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RESEARCH INTERESTS

The main focus of my research is the spatial growth of microbial communities and understanding how ecological and evolutionary processes play out in space. I use a combination of statistical physics methods and experiments with microbes to investigate the dynamics of range expansions and the emergence of scaling patterns that characterize the distribution of species, their abundances, and body sizes in ecosystems. Currently, I am investigating gene-environment and gene-gene interactions at the front of expanding populations.

RESEARCH APPOINTMENTS

Nov 2016	**Postdoctoral Fellow in Physics and Molecular and Cellular Biology** Harvard University Advisors: Prof. David R. Nelson, Department of Physics, Harvard University Prof. Andrew Murray, Department of Molecular and Cellular Biology, Harvard University
Oct 2016 Mar 2015	**Postdoctoral researcher** Laboratory of Ecohydrology École Polytechnique Fédérale de Lausanne (EPFL)
Oct 2016 Oct 2011	**Visiting scientist** Department of Aquatic Ecology Eawag, Swiss Federal Institute of Aquatic Science and Technology
Oct 2010 Jun 2011	**Visiting scientist** Centre for Complexity Science Imperial College London

EDUCATION

24 Feb 2015	**Docteur ès Sciences in Environmental Engineering (PhD)** École Polytechnique Fédérale de Lausanne (EPFL) Thesis title: *The role of fluctuations in ecological patterns and processes* Supervisor: Prof. Andrea Rinaldo, EPFL Co-Supervisor: Prof. Florian Altermatt, Zurich University
5 Jun 2012	**Certificate of Completion**, with marks 70/70 *cum laude* Galilean School of Higher Education, University of Padova The Galilean School of Higher Education admits 24 students per year based on an entrance examination at the national level and offers interdisciplinary courses and seminars from visiting professors. Students of the School attend such courses and seminars in addition to their regular degree courses at the University of Padova.

13 Jul 2011	**M. Sc. in Physics**, with marks 110/110 *cum laude*[1], University of Padova Thesis title: *Self-organised criticality and absorbing phase transitions in the deterministic lattice gas* Supervisor: Prof. Amos Maritan, University of Padova Co-Supervisor: Prof. Henrik J. Jensen, Imperial College London
3 Jul 2009	**B. Sc. in Physics,** with marks 110/110 *cum laude*[1], University of Padova Thesis: *Fluctuation theorems and non-equilibrium* Supervisor: Prof. Amos Maritan, University of Padova

FELLOWSHIPS AND SCHOLARSHIPS

Oct 2016	**Early Postdoc.Mobility Fellowship** Swiss National Science Foundation Project title: *Evolutionary fitness in temporally fluctuating range expansions.* Link: http://p3.snf.ch/project-168498
Mar 2010	Erasmus Mundus scholarship
Sep 2006	Progetto Lauree Scientifiche scholarship Awarded to 43 students enrolling in the first year of a Physics degree course in Italy. Selection based on a test at national level.

AWARDS

Sep 2017	Best poster award, Harvard Physics Department Scholars Retreat
Oct 2016	**EPFL ENAC Earth Science award** Awarded by the EPFL School of Architecture, Civil and Environmental Engineering for the best PhD thesis related to Earth Science
Oct 2015	**Honorable mention for the Lotka award** Ecological Society of America Theory section, ESA Annual Meeting
May 2013	Best student talk award, PhD Symposium, Eawag
Aug 2013	Best poster award, IIE Green Days, EPFL
Sep 2012	Best student talk award, Eawag Symposium, Eawag

MENTORING EXPERIENCE

- Silvia Zaoli, PhD thesis co-direction, EPFL (Since Dec 2014)
- Silvia Zaoli, M. Sc. thesis co-direction, University of Padova (Jul 2014)

[1] Note that the honors *magna cum laude* and *summa cum laude* do not exist in Italy and thus the maximum graduation mark is 110/110 *cum laude*.

TEACHING EXPERIENCE

- *Fourier analysis and boundary value problems*, EPFL (Spring term 2015 and 2016)
  My responsibilities for this PhD level course included developing and delivering lectures, generating new course materials, and complementing these with practical demonstrations in Mathematica.
- *Limnoecology*, ETH Zürich and Zurich University (Spring terms 2013 and 2014)
  My responsibilities for this M. Sc. and B. Sc. level course included the design of microcosm experiments with protists and algae, and the supervision of undergraduate students in the laboratory. Out of these courses practice, two research articles were published (references 6 and 7 in my publication list).

EXPERIMENTAL AND COMPUTATIONAL SKILLS

I adopt a variety of analytical and computational methods, programming languages and software to contrast experiments with mathematical models. In my research, such models are mainly expressed in the form of partial differential equations, either deterministic or stochastic. I mostly work with Mathematica, Matlab, Python, Cython, C and C++, depending on the problem at hand.

I perform experiments with microbes and I am currently using the baker's yeast *Saccharomyces cerevisiae* as a model system. In the past, I have performed experiments with protists, bacteria and phytoplankton. I adopt a combination of imaging (e.g., microscopy and NanoSIMS) and genetic engineering techniques to perform range expansion experiments. I enjoy designing simple electronic devices to perform custom-designed microbial experiments. For example, I have built low-cost programmable incubators using Peltier modules and Arduino microcontrollers in order to perform range expansions experiments with prescribed temporal temperature fluctuations and I have assembled digitally-addressable LED strips to investigate the phototactic accumulation of the alga *Euglena gracilis* and to perform range expansion experiments in landscape with heterogeneous distributions of resources (i.e., light).

REVIEWING ACTIVITY

I have reviewed manuscripts for the following journals:
Advances in Water Resources
Journal of Theoretical Biology
Nucleic Acids Research
Oikos
Physical Review E
Physical Review Letters
PLOS Computational Biology
Proceedings of the National Academy of Sciences of the United States of America
Proceedings of the Royal Society B-Biological Sciences
Theoretical Population Biology

The full verified list of reviews performed is available on my Publons profile: publons.com/a/1232387.