2015/2016 Teaching assistant

Mathematical Analysis and Statistics II, for Bachelors students in Biomolecular Sciences and Technology, University of Trento, Italy

2016/2017 Teaching assistant

Biostatistics, for Master Degree students in Quantitative and computational biology, CIBIO - University of Trento, Italy

2016/2017 **Teaching assistant**

Mathematical aspects of Bio-electromagnetism and Imaging for Master Degree students in Mathematics, University of Trento, Italy

2016/2017 **Teaching assistant**

Statistics for Stochastic Processes for Master Degree Students in Mathematics, University of Trento, Italy

2016/2017 **Teaching assistant**

Mathematical Analysis and Statistics I for Bachelor students in Biomolecular Science and Biotechnologies, University of Trento, Italy

2016/2017 **Teaching assistant**

Foundations of Computer Science for Bachelor students in Civil, Environmental and Mechanic Engineering, University of Trento, Italy

2016/2017 **Teaching assistant**

Mathematical Analysis and Statistics II, for Bachelors students in Biomolecular Sciences and Technology, University of Trento, Italy

2016/2017 **Teaching assistant**

Physiological Flow and Transport in Porous Tissue, for Master Degree students in Mathematics, University of Trento, Italy

2017/2018 **Teaching assistant**

Biostatistics, for Master Degree students in Quantitative and Computational Biology, CIBIO - University of Trento, Italy

2017/2018 **Teaching assistant**

Geometry I, Department of Physics, University of Trento, Italy.

2017/2018 **Teaching assistant**

Foundations of Computer Science, Department of Mathematics, University of Trento, Italy

2017/2018 **Teaching assistant**

of Physiological Flow and Transport in Porous Tissue, for Master Degree students in Mathematics, University of Trento, Italy

2017/2018 **Teaching assistant**

Mathematical Analysis and Statistics II, for Bachelors students in Biomolecular Sciences and Technology, University of Trento, Italy

2018/2019 **Teaching assistant**

Biostatistics, for Master Degree students in Quantitative and Computational Biology, CIBIO - University of Trento, Italy

2018/2019 **Teaching assistant**

Geometry I, Department of Physics, University of Trento, Italy

2018/2019 **Teaching assistant**

Foundations of Computer Science, Department of Mathematics, University of Trento, Italy

2018/2019 **Teaching assistant**

Physiological Flow and Transport in Porous Tissue, for Master Degree students in Mathematics, University of Trento, Italy

2018/2019 Teaching assistant

Mathematical Analysis and Statistics II, for Bachelors students in Biomolecular Sciences and Technology, University of Trento, Italy

2019/2020 Teaching assistant

Geometry, for Bachelors students Physics, University of Trento, Italy

2019/2020 Lecturer

Statistics for Data Science for Master students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2019/2020 Lecturer

Statistics for Data Science for Master students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2019/2020 **Teaching assistant**

Analysis for Bachelor students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2020/2021 Lecturer

Statistics for Data Science for Master students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2020/2021 **Teaching assistant**

Analysis for Bachelor students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2021/2022 **Lecturer**

Mathematics and Statistics for Data Science for Master students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2021/2022 **Teaching assistant**

Analysis for Bachelor students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2022/2023 Lecturer

Mathematics and Statistics for Data Science for Master students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2022/2023 **Teaching assistant**

Analysis for Bachelor students in Computer Science, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

2023/2024 Lecturer

Mathematics and Statistics for Data Science for Master students in Computer Science, Faculty of Engineering, Free University of Bozen-Bolzano, Italy

2023/2024 Lecturer

Preparatory Course in Mathematics for Bachelor students in Computer Science, Faculty of Engineering Free University of Bozen-Bolzano, Italy

2024/2024 Lecturer

Mathematics and Statistics for Data Science for Master students in Computer Science, Faculty of Engineering, Free University of Bozen-Bolzano, Italy

2024/2025 **Lecturer**

Preparatory Course in Mathematics for Bachelor students in Computer Science, Faculty of Engineering Free University of Bozen-Bolzano, Italy

Theses supervision

2023 Co-supervisor (Bachelor thesis)

Unveiling the Transcriptomic GeneExpression Landscape of Chronic MyeloidLeukemia using Google's PageRankAlgorithmFrancesco Mazzini

Student: Francesco Mazzini, Faculty of Engineering, Free University of Bzen-Bolzano, Italy

Supervisor: Bruno Carpentieri

Co-Supervisor: Paola Lecca, Faculty of Computer Science, Free University of Bozen-

Bolzano, Italy

Course: Master degree in Computer Science, University of Trento, Italy

2020 Co-supervisor (Master thesis)

A mathematical model for the metabolism and mechanism of action of the chemotherapy drug gemcitabine

Student: Yasmin Valer, Department of mathematics, University of Trento, Italy

Supervisor: Alberto Bellin

Co-Supervisor: Paola Lecca, Faculty of Computer Science, Free University of Bozen-Bolzano, Italy

Course: Master degree in Computer Science, University of Trento, Italy

2014 Supervisor (Master thesis)

COMPARATIVE TOPOLOGICAL ANALYSIS APPROACHES FOR GENE NETWORKS INFERRED FROM RNA-SEQ HUMAN DATA

Student: Nadir Sella, Department of Information Engineering and Computer Science, University of Trento, Italy

Supervisors: Paola Lecca, Francesca Demichelis, Department of Cellular, Computational and Integrative Biology - CIBIO

Course: Master degree in Computer Science, University of Trento, Italy

2011 Co-supervisor (Master thesis)

DESIGNING CORRELATION-BASED METHODS FOR BIOLOGICAL NETWORK INFERENCE Autori: Alessandro Casagrande, Department of Information Engineering and Computer Science, University of Trento, Italy

Supervisor: Corrado Priami, Department of Information Engineering and Computer Science, University of Trento, Italy

Co-supervisor: Paola Lecca, The Microsoft Research - University of Trento Centre for Computational and Systems Biology, Italy

Course: Master degree in Computer Science, University of Trento, Italy

2010 Co-supervisor (Ph.D. thesis)

MODELLING AND INFERENCE STRATEGIES FOR BIOLOGICAL SYSTEMS

Autori: Alida Palmisano, Department of Information Engineering and Computer Science, University of Trento, Italy

Supervisor: Corrado Priami, Department of Information Engineering and Computer Science, University of Trento, Italy

Co-supervisor: Paola Lecca, The Microsoft Research - University of Trento Centre for Computational and Systems Biology, Italy

Course: PhD in Computer Science and Telecommunications, University of Trento, Italy

2008 Supervisor (Master thesis)

MODELLING AND SIMULATING WITH "BLEN X" THE YEAST GENETIC REGULATORY NETWORK OF GALACTOSE METABOLISM

Student: Rosaline Hanna

Supervisor: Paola Lecca, The Microsoft Research - University of Trento Centre for Computational and Systems Biology, Italy

Co-supervisor: Corrado Priami, Department of Information Engineering and Computer Science, University of Trento, Italy

Course: Master degree in Computer Science, University of Trento, Italy

2008 Supervisor (Master thesis)

A BLENX MODEL OF YEAST PHEROMONE RESPONSE PATHWAY

Autori: Eileen Marie Hanna

Supervisor: Paola Lecca, The Microsoft Research - University of Trento Centre for

Computational and Systems Biology, Italy

Co-supervisor: Corrado Priami, Department of Information Engineering and Computer

Science, University of Trento, Italy

Course: Master degree in Computer Science, University of Trento, Italy

Tutorials

2009 Diffusion and space

The Microsoft Research - University of Trento, Centre for Computational and Systems Biology, April 2009.

2009 Biochemical kinetics, Inference and Missing data

The Microsoft Research - University of Trento, Centre for Computational and Systems Biology, April 2009.

2010 Models of diffusion coefficient in a non-homogeneous non-well-stirred reaction-diffusion system

Fourth UKSim European Symposium on Computer Modeling and Simulation, 2010, pp. xxii-xxiii, doi: 10.1109/EMS.2010.12

Teaching assignments from foreign institutions

April 2025 Invited lecturer

Invited lecturer. Lecture entitled "Integrating latent network geometry into mechanistic modeling of the network dynamics" at the Lecture series Causal Analysis of Biomedical Data, organised by Luxembourg Centre of Systems Biomedicine of the University of Luxembourg.

Organizational/Communication skills

Since 2010 Conferences, Workshops, Symposia

- 1. Bioinformatics: from observation to data analysis 2025, April 16 and April 30 2025, webinar series, Free University of Bozen-Bolzano, Italy (Organizer: Paola Lecca, Unibz, Italy)
- 2. Program Committee member of Artificial Intelligence Approaches for Network Analysis, workshop of The International Conference on Computational Science (ICCS) 2025.
- 3. Data4SmartHealth 2024, 28 November 2024, Free University of Bozen-Bolzano, Italy (organizers: Floriano Zini and Paola Lecca, Unibz, Italy)
- 4. Technical Program Committee member of International Workshop on Foundations of Network Analysis, held in conjunction with IEEE BIBM 2024, Lisbon, Portugal December 3-6, 2024
- 5. Program committee member of 16th IEEE International Conference on Knowledge and Systems Engineering (KSE 2024), Eastin Hotel Kuala Lumpur, Malaysia 5-7 November 2024
- 6. Program committee member of 2nd Workshop on Foundations of Network Analysis, held in conjunction with IEEE BIBM 2023, Istanbul, Turkey, December 5-8, 2023
- 7. Program committee member of 15th IEEE International Conference on Knowledge and Systems Engineering (KSE 2023), October 18-20, 2023, Ha Noi, Vietnam
- 8. Program committee member of ICCS INTERNATIONAL CONFERENCE ON COMPUTATIONAL SCIENCE (Workshop on Network Models and Analysis: From Foundations to Complex Systems), Prague, Czech Republic, 3-5 July, 2023 2023
- Technical Program Committee member of VPH 2022 CONFERENCE VIRTUAL PHYSI-OLOGICAL HUMAN, Digital twins for personalized treatment development and clinical trials 6 - 9 September 2022, Porto, Portugal.
- 10. Technical Program Committee member of 2022 4th International Applied Mathematics, Modelling and Simulation Conference (AMMS 2022) jointly held with 2022 5th International Conference on Mathematics and Statistics (ICoMS 2022) from June 17-19, 2022 in Paris, France.

- Technical program committee member of the 13th International Conference on KNOWL-EDGE AND SYSTEMS ENGINEERING (KSE 2021), November 10-12, 2021, Bangkok, Thailand & Online - Special Session on Bioinformatics and Computational Biology – BCB2021.
- 12. Organizer of "Multi-physics modelling" special session at 17th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering and the 5th Conference on Imaging and Visualization, 7 9 September 2021 (online).
- 13. Organizer of Bioinformatics and Computational Biology Track at the 36th ACM/SIGAPP Symposium On Applied Computing Virtual Conference, March 22-March 26, 2021.
- 14. KSE: Knowledge and Systems Engineering, Special Session Bioinformatics and Computational Biology BCB2020, 12-14 November 2020, Chan Tho, Viet Nam.
- 15. Track Chair of Bioinformatics Track at ACM SAC 2020, Brno, Czech Republic March 30-April 3, 2020.
- 16. Organizer committee member of CMBBE 2019: The 16th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering and 4th Conference on Imaging and Visualization, 14 16 August 2019, New York City, United States.
- 17. Organizer of Special Session on Bioinformatics and Computational Biology BCB2019 Da Nang, Vietnam October 24-26, 2019.
- 18. Member of the technical advisory panel 16th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering and the 4th Conference on Imaging and Visualization, 14- 16 August 2019, in New York City, United States of America.
- 19. Track Chair of VipIMAGE 2019: VII ECCOMAS Thematic Conference on Computational Vision and Medical Image processing, October 16-18, 2019, Porto, Portugal.
- 20. Track Chair of Bioinformatics Track at ACM SAC 2019, Limassol, Cyprus, 8-12 April 2019
- 21. Program Comittee Member of MICCAI2018 workshop on Bio-Imaging and Visualization for Patient-Customized Simulations, Septmeber 16-20, 2018, Granada, Spain.
- 22. Track Chair of Bioinformatics Track at ACM SAC 2018, April 9 13, Pau, France 2018.
- 23. Program Commetee Member of CIBB2018: Computational Intelligence methods for Bioinformatics and Biostatistics, Caparica, Portugal, 6-8 September 2018.
- 24. Program Commetee Member of 15th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering and 3rd Conference on Imaging and Visualization, CMBBE2018, Lisbon, Portugal 26-29 March 2018.
- 25. Program Comittee Member of CIBB2017: Computational Intelligence methods for Bioinformatics and Biostatistics, 7-9 September 2017, Cagliari, Italy.
- 26. Program Commetee Member of International Conference VIPIMAGE VI ECCOMAS Thematic Conference on Computational Vision and Medical Image processing, October 18-20, 2018, in Axis Vermar Conference & Beach Hotel, Porto, Portugal.
- 27. Bio-Imaging and Visualization for Patient-Customized Simulations (BIVPCS), in Quebec City, Canada, on September 14, 2017.
- 28. Program Committee Member of International Conference VIPIMAGE VI ECCOMAS Thematic Conference on Computational Vision and Medical Image Processing, October 18-20, 2017
- 29. Track Chair of Computational Biology and Bioinformatics Track at ACM SAC 2017, March 27 31, Marrakesh, Morocco 2017.
- Track Chair of Computational Biology and Bioinformatics Track at ACM SAC 2016, April 4 - 8, Pisa 2016, Pisa, Italy.
- 31. Track Chair of VipIMAGE 2015: V ECCOMAS Thematic Conference on Computational Vision and Medical Image Processing, October 19-21, 2015, in H10 Costa Adeje Palace, Costa Adeje, Tenerife, Spain
- 32. Track Chair of Computational Biology and Bioinformatics Track at ACM SAC 2015, April 13 17, Salamanca 2015, Salamanca, Spain.
- 33. Co-organizer of 3S Biology Summer School, Centre for Integrative Biology, University of Trento, September 8-11, 2014, Trento, Italy.
- 34. Track Chair of BioHealth Informatics Track at ACM SAC 2014, March 24 28, 2014, Gyeongju, Korea.
- 35. Track Chair of Bioinformatics Track at ACM SAC 2013, March 18 22, 2013, Coimbra Portugal
- 36. Conference vice-chair of ACM SAC 2012, Riva del Garda (Italy), March 26-29, 2012.

- 37. Track Chair of Bioinformatics Track at ACM SAC 2011, Tunghai University, Taichung, Taiwan.
- 38. Program Committee Member of SIMUL 2012, The Fourth International Conference on Advances in System Simulation November 18-23, 2012, Lisbon, Portugal.
- 39. Program Committee Member of SIMUL 2011, The Third International Conference on Advances in System Simulation, October 23-29, 2011 - Barcelona, Spain
- 40. Program Committee Member of Complmage2012, Computational Modelling of Objects presented in Images, Rome 5-7 September 2012.
- 41. Program Committee Member of Int. Conference EUROMEDIA 2010, April 14-16, 2010, UPV Gandia, Gandia (Workshop on Medical Imaging Systems)
- 42. Track Chair of ACM SAC 2010 Track of Bioinformatics and Computational Systems Biology, March 22-26 Sierre, Switzerland 2010.
- 43. Program Committee Member of International Symposium on Biocomputing (ISB 2010) 15 17 February 2010, Calicut, Kerala, India.

Third mission activities

2025

Since 2022 to June Courses for companies

- o "Artificial Intelligence (and more) to manage and exploit corporate data" "Intelligenza Artificiale (e non solo) per gestire e sfruttare i dati aziendali" - 6 hours per edition (2 editions Nov 2022 and Jan 2023). Corsi per le aziende nell'ambito del progetto del Fondo Sociale Europeo "Smart Enterprise Qualification Program - Programma di qualificazione per la l'azienda intelligente" della Facoltà di Scienze e Tecnologie informatiche codice FSE30771, CUP B51B22000550008.
- o "Managing and exploiting data with artificial intelligence" "Gestire e sfruttare i dati con l'intelligenza artificiale"'; Course European Digital Innovation Hub (EDIH) Bolzano. Fund Next Generation EU - Piano Nazionale di Ripresa e Resilienza (PNRR) MISSIONE 4 Istruzione e ricerca - Componente 2 Dalla ricerca all'impresa. First edition on May 2025.

May 2024 Initiatives of school guidance and interaction with schools of all levels

 Visit IISS (Istituto Istruzione Secondaria Superiore) Gandhi Meran at NOI Techpark, Bolzano/Bozen 2024: presentation of Smart Data Factory active research projects.

December 2022 Articles in Italian press on bioinformatics researches for Chronic Myeloid Leukemia

- Oll Fatto Quotidiano, 17 Dicembre 2022, "Così l'informatica può aiutare la ricerca per lo sviluppo di farmaci efficaci". https://www.ilfattoquotidiano.it/2022/12/17/leucemia-cosi-linformatica-puo-aiutare-laricerca-per-lo-sviluppo-di-farmaci-efficaci/6908006/
- O 30sciences, 15 Dicembre 2022, "Ricerca Italiana: lotta contro la leucemia e riparazione del genoma, la ricerca di Unibz e dell'Università di Verona". https://30science.com/2022/12/news/ricerca-italiana-lotta-contro-la-leucemia-e-riparazionedel-genoma-la-ricerca-di-unibz-e-delluniversita-di-verona/

February - April 2021 Articles in local press and radio broadcasts on: organoids' volume calculation from medical images in the service of cystic fibrosis research

- Pianeta salute: https://www.pianetasaluteonline.com/tag/bruno-carpentieri-lacs-lab/
- O Podcast: Greenwich Rai Bolzano: http://www.raibz.rai.it/feed.php?id=15
- O LaborPraxis: Mathematisches Modell Analyse von Organoiden im Kampf gegen Mukoviszidose (https://www.laborpraxis.vogel.de/analyse-von-organoiden-im-kampf-gegenmukoviszidose-a-1017299/?cmp=beleg-mail)
- Academa UniBZ: https://www.academia.bz.it/articles/neue-bildverarbeitende-methodenbeschleunigen-medikamentenstudien
- 24ore News: https://www.24orenews.it/salute-a-benessere/salute/85408-fibrosi-cisticanuovi-metodi-di-elaborazione-delle-immagini-accelerano-gli-studi-sui-farmaci
- Dolomiten, Feb 5 2021: Mukoviszidose: Ein Kick für Medikamentenstudien UNI BOZEN: Neue bildgebende Methode entwickelt
- Alto Adige Innovazione, Feb 4 2021: https://www.altoadigeinnovazione.it/fibrosicistica/
- InSalute, Feb 4 2021 http://www.insalutenews.it/in-salute/fibrosi-cistica-accelerati-gli-

studi-sui-farmaci-con-nuovi-metodi-di-statistica-avanzata-per-lelaborazione-di-immagini/

 InSalute, Feb 4 2021: https://www.suedtirolnews.it/unterhaltung/kultur/unibz-beschleunigtemedikamentenstudien

May 2020 Studium generale, Free University of Bozen-Bolzano, Italy

Lectures for the course "Nove equazioni che hanno cambiato il mondo / Nine equations that changed the world", managed by Prof. Bruno Carpentieri (Faculty of Computer Science, Free University of Bozen-Bolzano, Italy)

- Use of mathematics in cancer research.
- Use of mathematics in pharmaceutical research. Part I: chemical kinetics.
- O Use of mathematics in pharmaceutical research. Part IIa: drug dissolution and drug absorption kinetics.
- O Use of mathematics in pharmaceutical research. Part IIb: Monte Carlo simulation of drug release.

Organizational / managerial skills

Redearch group leadership

The Microsoft research - University of Trento, Centre for Computational and Systems Biology, Italy

I held the Head of the Laboratory of Knowledge Inference and Data Manipulation at COSBI University of Trento, Italy from 2011 to 2012. As principal Investigator I coordinated the research activities of the laboratory, that were principally focused on

- the inference of biological networks from experimental omics data,
- o and sensitivity analysis of network models.

The research activities has been carried out in robust and sustained collaborations with biologists and medical researchers at both Italian and foreign universities and research centres. The investigations identified the experimental data needed to build accurate and predictive models of biological systems. The investigations had two main goals:

- o developing of efficient, tailored, and data integrative mathematical procedures to infer and analyze topological and causal structures among components and interactions of a biological system;
- o developing experimental designs and statistical survey for the collection of highthroughput omics data useful to the construction of accurate and predictive model of biological processes.

At COSBI, my research studies interfaced with systems pharmacology, molecular nutrition and ecology, to support the development of models from experimental data with computational procedures of inference, data quality assessment, statistical analysis and sensitivity analysis. All these activities were complementary and synergistic to the research areas of Network Analysis and Network Simulation defined in the COSBI scientific plan.

School organization Department of Cellular, Computational and integrative biology - CIBIO, and direction University of Trento, Italy

System, Synthetic and Semantics biology (3S Summer School), Povo, Trento, Italy, 8th-11th September 2014.

Main research interests

The strongly multidisciplinary nature of my research lines and approaches over the past 20 years is reflected in equally multidisciplinary research intents spanning various disciplines (and their subareas) such as computer science, mathematics and physics, as detailed below.

Computer science Algorithms and Al approaches

- Graph analytics (algorithms for network analysis).
- Machine learning techniques for causal discovery.
- O Deep learning techniques for model calibration.
- O Physics Informed Neural Network for solving systems of differential equations.

Mathematics Applied mathematics and statistics

- Information theory.
- O Causal inference in high-dimensional systems.

- Numerical solution techniques for large linear and non-linear dynamic equation systems.
- Parametric and structural sensitivity analysis techniques (particularly for stochastic systems).
- O Tests of identifiability of dynamical systems.
- O Tests of observability of dynamical systems.
- O Tests of controllability of dynamical systems.
- O Computational models of hybrid (stochastic/deterministic) systems' dynamics.
- Optimization techniques for hybrid stochastic dynamical systems.
- Statistical analysis of stochastic processes.

Mathematics Pure mathematics

- Inverse problems.
- Control theory.
- Non-linear dynamical models.
- Inferential statistics.
- Graph theory.

Physics Applied physics

- O Biochemical kinetics and physical chemistry.
- Dynamics of non-linear biochemical systems.
- O Parametric and structural sensitivity analysis of dynamical network models
- Methods of statistical surveys, data quality assessment and link analysis in biophysics and biology

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- P. Lecca and C. Priami and C. Laudanna and G. Constantin, A BioSpi model of lymphocyte-endothelial interaction in inflamed brain venules. Biocomputing 2004, Proceedings of the Pacific Symposium, Hawaii, USA, 6-10 January 2004 2004
- 57. **P. Lecca** and C. Priami and C. Laudanna and G. Constantin. *Predicting cell adhesion probability via the biochemical stochastic* π -calculus. In Proceedings of "ACM Symposium on Applied Computing", Cyprus, pp. 211-212, 2004.
- 58. **P. Lecca** and C. Priami and C. Laudanna and G. Constantin, *Computer modeling of lymphocyte behavior in inflamed brain venules by using stochastic Pi-calculus*, Poster, 7th Int. Congress of neuroimmunology, Venice, September 27 October 02, 2004.
- 59. **P. Lecca**, *EXPLODET Project: methods of automatic data processing and analysis for the detection of hidden explosive*, In the Proceedings Book of International Workshop on Detecting Environmental, Industrial & Bio-Medical Signals, Editor M. de Palma, 2003.
- 60. G. Viesti, M. Lunardon, G. Nebbia, M. Barbui, M. Cinausero, E. Fioretto, G. Prete, A. Pantaleo, G. D'Erasmo, M. Palomba, M. Abbrescia, G. Iaselli, F. Loddo, V. Paticchio, T. Ranieri, R. Trentadue, A. Colla, A. Musso, A. Piccotti, F. Poggio, G. Dellacasa, I. Lazzizzera, P. Lecca, J. Obhodas, D. Sudac, K. Nad, V. Valkovic, A. Brusegan, J. Lobo and S. Hlavac, *The DIAMINE Landmine Detection System*, In the Proceedings Book of International Workshop on Detecting Environmental, Industrial & Bio-Medical Signals, M. de Palma Editor, (http://www.pd.infn.it/explodet/diamine.html) 2003.

Technical reports

- 1. **P. Lecca** and A. Ihekwaba, L. Demattè, and C. Priami, *Spatio-temporal dynamics of reaction diffusion systems: stochastic simulation of the bicoid gradient in Drosophila embryo*, Technical Report 5/2010, 2010.
- P. Lecca and C. Priami, Deterministic chemical chaos, The Microsoft Research -University of Trento Center for Computational and Systems Biology, Technical Report 12/2009, 2009.
- 3. **P. Lecca**, A. Palmisano and C. Priami, *Inferring kinetic parameters and their variances from a time series of concentrations*, The Microsoft Research University of Trento Center for Computational and Systems Biology, Technical Report 10/2009, 2009.
- P. Lecca, A. Palmisano, C. Priami and A. Ihekwaba, A noise-robust method for parameter inference in biochemical network models: an NF-kappaB case study, The Microsoft Research - University of Trento Center for Computational and Systems Biology, Technical Report 08/2009, 2009.
- 5. **P. Lecca** and A. Palmisano, *Inferring the kinetic constants of cyclin-triggered Cdc20 gene expression from mRNA experimental time-course data*, The Microsoft Research University of Trento Center for Computational and Systems Biology, Technical Report 02/2009, 2009.
- P. Lecca, On the mathematical structure of chemical kinetic models, The Microsoft Research - University of Trento Center for Computational and Systems Biology, Technical Report 01/2009, 2009.
- 7. **P. Lecca** and S. Teso, *Notes on stochastic simulation of chemical kinetics with cycle-leaping*, The Microsoft Research University of Trento Center for Computational and Systems Biology, Technical Report 19/2008, 2008.
- 8. **P. Lecca**, A. Palmisano and C. Priami, *Inferring rate coefficients of biochemical reactions from noisy data with KInfer*, The Microsoft Research University of Trento Center for Computational and Systems Biology, Technical Report 17/2008, 2008.
- P. Lecca, L. Dematté and C. Priami, Modeling and simulating bio-molecule diffusion in non-homogeneous solutions. Diffusive spatial effects on chaperone-assisted protein folding: a case study, The Microsoft Research - University of Trento Center for Computational and Systems Biology, Technical Report 16/2008, 2008.
- P. Lecca, A. Palmisano, C. Priami, and G. Sanguinetti, Calibration of biochemical network models, The Microsoft Research - University of Trento Center for Computational and Systems Biology, Technical Report 13/2008, 2008.
- 11. I. Fronza and **P. Lecca**, *Solving a system of Master Equations for parallel chemical interactions*, The Microsoft Research University of Trento Center for Computational ans System Biology, Technical Report 21/2007, 2007.
- P. Lecca, G. Sanguinetti, A. Palmisano and C. Priami, A new model for kinetic parameter estimation in biochemical reactions, The Microsoft Research - University of Trento Center for Computational ans System Biology, Technical Report 20/2007, 2007.
- P. Lecca. W. F. Ooi, and C. Priami, Rate sensitivity analysis of a Beta binders model of lymphocyte recruitment control mechanism, The Microsoft Research - University of Trento Center for Computational ans System Biology, Technical Report 18/2007, 2007.
- P. Lecca and M. Lecca, Molecular mechanism of energy metabolism in astrocytes: a parametric model from FDG- PET images, The Microsoft Research - University of Trento Center for Computational ans System Biology, Technical Report 07/2007, 2007.
- 15. **P. Lecca**, Simulating a faulty mechanism of protein folding in the pathogenesis of familial Parkinson's disease, The Microsoft Research University of Trento Center for Computational ans System Biology, Technical Report 06/2007, 2007.
- 16. **P. Lecca**, L. Dematté, and C. Priami, *Simulating reaction-diffusion with state-dependent diffusion coefficients*, The Microsoft Research University of Trento Center for Computational ans System Biology, Technical Report 04/2007, 2007.

Editorial activity

- 1. Editor of Article Collection in *Applied Artificial Intelligence* (Taylor & Francis), entitled *Advances in Explainable and Interpretable Artificial Intelligence for Medicine and Healthcare*, 2025
- 2. Associate Editor of Frontiers in Systems Biology, Switzerland Frontiers Media SA.
- 3. Book co-editor, "Big Data Analysis and Artificial Intelligence for Medical Sciences", Wiley 2024, Eds: Bruno Carpentieri, Paola Lecca.

- 4. Guest Editor of Expert Opinions in "Network bioinformatics" initiative Frontiers in Bioinformatics, 2022.
- 5. Editorial Board Member of Frontiers in Bioengineering and Biotechnology.
- 6. Guest Editor for Computational Genomics, Frontiers in Genetics.
- 7. Permanent Review Editor for Mathematical Biology, Frontiers in Applied Mathematics and Statistics.
- 8. Permanent Review Editor for Multiscale Mechanistic Modeling. Frontiers in Systems Biology.
- 9. Guest editor of Network-Oriented Approaches to Anticancer Drug Response, Frontiers in Bioengineering and Biotechnology 2020.
- 10. Editor of Biomechanics of cells and tissues: experiments, models and simulations, Springer Series in Lecture Notes in Computational Vision and Biomechanics, Springer 2012.
- 11. Editor of Systemic Approaches in Bioinformatics and Computational Systems Biology: Recent Advances, Co-editors: Dan Tulpan (National Research Council of Canada, Canada) and Kanagasabai Rejaraman (Institute for Infocomm Research, Singapore), IGI-Global Disseminator of Knowledge, 2012.
- 12. Member of the editorial board Computer Methods in Biomechanics and Biomedical Engineering: Imaging & Visualization Taylor and Francis Group.
- Member of the editorial board International Journal of Imaging and Robotics (ISSN 2231-525X) [formerly known as the "International Journal of Imaging" (ISSN 0974-0627)], CESER Publications.
- 14. Member of the editorial board International Journal of Biometrics and Bioinformatics, CSC Journal Kuala Lumpur Malaysia.

Reviewer service (accredited on Web of Science)

- 1. Reviewer for PLoS One, PLoS Computational Biology.
- 2. Reviewer for Molecular BioSystems, RCS Publishing.
- 3. Reviewer for Genomics, Elsevier.
- 4. Reviewer for Cancer Medicine, Wiley.
- 5. Reviewer for IEEE/ACM Transactions on Computational Biology and Bioinformatics
- 6. Reviewer for Journal of theoretical biology, Elsevier.
- 7. Reviewer for Frontiers for in Applied Matheamtics and Statistics
- 8. Reviewer for Frontiers for BMC Supplements
- 9. Reviewer for Frontiers in Genetics
- 10. Reviewer for Frontiers in Systems Biology
- 11. Reviewer for SoftwareX
- 12. Reviewer for BMC Bioinformatics
- 13. Reviewer for BMC Bioinformatics
- Reviewer for International Journal of Applied and Computational Mathematics, Springer Nature.

The information in this section can be found on the following web-pages:

- https://loop.frontiersin.org/people/201561/overview
- http://www.ceserp.com/cp-jour/index.php/ijir/pages/view/eb-ijir
- https://www.tandfonline.com/action/journalInformation?show= editorialBoard&journalCode=tciv20
- https://www.igi-global.com/book/systemic-approaches-bioinformatics-computational-systems/55294
- https://www.springer.com/us/book/9789400758896
- https://publons.com/researcher/4102503/paola-lecca/
- https://gitlab.inf.unibz.it/Paola.Lecca/big-data-analysis-and-artificial-intelligencefor-medical-sciences

Awards

2007 Best paper award

I won the young researchers' best-paper grant for the article *Molecular mechanism of glutamate-triggered brain glucose metabolism: a parametric model from FDG PET-scans*, Brain, Vision and Artificial Intelligence 2007, LNCS (Ed. F. Mele, G. Ramella, S. Santillo and F. Ventriglia), 4729:350-359 Springer Verlag, 2007.

2009 Competition

In a team with 11 COSBI researchers integrated with 3 French researchers and 1 German researcher I won first prize at the international modelling competition in Dagstuhl, Germany (information can be found at http://www.cosbi.eu/index.php/other-events/eventsarchive/243).

2021 Best presention award

I have been awarded for the best presentation at the 3rd International Applied Mathematics, Modelling and Simulation, Conference (AMMS 2021) Paris (France) & online June 24-26, 2021 (organized by Hong Kong Chemical, Biological & Environmental Engineering Society HKCBEES)

National and international grants and funds (excluded commissioned research)

2018 - 2020 Italian Cystic Fibrosis Foundation Grant

Partner in a projected granted by Italian Cystic Fibrosis Foundation (2018). Project Title: Testing intestinal organoids for the prediction of response to CFTR potentiators and correctors used in clinics. Project ID: FFC#13/2018. Project Coordinator: Claudio Sorio, Department of Medicine, University of Verona, Italy.

My role in the project: principal investigator for the computational research line of the project at Department of Mathematics, University of Trento, Italy.

Web-page: https://www.fibrosicisticaricerca.it/risultati-di-ricerca/

Commissioned research projects funded by companies

2021-2026 Azienda Sanitaria dell'Alto Adige

Comissioned research project with Azienda Sanitaria dell'Alto Adige - Medicina Nucleare (https://www.sabes.it/it/ospedali/bolzano/1665.asp).

Project name: GLI-HOPE (All-Ages Malignant Glioma: Holistic Management In The Personalised Minimally-Invasive Medicine Era - From Lab To Rehab) Programmi di Rete del Ministero della Salute

Research title: Brain Glucose Metabolism Kinetics Mapping, My role in it: Principal Investigator of the Free University of Bozen-Bolzano, Italy.

2025 Ki6-editori srl / Decor Lab & Allestire

Comissioned orientation counseling with Ki6-editori srl / Decor Lab & Allestire, Bolzano Orientation subject: use of augmented reality and AI techniques for the creation of local combinations and furnishings to be shown to customers

My role in it: point of contact between company and Unibz academic staff involved in the orientation phase of this project.

Commissioned research projects from international institutes

2018 Louvain Centre for Toxicology and Applied Pharmacology (LTAP)/Institut de Recherche Expérimentale et Clinique Université Catholique de Louvain

Implementation of a new imaged-controlled sweat test for in vivo quantification of CFTR function: value for diagnosis and efficacy of new therapies (commissioned by the scientific consortium of the FFC project grant #5/2016).

Internal grants and funds

31/05/2022 (internal Bolzano, Italy

01/06/2021 - RTD Call 2021- Faculty of Computer Science, Free University of Bozen-

funding of Unibz) SABLE: Computational methods to simulate the SARS-CoV-2 attack to red blood cells.

01/07/2020 - Interdisciplinary Project Call 2020 (ID 2020)- Faculty of Computer Science, 30/06/2022 (internal Free University of Bozen-Bolzano, Italy

funding from Unibz) Project title: DAQETA-CML (Detecting and quantifying (side-)effects of recent experimental therapies against Chronic Myeloid Leukemia).

My role in it: principal invetigator.

31/12/2021 (internal Bolzano, Italy

01/01/2010 - RTD Call 2019 - Faculty of Computer Science, Free University of Bozen-

funding from Unibz) Project tile: COMPANET (Comparative analysis for detecting altered pathways in gene networks.

My role in it: principal invetigator.

Participation in projects

From 2015 to 2019 OptHySys

Research assistant team member in the project OPTmization techniques for Hybrid dynamical SYStems (funded as part of the Strategic Plan 2014-2016 of the University of Trento, Italy): from theory to applications, at the Department of Mathemaics of University of Trento (Italy) (Principal Investigator: Dr. Fabio Bagagiolo). Web-page: http://r.unitn.it/en/maths/opthysys.

From 2012 to 2015 Functional Validation of Prostate Cancer Driving Mutations

Functional Validation of Prostate Cancer Driving Mutations. I was involved in the project as Research Fellow at CIBIO- University of Trento. Teh project was supported by grants issued to F. Demichelis by US Department of Defence Synergy Awards and by the US National Cancer Institute) In the context of this project, I developed cumulative models of cancer progression defining the order and the timing of the occurrence of mutation events.

From 2008 to 2011

Nobel project

Nobel Project: Molecular modeling of gene regulation, transcription and translation. Funding agency: Cariplo Foundation and Caritro Foundation. This project addresses the bio-inspired definition of new modelling languages and tools that are suited to represent and to analyse the properties and the time-dependent behaviour of complex systems composed of a huge number of competing, cooperating and communicating components. Starting from the excellent and challenging examples provided by a set of selected case studies from biological systems offered by the other NOBEL platforms, the project intends to identify the key modelling elements required to capture and characterize the aspects of modularity, self-organization and hierarchy to define and prototype a composable and scalable framework that integrates modelling and evaluation features for analysis, prediction of systems behaviour and inference of new knowledge. The involvement of bioscientists conducting project-specific ongoing experimental research on reverse engineering of living cells is essential to the strategic concept of this proposal. The close cooperation of experts from the ICT field and systems analysis (reverse engineering) and scientists from the field of molecular biosciences created an integrated multi-disciplinary effort whose results will be applicable to both research communities. Partners: Prof. Roberto Sitia, Fondazione San Raffaele Milano Platform: GENO PROTEOMICS OF AGE RELATED DISORDERS (GuARD).

From 2001 to 2002 **EXPLODET**

EXPLODET (EXPLOsive DETection) of the National Institute of Nuclear Physics): from 2001 to 2002. The project aimed to development of a thermal neutron sensor for hidden explosive search (details at http://www.pd.infn.it/explodet/tna.html).

From 2001 to 2002 **DIAMINE**

DIAMINE (Detection and Imaging of Antipersonnel Landmines by Neutron Backscattering): the project has been funded by the European Union under the contract IST-2000-25237 during the years 2001-2002.

Project application currently under evaluation

2025 Interdisciplinary project of Free Unviersity of Bozen-Bolzano 2025 (ID

Title of the Project: Genetic Resilience in Adaptive Coniferous Ecosystems (GRACE), Personal role: PI for the Faculty of Engineering of University of Bozen-Bolzano. In collaboration with Prof. Tomelleri Enrico, PI for the Faculty of Agricultural, Environmental and Food Science, and Prof. Shona Kitschen, Faculty of Design and Art, Free University of Bozen-Bolzano.

Ongoing contacts with companies

2025 Progress Group

Definition of a possible commissioned research project for the development of mathematical models and computational techniques for the avaluation of the linearity of the support elements of concrete structures. Title: "Automatisches anpassen Richtsatzeinstellung über Daten Geradheitsmessung und KI - Regolazione automatica del set di allineamento tramite i dati misura della rettilineitàd e IA".

Progress Group website: https://www.progress.group/it/.

Unibz colleagues involved: Prof. Angelika Peer and Dr. Floriano Zini.

Since 2023 Asotech S. r. I. Modena

Identification and definition of projects and commissioned researches in computational fluid dynamics. Tentative proposal "AI calibrated dynamical models specified with Navier-Stokes equations". Asotech website: https://www.asotech.com/

Computer skills

- Experienced computer programmer in Python, C, C++, Java, Perl, Javascript: very good.
- Proficient user of Linux/Ubuntu, Windows, Android operating systems.
- Experienced computer programmer in tools for computational and statistical analysis and modelling: R, Matlab, Prism.
- O Competent with most Microsoft Office programmes and Latex programming.
- IT systems maintenance; network maintenance, PC hardware and software restoring and bug fixing.

Software

1. **Graph embedding** GitLab repository of Python scripts for graph embedding in flat and curvede geometries.

https://gitlab.inf.unibz.it/Paola.Lecca/graph-embedding

2. **Network Analyzer and Dynamics Simulator** GitLab repository of R scripts to translate a network into a set of mass action law differential equations.

https://gitlab.inf.unibz.it/Paola.Lecca/network-analyzer-and-dynamics-simulator/-/blob/main/README.md

3. Identification of genes responsive to treatments against Chronic Myeloid Leukemia GitLab repository of R code implementing differential expression analysis and gene set enrichment analysis applied to the expression data of genes candidate to be involved in Chronic Myeloid Leukemia onset and development.

(https://gitlab.inf.unibz.it/Paola.Lecca/chronic-myeloid-leukemia-genes)

4. Advection-diffusion equations simulation

GitLab repository of Python code for the simulation of advection-diffusion equation in bubble columns bioreactor. (https://gitlab.inf.unibz.it/Paola.Lecca/advection-diffusion-simulation)

5. Data regression - project on GitHub

GitLab repository of R for experimental data regression. This repository is constantly updated with new scripts relating to specific ongoing projects in computational biology. (https://gitlab.inf.unibz.it/Paola.Lecca/data-regression/)

- 6. TD-WGcluster (Time Dependent Weighted Graphs Clustering). Time Delayed Weighted Edge Clustering (TD-WGcluster) integrates static interaction networks with time series data in order to detect modules of nodes between which the information flows at similar time delays and intensities. (Reference and links on personal web-page)
- 7. TO-DAG (Timed Oncogenetic Direct Acyclic Graphs). TO-DAG infers the graph of the causal dependencies and the waiting times among mutational events from cross-sectional data of genetic alterations in independent human tumor samples. The use of TO-DAG is relevant to three crucial aspects of computational modeling of tumor progression, i.e.
 - data organization,
 - data interpretation
 - o and inference of new knowledge in cancer genomics.

(Reference and links on personal web-page)

- 8. **WG-Cluster (Weighted Graphs Clustering)**. WG-Cluster (Weighted Graph CLUS-TERing). is a tool to detect communities in biological network. Principal features of the tool are:
 - o efficient clustering by edge weights
 - o efficient (fast-greedy based) community detection
 - o assessment of statistical significance for detected communities.

(Reference and links on personal webpage)

- 9. **KInfer (Kinetics Inference, see COSBI LAB)** KInfer is a tool for estimating rate constants of systems of chemical reactions from experimental time series of reagents concentrations. Principal features of the tool are:
 - automatic generation of generalized mass action model from the chemical equations of the reactions involved in the system
 - o automatic estimation of the initial guesses and bounds for the parameter values
 - estimate of the propagation of the experimental errors from the input data to the parameter estimates
 - o estimation of the level of noise in the input data.

(Reference and links on personal web-page)

- 10. Redi (Reaction-diffusion) Redi is a simulator of stochastic reaction-diffusion systems. It implements a new model of diffusion of molecules in non-homogeneous media and incorporates this model into a Gillespie-like simulation algorithm of biochemical reactions. In the new model of diffusion, diffusion coefficient are not fixed, but computed dynamically in a state-dependent way, as function of local concentration of solute and solvent, local frictional forces and local temperature. The diffusion model is inspired to the Maxwell-Stephen model of transport phenomena. (Reference and links on personal web-page)
- 11. **COSBI LAB Infer**. COSBI LAB Infer infers the topological and causal structure of a gene and metabolic network from time-series data of the amount of abundance of networks components (expression levels, metabolites and enzymes concentrations, respectively).

Talks

Invited talks

- 2025-09-24 The Bayesian basis of Decision-Making in Artificial Intelligence: Does It Help to Determine the Level of Confidence in Artificial Intelligence Results?

 7th International Applied Mathematics, Modelling and Simulation Conference (AMMS 2025)
- 2024-05-16 The landscape of gene expression in chronic myeloid leukaemia Multiomics: from Big Data to Insights, NOI Techpark, Bolzano-Bozen May 16, 2024
- 2023-07-14 From data to diagnosis: artificial intelligence in Nuclear Medicine
 Panelist at workshop organized by Azienda Sanitaria dell'Alto Adige at Eurac Research
 Bolzano-Bozen, Italy
- 2023-07-14 The determination of the latent geometry of a network and its structural and dynamical implications

5th International Applied Mathematics, Modelling and Simulation Conference (AMMS 2023)

- 2016-11-18 Inference and models of complex biological systems CIMEC, University of Trento, Italy
- 2016-10-14 Developing computational models for complex systems simulation. Efficient computing: an interest common to biology and astrophysics

 Department of Civil Environmental and Mechanical Engineering, Italy.
- 2016-09-26 Multistep theory of carginogenesis: a new predictive model of age incidence of chronyc Myeloid Leukemia

 Department of Medicine, University of Verona, Italy
- 2015-10-29 **Hybrid stochastic-deterministic models for simulation of biochemical systems**Department of Mathematics, University of Trento, Italy

- 2011-10-14 Clinical Bioinformatics, Spatial pharmacokinetic-toxicokinetic modelling NETTAB 2011, Pavia, Italy
- 2009-04-28 On the mathematical structure and algorithmic implementation of biochemical network models

Int. Conference on Cellular and Molecular Biology, World Academy of Science, Engineering and Technology, Rome 28 April, 2009.

2007-06-01 Which algorithm for emulating the chemical interactions in biomolecular systems?

Department of Mathematics of University of Trento, Italy.

2007-08-28 Stochastic formalisms and algorithms to model and simulate biological inter-actions

Institute for Systems Biology, Seattle

Conference talks with peer-reviewed abstracts/paper

20-10-2025 Feasibility study of applying deep learning techniques to solve 2D Poisson's equation

Accepted talk at: 14th International Conference on Mathematical Modeling in Physical Sciences October 20-23, 2025

30-09-2024 (I): Guidelines to design the architecture of Artificial Neural Networks for application in physical chemistry. (II): Network theory in support of climate change studies: analysis of temperature anomalies

13th International Conference on Mathematical Modeling in Physical Sciences, Kalamata, Greece, 2024

28-08-2023 **28-08-2023**, Learning systems of ordinary differential equations with Physics-Informed Neural Networks: the case study of enzyme kinetics

12th International Conference on Mathematical Modeling in the Physical Sciences (IC-MSQUARE 2023), Belgrade, Serbia, August 28-31, 2023

- 2022-12-07 Checking for non-Euclidean latent geometry of biological networks
 1st International Workshop on Foundations of Network Analysis held in conjunction with
 IEEE BIBM 2022, 6-8 December 2022.
- 2022-09-06 Uncovering the geometry of protein interaction network: the case of SARS-CoV-2 protein interactome,

11th International Conference on Mathematical Modeling in Physical Sciences, September 5-8, 2022.

2022-06-18 New Proposal of Power Series Method to Solve The Navier-Stokes Equations: Application Contexts And Perspectives

4th International Conference of Applied Mathematics, Modelling and Simulations, Paris, France, June 17-19, 2022.

2021-12-09 Analysis of SARS-CoV-2 protein interactome map

IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2021) - Workshop on Integrative Data Analysis in Systems Biology (IDASB 2021), 9-12 December 2021 - Virtual online conference.

2021-09-07 Agent-based control of multiphysics systems

17th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, 7-9 September 2021 - Online conference

2021-09-06 On the asymptotic stability of advection-diffusion equations of mass transport in bubble column bioreactor

10th International Conference on Mathematical Modeling in Physical Sciences September 6-9, 2021 Virtual, on-line Conference

 $2021\mbox{-}09\mbox{-}06$ The effects of gravitational potential on chemical reaction rates

10th International Conference on Mathematical Modeling in Physical Sciences September 6-9, 2021 Virtual, on-line Conference

2021-06-25 The theory of active agents for simulating dynamical networks and its π -calculus specification

3rd International Applied Mathematics, Modelling and Simulation Conference (AMMS 2021), June 24-26, 2021; best presentation awarded.

2020-12-16 Stiffness estimate of information propagation in biological systems modelled as spring networks

International Workshop on Biological Network Analysis and Integrative Graph-Based Approaches, Mingon Kang, Ananda - 2020 IEEE International Conference on Bioinformatics and Biomedicine (BIBM).

2020-11-13 A network analysis computational pipeline to detect altered gene pathways in chronic myeloid leukemia

Free Software Conference, Bozen-Bolzano, Italy

2020-10-27 Computing organoids' volume in medical images: the case study of cystic fibrosis

2020 IEEE International Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB 2020, October 27-29, 2020)

2020-09-25 A Computational Control Theory Approach to the Analysis of Virus-Host Interactome in Covid-19

ACM - WonEncourage 2020, September 24-25, 2020.

2020-06-24 Comparative dynamic network analysis to detect altered pathways in chronic myeloid leukemia human cell model,

24th International Conference On Research In Computational Molecular Biology, 22-25 June 2020.

2018-11-18 Multilinear Regression Analysis of Sweat Secretion Volumes in Cystic Fibrosis

Proceedings of FRUCTi23, Bologna (Italy), 13-16 November 2018

2018-08-28 Phase-space analysis of chaotic deterministic dynamics with Python: the case of biological systems with many degrees of freedom

EuroSciPy 11th European Conference on Python in Science, EuroSciPy 11th European Conference on Python in Science 2018, Fondazione Bruno Kessler, 28-29 August 2018, Trento, Italy, 2018

2018-06-06 CORVO: a software tool for computing volume of complex biological structures in medical images and videos

SIAM Conference on Imaging Science Bologna, Italy

- 2014-09-30 **TO-DAG:** a new graph-based timed model for cumulative cancer progression Cancer, Systems and Complexity School and Workshop, Como, Italy
- 2011-09-12 Calibration of process algebra models of discretely observed stochastic biochemical systems

The 23rd European Modeling & Simulation Symposium (EMSS 2011), Rome Italy

2009-03-25 Deducing chemical reaction rate constants and their regions of confidence from noisy measurements of time series of concentration

11th Int. Conference on Computer Modelling and Simulation, Emmanuel College Cambridge, 2009.

2009-03-24 On the deduction of chemical reaction rate constants from measurements of time series of concentration

The Microsoft Research Cambridge 2009.

2008-10-29 **Dynamics of reaction-diffusion systems in non-homogeneous media** Int. Conference on Bioinformatics and Biomedicine 2008, Venice, Italy.

2008-09-19 KInfer: a software tool for parameter inference in models of biochemical net-works

XIX Congress Sibpa 2008 Rome, 2008.

2008-07-12	Modelling and estimation of cellular mechanisms of cerebral glucose metabolism from dynamic Positron Emission Tomography scans Forum of European Neuroscience, Geneva, Switzerland			
2008-06-30	Estimating the kinetics of Na+ and Ca2+ waves in astrocytes ICAM-ECCOMAS Congress Venezia Lido, Italy			
2008-06-04	Identification of rate coefficients in dynamic models of biochemical systems European Conference of Mathematical and Theoretical Biology, Edinburgh, Scottland.			
2007-10-11	Glutamate-triggered brain glucose metabolism: a parametric model from FDG-PET-scans Design Vision and Artificial Intelligence Companions Names Italy			
	Brain, Vision and Artificial Intelligence Symposium, Naples, Italy			
2007-10-10	Molecular mechanisms of glutamate-triggered brain glucose metabolism Istituto Italiano Studi Filosofici, Napoli			
2007-09-07	A simple model for inferring kinetic parameters in biochemical reactions Institute for System Biology, Seattle			
2007-03-26	Quantitative data for simulating biochemical systems Fondazione Cariplo, Milano, Italy			
2006-11-07	Simulating kinetic in living systems. Collecting useful data for in silico experiments			
	COSBI, University of Trento, italy			
2006-04-24	A time-dependent extension of Gillespie algorithm for biochemical stochastic π -calculus			
	ACM Symposium on Applied Computing 2006, Dijon, France			
2004-03-14	Predicting cell adhesion probability via the biochemical stochastic π -calculus ACM Symposium on Applied Computing, Nicosia, Cyprus			
2003-09-06	Cell cycle control in Eukaryotes: a BioSpi model BioConcur 2003, Marseille, France			
	Memberships & Affiliations			
Since February 2020	Member of Istituto Nazionale di Alta Matematica "Francesco Severi", Gruppo Nazionale di Analisi Matematica, Probabilitá e Applicazioni, Italy. Web page: https://www.maths.unitn.it/111/indam-a-trento.			
Since January 2019	Member of the National Institute of Nuclear Physics, TIFPA - Trento Institute for Fundamental Physics and Applications, Italy			
Since 2009	Member of Italian Society of Pure and applied Biophysics (SIBPA)			
From 2008 to 2009				
	Member of Italian Society of Neurosciences (SINS)			
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Since January 2019 Advisory Board Member of AIR Institute (International Research Institute Foundation for Artificial Intelligence and Computer, Salamanca, Spain. https://innovationhub.es/team)

January - June 2017 Member of the committee for the PhD Thesis evaluation for the PhD Scholarship Program of at the Department of Computer Science of University of

December 2008 - External reviewer of the Microsoft Research PhD Scholarship Program February 2009

National and international collaborations

Since 2021 Faculty of Health and Life Sciences, Coventry University, Coventry, UK

Research topics: computational modelling of DNA repair mechanisms.

Reference person: Adaoha E. C. Ihekwaba-Ndibe.

Since 2020 Centro Medico Poliambulatorio Eurocenter Venalinfa, San Benedetto del Tronto. Italy

Research topics: computational analysis of SARS-CoV-2 interactome.

Reference person: Attilio Cavezzi

Since 2020 Istituto di Sicurezza Sociale

Research topics: computational analysis of SARS-CoV-2 interactome.

Reference person: Emidio Troiani, Repubblica di San Marino.

Since 2017 Istituto Italiano di Tecnologia, Parco scientifico e tecnologico per l'ambiente, Turin, Italy

Research topics: mathematical models of industrial bioreactor.

Reference: Group of Systems and Synthetic Biology

Since 2010 Department of Medicine, Division of Pathology of University of Verona (Italy)

> Research topic: probabilistic computational models of the onset of chronic myeloid leukemia; medical image processing of organoids in cystic fibrosis research.

Reference person: Claudio Sorio

Since 2009 Institute for Biophysics, Palermo (Italy)

> Subject: Event organization and editorial activity for Association of Computing Machinery (NY, USA).

Reference person: Daniela Giacomazza

Since 2005 National Research Council, Canada, Institute for Information Technology, and University of Guelph, Canada

> Subject: events organization and editorial activity for Association of Computing Machinery (NY, USA).

Reference person: Dan Tulpan

From 2006 to 2017 Quadram Institute Bioscience, Norwich Research Park, UK

Research topic: computational modelling in microbiology.

Reference person: Adaoha Ihekwaba

Since 2009 Faculdade de Engenharia da Universidade do Porto Departamento de Engenharia Mecanica, Porto, Portugal

Subject: conference organization and editorial activity for journals.

Reference person: João Manuel R. S. Tavares

From 2012 to 2015 ETH Zurich, D-BSSE Computational Biology Group (CBG)

Subject: Bayesian inference techniques for statistical genomics.

Reference: N. Beerenvinkel, S. Costantinescu

From 2012 to 2015 Weill Cornell Medical College, New York. Subject: network-based approaches in functional genomics

Reference: A. Sboner, C. Barbieri and M. Rubin

From 2012 to 2015 Division of Experimental Therapy, Department of Clinical Pharmacology, The Netherlands Cancer Institute/Antoni van Leeuwenhoek Hospital

Reference person: S. Veltkamp.

Research topics: computational model of gemicitabine metabolism.

Trento, July 30, 2025