

Dr. Simone Pompei

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Current Position

Post-Doctoral researcher, IFOM, Milan, Statistical Physics of Cells and Genomes,
Lab. of Prof. Marco Cosentino Lagomarsino,
Fellow of the "Fondazione Umberto Veronesi 2022".

Research Interests

statistical physics, cancer evolution, statistical inference, population genetics, quantitative biology, phylogenetics.

Employment and education

- **01/2022-Present** Fellow of the "Fondazione Umberto Veronesi" 2022 Fellowship.
- **09/2019-Present** Post-Doctoral researcher, IFOM, Lab. of Prof. Marco Cosentino Lagomarsino.
- **04/2020-04/2021** Fellow of the "Fondazione Umberto Veronesi" 2020 Fellowship.
- **01/2013 - 09/2019** Post-Doctoral researcher at the University of Cologne, institute of theoretical physics. Lab of Prof. Michael Lässig.
- **07/2019** Visiting Scientist at Nordita, Stockholm.
- **07/2014 - 08/2014** Visiting Scientist at the KITP institute, University of California, Santa Barbara, Program "Evolution of drug resistance"
- **08/2013** Visiting Scientist at the Isaac Newton Institute, Cambridge, Program "Infectious Disease Dynamics"
- **02/2013, 07/2014** Visiting Scientist at the Novartis Institute, Siena, Lab of Duccio Medini.
- **2010 - 2013** Phd at the University of Turin, doctoral school in Complex Systems in Medicine and Life Sciences. Member of the group Complex Systems Lagrange Lab at the ISI Foundation in Turin. Supervisors: Prof. Vittorio Loreto and Dr. Francesca Tria. Thesis: "Phylogenetic trees: Inference, Analysis, Modeling". Thesis defense: 01/02/2013.
- **2009** Master Degree in Physics at the University of Rome Sapienza, supervisor Prof. Vittorio Loreto. Final grade: 110/110 cum laude (25/9/2009).
- **2007** Bachelor Degree in Physics and Astrophysics at the University of Rome Sapienza, supervisor Prof. Vittorio Loreto. Final grade: 110/110 cum laude (29/10/2007).
- **2003** Secondary School certificate at the Scientific Lyceum G. Marconi (Foligno, PG) with final grade 100/100

Awards

- **11/2021** Winner of the "Fondazione Umberto Veronesi" 2022 Fellowship.
- **10/2019** Winner of the "Fondazione Umberto Veronesi" 2020 Fellowship.

- **2004-2009** Winner of Lamaro-Pozzani college scholarship. Every year the top 12-ranked Italian high-school students are offered the opportunity to join the college. The College gives young people the possibility of integrating their well-rounded individual, through Economics, Law and Languages classes, meetings with prominent people from the world of Politics, Economics or from the University and journeys to foreign countries.
- **2002-2004** Winner of awards (best student, best oral presentation, best final exam) as a student of the project “Matematica & Realtá, hold by the University of Perugia, department of mathematics (Prof. Primo Brandi and Prof. Anna Salvadori).
- **1999-2004** Winner of several regional Mathematics, Physics and Chemistry Olympiad, hold by Scuola Normale Superiore of Pisa, and Universita’ Bocconi, Milan.

Professional service

- **05/2018** Member of the external committee for the evaluation of research proposals submitted to the first call for Dioscuri Centers of Scientific as external referee, On behalf of the Dioscuri Committee, appointed by the President of the Max Planck Society, Professor Martin Stratmann.
- **03/2016** Member of the evaluation Committee of the BCGS (Cologne-Bonn Graduate School) selection process of phd scholarships.
- Review activity for: PloS Computational biology (1) , PNAS Nexus (1), Archives of Biochemistry and Biophysics (1), Genes. (1), International journal of molecular sciences. (2), Journal of clinical medicine. (1), Signals. (1).

Publications

*= joint first authorship

- Mariangela Russo* , **Simone Pompei***, Alberto Sogari * , Mattia Corigliano * , Giovanni Crisafulli, Alberto Puliafito , Simona Lamba , Jessica Erriquez , Andrea Bertotti , Marco Gherardi , Federica Di Nicolantonio , Alberto Bardelli, Marco Cosentino Lagomarsino (2022). A modified fluctuation-test framework characterizes population dynamics and mutation rate of cancer persister cells. **In Press (Nature Genetics)**.
- Röschinger T, Tovar RM, **Pompei S**, Lässig M. *Adaptive ratchets and the evolution of molecular complexity. arXiv preprint arXiv:2111.09981. 2021 Nov 18.*
- Mattia Pavani, Paolo Bonaiuti, Elena Chiroli, Fridolin Gross, Federica Natali, Francesca Macaluso, Adam Poti, Sebastiano Pasqualato, **Simone Pompei**, Marco Cosentino-Lagomarsino, Giulia Rancati, David Szuts, Andrea Ciliberto (2021). Epistasis, aneuploidy, and gain-of-function mutations underlie the evolution of resistance to induced microtubule depolymerization. *The EMBO Journal*. 2021 Oct 4:e108225.
- Jeffrey Power* , Fernanda Pinheiro,* **Pompei, S.***, Viera Kovacova , Melih Yüksel , Isabel Rathmann , Mona Förster , Lässig, M. and Meier B (2020). Adaptive evolution of hybrid bacteria by horizontal gene transfer. *PNAS (Proceedings of the National Academy of Sciences)*. 2021 Mar 9;118(10).
- **Pompei, S.**, Loreto, V., Tria, F. (2018). Copystree: gaming artificial phylogenies. *Language Dynamics and Change* 8.1 (2018): 55-77. 10.1163/22105832-00801003
- Morris, D.H*., Gostic, K.M.* , **Pompei, S.***, Bedford, T., Luksza, M., Neher, R.A., Grenfell, B.T., Lässig, M. and McCauley, J.W., (2017). Predictive Modeling of Influenza Shows the Promise of Applied Evolutionary Biology. *Trends in microbiology*.10.1016/j.tim.2017.09.004
- Pugliese, M., Loreto, V., **Pompei, S.**, Tria, F. (2016). Exploring the evolution of pathogens organised in discrete antigenic clusters. *Journal of Statistical Mechanics: Theory and Experiment*, 2016(9), 093306. DOI:10.1088/1742-5468/2016/09/093306
- Tria, F., **Pompei, S.** and Loreto, V. (2013). Dynamically correlated mutations drive human Influenza A evolution. *Scientific reports* 3. doi:10.1038/srep02705

- **Pompei, S.** , Tria, F. and Loreto, V. (2012). Phylogenetic properties of RNA viruses. PLoS One 7 (9), e44849. DOI: 10.1371/journal.pone.0044849
- **Pompei, S.** , Loreto, V. and Tria, F. (2011). On the Accuracy of Language Trees. PLoS One 6 (6): e20109. doi:10.1371/journal.pone.0020109
- Tria, F. , Caglioti, E., Loreto, V. and **Pompei, S.** (2010), A Fast Noise Reduction Driven Distance-Based Phylogenetic Algorithm. Proceedings of BIOCOMP2010 - The 2010 International Conference on Bioinformatics & Computational Biology.
- **Pompei, S.** , Caglioti, E., Loreto, V. and Tria, F. (2010), Distance-based Phylogenetic algorithms: new insights and applications Mathematical Models and Methods in Applied Sciences (M3AS). Volume: 20, Supplementary Issue 1(2010) pp. 1511-1532. doi: 10.1142/S0218202510004672

Conference talks and seminars

- **05/2022** Talk, The many faces of cancer evolution, EMBO Workshop, Rimini.
- **10/2021** Seminar, Population Dynamics Seminars, Edinburgh.
- **06/2021** Seminar, Evolutionary and ecological systems biology, MIT
- **10/2020** Talk at the Paris Biological Physics Community Day 2020.
- **11/2018** Seminar at the MPI for Dynamics and Self-Organization Institute of Göttingen.
- **07/2016** Conference: Modelling Influenza, Princeton University (Invited talk)
- **04/2016** Workshop: Coevolution in proteins and RNA, theory and experiments, Cargese (Poster)
- **07/2015** Conference: Forecasting Evolution ?, Lisbon (Poster)
- **12/2014** Seminar at the University of Cologne.
- **08/2013** Seminar at Novartis Institute, Siena.
- **03/2012** Seminar at the Max Plank Institute of Molecular Biology, Dresden
- **03/2012** Seminar at the University of Cologne, Institute of Theoretical Physics
- **01/2012** Epifor and Epiwork (EE2), 2nd International Workshop: Facing the Challenge of Infectious Diseases. Courmayeur (Ao), Italy. (Poster).
- **04/2011** Workshop: Languages, Texts and Keys. Bagno Vignoni (Si), Italy. (Invited Talk).
- **07/2010** SMBE 2010 -Annual Meeting of the Society for Molecular Biology and Evolution. Lyon. (Poster)

Summer schools

- **07/2012** Quantitative laws of genome evolution, Lake Como School of Advanced Studies, Como
- **07/2011** Complex Physical, Biological and Social Systems, Computer Programming and Complex Systems Complex Systems Modeling and Networks. New England Complex Systems (NECSI), Boston

Teaching experiences

Lectures

- **03-05/2022** Two Lectures, Fisica statistica dei sistemi complessi, University of Milan.
- **03-05/2021** Two Lectures, Fisica statistica dei sistemi complessi, University of Milan.
- **12/2020** Four Lectures, Fisica dei Sistemi Complessi, University of Rome.
- **03/2020** Two Lectures, Meccanica statistica 2, University of Milan.
- **11/2019** Two Lectures, Fisica dei Sistemi Complessi, University of Rome.
- **01/2019** Two Lectures, Fisica dei Sistemi Complessi, University of Rome.
- **12/2017** Two Lectures, Advances Statistical Mechanics, University of Cologne.
- **12/2017** Two Lectures, Fisica dei Sistemi Complessi, University of Rome.
- **11/2016** One Lecture, Statistical Mechanics, University of Cologne.
- **06/2015** One Lecture, Non-Equilibrium Statistical Mechanics, University of Cologne.
- **01/2014** One Lecture, Stochastic Processes, University of Cologne.

Teaching Assistant

- Statistical Genetics, Prof. Michael Lässig (Summer Semester 2019)
- Statistical Mechanics, Prof. Michael Lässig (Winter Semester 2018)
- Advanced Statistical Mechanics, Prof. Johannes Berg (Winter Semester 2017)
- Statistical Genetics, Prof. Michael Lässig (Summer Semester 2016)
- Statistical Mechanics, Prof. Michael Lässig (Winter Semester 2015)
- Non-Equilibrium Statistical Mechanics, Prof. Michael Lässig (Summer Semester 2015)
- Mathematical Methods, Prof. Martin Zirnbauer, (Winter Semester 2014)
- Statistical Genetics, Prof. Michael Lässig (Summer Semester 2014)
- Stochastic Processes, Prof. Michael Lässig (Winter Semester 2013)
- Statistical Biology Seminar, Prof. Michael Lässig (Summer Semester 2013)
- Statistical Mechanics, Prof. Michael Lässig (Winter Semester 2012)

Co-Supervised Master Thesis

- Arianna Di Bernardo, Master Thesis, UniMi, (April 2022)
- Camilla Cancrini, Master Thesis, Sapienza, Università di Roma, 2020.
- Tom Röschinger, Master Thesis, University of Cologne, 2019,
- Christian Kiefer, Master Thesis, University of Cologne, 2015.

Co-Supervised Bachelor Thesis

- Pietro Rivetti, Bachelor Thesis, UniMi, 2021
- Edoardo Bella, Bachelor Thesis, UniMi, 2021
- Dominik Kiese, Bachelor Thesis, University of Cologne, 2016.
- Tom Röschinger, Bachelor Thesis, University of Cologne, 2016.
- Charlotte Neubacher, Bachelor Thesis, University of Cologne, 2016.

Outreach

- **05/2022** Seminar, ITIS Ettore Molinari, Milano.
- **11/2020** Seminar, Liceo Scientifico Statale Vittorio Veneto, Milano.
- **04/2017** Conference: Festival della scienza e della Filosofia, Foligno (PG). Title of the contribution "Leggere il passato, il presente e il futuro dagli alberi"

Computer Skills

- Programming languages: C (advanced), C++ (advanced), Latex (advanced), Mathematica (advanced), bash (advanced), Perl (advanced), python (intermediate), R (intermediate), awk (intermediate), Fortran 77 (intermediate), Visual Basic (intermediate), HTML (intermediate), SQL (basic), Ruby (basic), Rails (basic).
- Operating Systems: Windows (XP and Vista), Linux (Debian, Ubuntu), Mac.
- Certificates: European Computer Driving Licence (ECDL).

Spoken Languages

- Italian: native.
- English: fluent in reading, writing, listening, speaking.
- French: basic in reading, writing, listening, speaking.