SILVIA ZAOLI

CONTACTS

silvia.zaoli@gmail.com

SKILLS

PROGRAMMING AND SOFTWARE
•Proficient in Matlab and Mathematica
• Intermediate knowledge of Python
•Basic knowledge of R and C++
• Proficient in Latex, Adobe Illustrator, Office (Word, Excel, PowerPoint)

LANGUAGE
• Mother-tongue Italian
• Fluent in English and French

REFERENCES

Available on request

RESEARCH EXPERIENCE

Postdoctoral researcher in Quantitative Life Science
at ICTP (The Abdus Salam International Centre for Theoretical Physics)

2020-present

- Microbial ecology, composition and dynamics of microbial communities
- Disentangling stochastic and deterministic component in the variability in time and across hosts using time-series data of gut microbial communities
- Dissimilarity between communities and the effect of sampling

Postdoctoral researcher
at Università di Bologna (Department of Mathematics)

2018-2019

- Member of SESAR project DOMINO: Novel tools to evaluate ATM systems coupling under future deployment scenarios (funded under Horizon2020)
- Worked on the project as a part of an international team of researchers from 4 different institutions in 3 countries
- Developed new network metrics for temporal multilayer networks suited for the Air Traffic Management (ATM) network. I used the new metrics, together with more traditional ones, to evaluate the network-wide effects of possible modifications in ATM mechanisms, simulated by an agent-based model.

EDUCATION

PhD in Environmental Engineering at EPFL, Switzerland

2015-2018

- Thesis: "Scaling theory and the emergence of patterns in ecology and biology".
- Formulation of a theoretical framework rationalizing diverse field observations of ecosystem properties and their linkages
- Characterization of the intra-specific variability of traits (size, metabolic rate)
- Tools used include: mathematical modeling and numerical simulations, comparison with data, experiments with pytoplanktonic cultures on relationship between size and metabolic rate.

Master and Bachelor Degrees in Physics at Università di Padova, Italy

2012-2014 - Master Degree, 110 cum laude (GPA:29.7/30)

- Thesis: "Phenomenological modeling of the motility of self-propelled microorganisms".
- Design of a stochastic model describing experimental data on motility of a protist species.
- Data analysis included image analysis and noise filtering techniques.

2009-2012 - Bachelor Degree, 110 cum laude (GPA:29.0/30)

- Thesis on a model for human mobility with application to commuting patterns in the US

PUBLICATIONS

Zaoli S. and Grilli J., A macroecological description of alternative stable states reproduces intra- and inter-host variability of gut microbiome , bioRxiv 2021.02.12.430897

Mazzarisi P., **Zaoli S**., Campajola C., Lillo F., Tail Granger causalities and where to find them: extreme risk spillovers vs spurious linkages, Journal of Economic Dynamics and Control, 104022, 2020.

Zaoli S., Mazzarisi P., Lillo F., Betweenness centrality for temporal multiplexes, Scientific Reports 11(1), 2020.

Mazzarisi P., **Zaoli S.**, Lillo F., Delgado L., Gurtner G., New centrality and causality metrics assessing air traffic network interactions, Journal of Air Traffic Management 85, 2020.

Zaoli S., Giometto A., Emilio Marañón, Stéphane Escrig, Anders Meibom, Arti Ahluwalia, Roman Stocker, Maritan A., Rinaldo A., Generalized size scaling of metabolic rates based on single-cell measurements with freshwater phytoplankton, PNAS 116 (35) 17323-17329, 2019.

Zaoli S., Mazzarisi P., Lillo F., Trip Centrality: walking on a temporal multiplex with non-instantaneous link travel time, Scientific Reports 9(1):10570, 2019.

Zaoli S., Giometto A., Giezendanner J., Maritan A., Rinaldo A., On the probabilistic nature of the species-area relation, Journal of Theoretical Biology 462:391-407, 2019.

Zaoli S., Giometto A., Maritan A., Rinaldo A., Covariations in ecological scaling laws fostered by eco-evolutionary dynamics, PNAS 114(40):10672-10677, 2017.
Featured on the cover and subject of a commentary invited by the Editorial Board

Conference proceedings

Mazzarisi P. , **Zaoli S.** , Lillo F., Delgado L., Gurtner G., Cook A., Valput D., Network-wide assessment of 4D trajectory adjustments using an agent-based model, Proceedings of the Ninth SESAR Innovation Days, 2019.

Mazzarisi P., **Zaoli S.**, Lillo F., Delgado L., Gurtner G., Towards New Metrics assessing Air Traffic Network Interactions, Proceedings of the Eighth SESAR Innovation Days, 2018.

INVITED TALKS

April 2019 Trip Centrality: walking on a temporal multiplex with non-instantaneous link travel time, Workshop “Interdisciplinary Challenges in Non-Equilibrium Physics”, Edimburgh.

TALKS AND POSTERS

Nov 2019 Trip Centrality: walking on a temporal multiplex with non-instantaneous link travel time, Oral contribution at the Conference NET2019: Network Models in Statistics, Economics and Social Sciences, Milano.

Jul 2019 Trip Centrality: walking on a temporal multiplex with non-instantaneous link travel time, Poster presented at CCS/Italy, Trento.

May 2019 Trip Centrality: walking on a temporal multiplex with non-instantaneous link travel time, Oral contribution at the conference ’Statistical Physics of Complex Systems’, Nordita, Stockholm.

Dec 2018 Towards New Metrics assessing Air Traffic Network Interactions, Oral contribution presented at the SESAR Innovation Days 2018, Salzburg.

April 2018 Laws in Ecology: a unifying framework , Poster contribution at the workshop “Stochastic models in ecology and evolutionary biology”, Venice.

Feb 2018 A Finite-size Scaling Framework Uncovers the Covariations of Ecological Scaling Laws, Quantitative Life Science Guest Seminar at ICTP, Trieste.

June 2016 Covariations in ecological scaling laws fostered by eco-evolutionary dynamics, Oral contribution presented at the summer school "Quantitative Laws II", Fondazione Alessandro Volta, Como, Italy. http://qlsb.lakecomoschool.org/

May 2016 Covariations in ecological scaling laws fostered by eco-evolutionary dynamics, Special SIAM seminar, EAWAG, Dübendorf.

Sept 2015 Scaling exponents of macroecological laws: are they linked?, Oral contribution presented at the Conference of complex systems (CCS), Tempe, USA, http://www.ccs2015.org.

Sept 2015 Consequences of limited availability of resources on scaling exponents of interrelated macroecological laws., Oral contribution presented at the conference "Living systems, from interaction patterns to critical behaviour", Venice, Italy, http://www.pd.infn.it/ maritan/SanServolo/.

Aug 2015 Consequences of limited availability of resources on scaling exponents of interrelated macroecological laws., Oral contribution presented at the 100 th Ecological Society of America (ESA) annual meeting, Baltimore, USA, http://esa.org/baltimore/.

Oct 2014 A stochastic model for the motility of self-propelled microorganisms, Poster presented at the Venice meeting on fluctuations in small complex systems II, Istituto veneto di scienze, lettere e arti, Venezia, Italy, http://www.agnld.uni-potsdam.de/ metz/venice1/venice.html.

June 2014 A stochastic model for the motility of self-propelled microorganisms, Poster presented at the XIX National Conference on Statistical Physics and Complex Systems , Università degli Studi di Parma, Parma, Italy.

PARTICIPATION TO WORKSHOPS AND SCHOOLS

Dec 2020 Winter School on Quantitative Systems Biology: Quantitative Approaches in Ecosystem Ecology, online event organized by ICTP, Trieste, Italy, http://indico.ictp.it/event/9131/

Feb 2017 Workshop: Phytoplankton biodiversity, dynamic eco- physiology, and ecosystem function, Leibniz Center for Tropical Marine Ecology , Bremen, Germany.

June 2016 Summer school "Quantitative Laws II", Fondazione Alessandro Volta, Como, Italy, http://qlsb.lakecomoschool.org/.

22 June-3 July 2015 Doctoral training in statistical physics, École de physique des Houches, Les Houches, France, http://statphys15.inln.cnrs.fr/spip.php?article4.

TEACHING EXPERIENCE

2018	Crash course of Mathematics, Bachelor of Economy, Università di Bologna.
2018	Tutor for the course “Matematica per economisti” (Mathematics for economists), Master of Economy at Università di Bologna.
2017	Assistant for the Mise à Niveau Course (Algebra and Geometry modules), bachelor of Engineering at EPFL.
2016	Assistant for Linear Algebra, bachelor of Engineering at EPFL.

MASTER THESES SUPERVISION

A.A. 2019/2020	Valeria Paolucci, Community detection for air traffic networks and its application to strategic flight planning, Grade: 110/110 cum laude.
A.A. 2019/2020	Silvio Aiello, Centrality metrics and epidemic spreading on persistent temporal networks.

SCIENCE OUTREACH ACTIVITIES

Sept 2020	Participated to World Science Cafè event, where researchers of ICTP chat with the general public about their research during an informal apero
Feb-Jun 2019	Tutor at Opificio Golinelli, in Bologna, for the "Old Quantum Physics" laboratory for high school students.
Feb. 2016	Educational talk “A che cosa serve la ricerca scientifica?” (“Why do weneed scientific research”), Scientific High school A. Serpieri, Rimini.

OTHER EXPERIENCE

19-21 Jan. 2021	Co-organizer of online Workshop "Limits to Diversity Assembly" on the topic of ecological assembly at the interface between theory, experimental results, and field data http://indico.ictp.it/event/9511/overview
2019	Representative of the postdocs of the Math Department

PERSONAL INTERESTS

- Watercolour (attended weekly courses in 2020 and 2021)
- Cooperative board games
- Member of Association "Basta Plastica in Mare", aiming at informing and acting against plastic pollution (participated to communication activities, beach-cleaning activities)