

Curriculum vitæ et Studiorum

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Languages In addition to Italian as a mother tongue, I have a very good knowledge, written and spoken, of English and French.

Military Service Until the 1.10.1992 I have served in the Italian Army as Second Lieutenant of the Technical Services.

Education:

1985 Secondary School certificate at the Scientific Lyceum "E. Severi" with final grade **60/60**.

1990 Undergraduate studies in Physics at the University of Rome *La Sapienza*. Doctor in Physics with final grade *110/110* cum laude (13/12/1990).

'92-'95 Ph.D. studies at the University of Rome *La Sapienza*.

Present positions:

Director (from October 2021) of the **Sony Computer Science Laboratories - Rome**

Full Professor (from November 2016) at the Physics Dept. of **Sapienza** University of Rome, Italy.

External Faculty member (from May 2017) of the Complexity Science Hub Vienna **CSH**, Vienna, Austria.

Research Associate to the Centro Studi e Ricerche "Enrico Fermi" **CREF**, Rome, Italy.

Contents

1	Positions	3
2	Summary of my scientific activity	4
2.1	Statistical Physics of Social Dynamics	5
2.2	Information dynamics in Techno-social systems	7
2.3	Information Theory and Complexity	9
2.4	Sustainable cities	9
2.5	Infosphere	10
2.6	Augmented Creativity	10
3	Coordination and management activities	12
3.1	Research projects coordination	12
3.2	Conference Organization	13
4	Teaching activity	16
5	Referee activity	17
6	Scientific outcomes	18
6.1	Patents	18
6.2	Impact of the publications (list not updated after 2016)	18
6.3	20 selected publications	22
6.4	5 most cited publications	23
6.5	Invited and Contributed talks (updated at 2024)	24
7	Full publications list	33
7.1	International Reviews	33
7.2	Books	44
7.3	Book contributions and miscellanea	44
7.4	Conference Proceedings	46
7.5	Others publications	50

1 Positions

- '91-'93 Teacher of mathematics and physics in several secondary schools from 15.1.1991 to 13.6.1991 and from 7.11.1991 to June 1993.
- '92-'95 Ph.D. student at the University of Rome "La Sapienza" under the supervision of Prof. L. Pietronero. Dissertation presented February the 28th 1996, approved October the 17th 1996.
- '93-'98 Researcher (permanent position) at the ENEA Research Center, Portici, Naples (ITALY).
- '96-'98 EEC Post-Doc position at the *École Supérieure de Physique et Chimie Industrielles*, Paris (FRANCE), in the group of Prof. H.J. Herrmann.
- '99 CNRS Researcher (Centre National de la Recherche Scientifique) at the *École Supérieure de Physique et Chimie Industrielles*, Paris (FRANCE).
- '99-'07 Researcher at Sapienza University of Rome.
- 2004 Winner of the Comparative Evaluation for a position of Associate Professor in Condensed Matter at the *Bicocca* University in Milan.
- 2004 Invited research position at the Laboratoire de Physique Théorique, Université de Paris Sud, Orsay, France (August-December 2004).
- 2009 Invited professor position at the Centre de Physique Théorique, Marseille, France (June 2009).
- 2007-2016 **Associate Professor** at the Physics Dept. of **Sapienza** University of Rome.
- 2007-2017 **Research Leader** at the Institute of Scientific Interchange (**ISI**) foundation, Turin, Italy. Coordinator of the *Information Dynamics* group.
- 2008-2017 **Research Associate** to the Institute for Complex Systems of the Consiglio Nazionale delle Ricerche (**CNR-ISC**), Rome, Italy.
- 2013 Visiting Research Associate Professor at the Physics Dept. of Northeastern University, College of Science, July 22nd to September 11th 2013.
- 2013 Qualification (*Abilitazione Scientifica Nazionale*) as Full Professor (Professore Ordinario) for Theoretical Condensed Matter Physics.
- 2014-2015 On sabbatical leave as **Invited Senior Researcher** at the Sony Computer Science Laboratories - Paris.
- 2017-2023 **Director** of the **Sony Computer Science Laboratories - Paris**.

2 Summary of my scientific activity

I am a Full Professor of Physics of Complex Systems at Sapienza University of Rome and External Faculty of the Complexity Science Hub Vienna. From 2017 to 2023, I directed the Sony Computer Science Laboratories in Paris, where he also ran the "Innovation, Creativity and Artificial Intelligence" team. In 2021 I founded a new Sony Computer Science Laboratories in Rome (CSL-Rome). Established through a Joint Initiative with the "Enrico Fermi" Research Centre, CSL-Rome is tackling Sustainable Development Goals with specific initiatives focusing on Sustainable Cities, the Infosphere and the Augmented Creativity for which I act as PI. My scientific activity is mainly focused on the interdisciplinary applications of complex systems science to the dynamics of social, biological and technological systems. In the last few years, in particular, I have been intensively working on the investigation of the so-called techno-social systems, which mix in an unpredictable way, cognitive and social elements with Information and Communication Technologies (ICT). On these themes I coordinated the EU project EveryAware that integrates environmental monitoring, awareness enhancement and behavioural change by creating a new technological platform combining sensing technologies, networking applications, data-processing and modelling tools. I have also coordinated a project founded by the Templeton Foundation for the period (2014-2017). The project addressed the dynamics of novelties - a fundamental factor in the evolution of human societies, biological systems and technology - with the aim to unfold and quantify the underlying mechanisms through which creativity emerges and innovations diffuse, compete and stabilise. On these topics I gave one [TED talk](#) and one [TEDx talk](#).

I started my scientific career as Ph.D. student in Rome in 1992 under the supervision of Prof. Luciano Pietronero, focusing on the statistical physics of self-organised critical systems. This choice of Ph.D. subject represented a significant departure from my undergraduate studies where I focused on the quantum optics of free-electron lasers. At that time, there was a great interest for **systems self-tuning themselves to a critical state**. I became interested in these subjects and I contributed to elucidating the statistical physics of these systems by revealing the existence of hidden control parameters corresponding to an extreme separation of time-scales. In particular, with A. Vespignani and S. Zapperi, we introduced a novel real-space renormalisation scheme (Dynamically Driven Renormalisation Group), which was published in Journal of Statistical Physics.

By the end of my Ph.D, I had already obtained a permanent position at the ENEA research centre in Naples. However, after a few months, I realised that I would not have the opportunity to fully develop my ideas at ENEA. After a few months I obtained a Marie-Curie individual fellowship to join Prof. H.J. Herrmann's group in Paris. The project for which I received funding was about the **physics of granular media**, and the three and a half years I have spent in Paris, as a Marie-Curie first and after as a CNRS invite researcher, have strongly affected my career. My first relevant contribution to the field of granular media has been the introduction of the Tetris model, of a new class of microscopic models, published in Physical Review Letters (129 citations), where the crucial physical ingredient is the geometrical frustration felt by the grains. These kind of models turned out to be able to reproduce correctly most of the phenomenology of dense granular media: slow compaction, segregation, ageing, memory effects and response properties. On the basis of these results, it has been possible to address more difficult questions: the existence of a pseudo-temperature for these "non-thermal" systems, its definition by means of the Fluctuation-Dissipation relations and the possibility of constructing a satisfactory "thermodynamics". These ideas appeared first in Phys. Rev. Lett. (146 citations) and triggered my interest for an experimental check of the theoretical predictions. I started a collaboration with Prof. G. D'Anna at the EPFL in Lausanne and together we devised a series of experiment aimed at studying the glassy

behaviour and the response properties in dense granular media as well as the possibility of defining a set of statistical ensembles suitable to describe their out-of-equilibrium phenomenology. These studies were published in *Nature* (199 citations) and were featured in the cover page and in the News and Views section, a News feature and an extensive

After leaving Paris, I moved to Sapienza University of Rome as Ricercatore (Assistant Professor) in 1999 first in the group of Prof. Pietronero and then, from 2004 onwards, building my own group. My move to the University of Rome coincided with the opening of new research lines.

At Sapienza University of Rome I became interested in problems related to an **information theory** approach to the notion of **complexity**. The first problem I considered was that of measuring the similarity between sequences of characters. Together with Dario Benedetto and Emanuele Caglioti I have introduced (and patented) an automatic method for context classification of sequences of characters. This method, first published in *Physical Review Letters* (260 citations) exploits concepts of information theory, and in particular tools borrowed from data compression techniques, to address the fundamental problem of identifying and defining the most suitable tools to extract, in a automatic and unsupervised way, information from a generic string of characters. At the same time I became interested in the rapidly growing field of **Complex Networks** and I became proficient with the tools used in this area. The specific angle I took in this area was to focus on looking for algorithms for the detection of communities in large graphs. On this topic I supervised the undergraduate Laurea research of Filippo Radicchi and the ensuing work appeared in the *Proceedings of the National Academy of Sciences* (1936 citations). Since then complex networks represent an important tool in my whole research activity.

Below I summarise my main scientific interests in the last few years.

2.1 Statistical Physics of Social Dynamics

Key papers:

V. Loreto and L. Steels, *Emergence of language*, *Nature Physics*, **3**, 758-760 (2007).

A. Puglisi, A. Baronchelli and **V. Loreto**: *Cultural route to the emergence of linguistic categories*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **105**, 7936-7940 (2008).

C. Castellano, S. Fortunato and **V. Loreto**, *Statistical physics of social dynamics*, *Rev. Mod. Phys.*, **81** 591-646 (2009).

T. Gong, A. Baronchelli, A. Puglisi and **V. Loreto**, *Modelling the emergence of universality in color naming patterns*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **107**, 2403-2407 (2010).

V. Loreto, A. Mukherjee and F. Tria, *On the origin of the hierarchy of colour names*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **109(18)**, 6819-6824 (2012).

F. Tria, **V. Loreto**, V.D.P. Servedio and S.H. Strogatz and, *The dynamics of correlated novelties*, *Nature Scientific* **4**: **5890** doi:10.1038/srep05890 (2014).

Statistical mechanics has proven to be a very fruitful framework to describe phenomena outside the realm of traditional physics. The last years have witnessed the attempt by physicists to study phenomena which heavily rely on human behaviour, like the dynamics of financial markets and the emergence of collective organization in social systems. Stochastic dynamics, phase transitions, scaling, metastability and other concepts and tools of statistical physics have then come into play in the study of social phenomena. Microscopic models have been devised, where each individual is represented by few degrees of freedom, which quantify its relevant attributes, and simple rules for the interaction of the individuals with their peers determine the dynamics. In the last few years I have been focusing on three major research lines, i.e. opinion dynamics, cultural dynamics and

the emergence and evolution of language. On these subjects I wrote a [review article](#) in *Reviews of Modern Physics* (2953 citations).

Language dynamics In many biological, technological and social systems, a crucial problem is that of the communication among the different components, i.e., the elementary units of the systems, typically called agents. The agents interact among themselves and with the environment in a sensorial and non-symbolic way, their communication system not being predetermined nor fixed from a global entity. The communication system emerges spontaneously as a result of the interactions of the agents and it could change continuously due to the mutations occurring in the agents, in their objectives as well as in the environment. An important question concerns how communication can arise, which kind of communication systems are possible and what are the prerequisites for such an emergence to occur. Other important questions concern which functions are made possible to a collective level from specific communication systems and what is the role of the topology in the interactions between agents. Examples of systems like the ones described range from animal communication to human language, from the communication among biological elements to that among elements of technological systems. Language dynamics is an emerging field that focuses on all processes related to the emergence, evolution and extinction of languages and communication systems. Recently the study of the self-organization and evolution of language and meaning has recently led to the idea that a community of language users can be seen as a complex dynamical system that collectively solves the problem of developing a shared communication framework through the back-and-forth signalling between people. On these subjects I coordinated the Italian team of the EU Integrated Project (IP) [ECAgents](#). I have presently an extensive activity focused on investigating how language structures of increasing complexity emerged and evolved: emergence of names, categories, syntactic and grammar structures. In parallel I co-coordinated (together with Claudio Castellano) the *DRUST: Digging at the Roots of Understanding* project of the European Science Foundation, focused on the understanding the origins and evolution of consensus and misunderstanding. This is a challenging question that touches on all aspects of cognition as well as of social interactions. As such it stimulates creative thinking and casts many fundamental issues in a new light. The theoretical activity is paralleled both by large-scale data analyses to ground the models' predictions and an experimental activity through the realisation of targeted games/experiments using the platform [Xtribe](#) for social computing and web-gaming (see below for a description of it).

Opinions and norms dynamics Opinion dynamics concerns social processes through which populations or groups of individuals agree or disagree on specific issues. As such, modelling opinion dynamics represents an important research area that has been progressively acquiring relevance in many different domains. Existing approaches have mostly represented opinions through discrete binary or continuous variables by exploring a whole panoply of cases: e.g., independence, noise, external effects, multiple issues. In most of these cases the crucial ingredient is an attractive dynamics through which similar or similar enough agents get closer. Only rarely the possibility of explicit disagreement has been taken into account (i.e., the possibility for a repulsive interaction among individuals' opinions). My research in this area concerns the investigation of the interplay between the possibility of explicit disagreement, modulated in a self-consistent way by the existing opinions' overlaps between the interacting individuals, and the effect of external information on the system. Opinions are modelled as a vector of continuous variables related to multiple possible choices for an issue. Information can be modulated to account for promoting multiple possible choices. Key points addressed involve: why extreme information results in segregation and has a limited effect

on the population? Why milder messages may have better success and a cohesion effect? The theoretical analysis is more and more paralleled by specifically devised web-based experiments (see below the Social Computation section) to gather reliable data in controlled experimental settings. The last experiment realised in this area, [LaPensoCosì](#), concerned the monitoring of positive and negative opinions about political subjects during the last Italian political elections.

Another related area of research focuses on how norms or conventions may arise as emergent phenomena and evolve in somewhat predictable trajectories, and how these may be modelled from various perspectives, i.e., from computational to data-driven to experimental perspectives. I am interested in particular in exploring how the norms or norm-like behaviours emerge from repeated interactions among agents, and subsequently pinpoint the important factors in determining the trajectories of the norm-like interaction behaviour. The cognitive level of sophistication of the agents might affect the dynamic patterns of the interaction behaviours, thus the 'ecology' in which the whole process plays out might be a central parameter.

Innovation dynamics A universal feature of evolution, whether in biology, culture, language, or technology, is that one innovation sets the stage for another. Lipid bilayers ultimately led to cell membranes; the transistor paved the way, through subsequent innovations large and small, to the integrated circuit, personal computers, and the World Wide Web. By opening new possibilities, one novelty can pave the way for others in a process that Kauffman has called "expanding the adjacent possible". Though the creative power of this expansion into the adjacent possible is widely appreciated at an anecdotal level, it remains poorly understood theoretically and undocumented empirically. In this area, in collaboration with F. Tria, V.D.P. Servedio and S.H. Strogatz, I proposed the first mathematical model of innovation via the adjacent possible and derive testable, quantitative predictions from it. We tested these predictions on four data sets of human activity: the edit events of Wikipedia pages, the emergence of tags in annotation systems, the sequence of words in texts, and listening to new songs in online music catalogues. By quantifying the dynamics of correlated novelties, our results provide a starting point for a deeper understanding of the ever-expanding adjacent possible. From this perspective this work is giving raise to many spin-off research lines as for the emergence and diffusion of innovation in biology, linguistics, cultural and technological evolution. On these themes I'm presently coordinating the already mentioned KREYON Project (www.kreyon.net) for the period 2014-2017. Funded by the John Templeton Foundation, KREYON aims to unfold and quantify the underlying mechanisms through which creativity emerges and innovations diffuse, compete and stabilise. The project is timely due to the availability of extensive longitudinal records of human, social, biological and technological evolution. KREYON is exploiting the unique opportunity offered by the combination of ICT tools for social computation with powerful analytical and modelling tools, by blending, in a unitary interdisciplinary effort, three main activities: web-based experiments, data science and theoretical modelling. Through this experimental, mathematical and computational framework we aim at providing the scientific community with a quantitative understanding of the determinants of creativity and innovation as well as a solid overarching scientific framework describing creativity in a quantitative and operational way.

2.2 Information dynamics in Techno-social systems

Key papers:

C. Cattuto, V. Loreto and L. Pietronero, *Semiotic Dynamics and Collaborative Tagging*, *Proc.*

Natl. Acad. Sci. USA (PNAS), **104**, 1461-1464 (2007).

C. Cattuto, A. Barrat, A. Baldassarri, G. Schehr and **V. Loreto**, *Collective dynamics of social annotation*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **106**, 10511-10515 (2009).

R. Conte, N. Gilbert, C. Cioffi-Revilla, G. Deffuant, J. Kertesz, **V. Loreto**, S. Moat, J.-P. Nadal, A. Sanchez, A. Nowak, A. Flache, M. San Miguel, D. Hekbing, *Manifesto of Computational Social Science*, *European Physical Journal - Special Topics* **214**, 325-346 (2012).

M. Becker, S., D. Fiorella, L. Francis, P. Gravino, M. Haklay, A. Hotho, **V. Loreto**, J. Mueller, F. Ricciuti, V.D.P. Servedio, A. Sîrbu, F. Tria, *Awareness and learning in participatory noise sensing*, *PLoS ONE* **8(12)**, e81638 (2013).

Alina Sîrbu, Martin Becker, Saverio Caminiti, Bernard De Baets, Bart Elen, Louise Francis, Pietro Gravino, Andreas Hotho, Stefano Ingarra, **Vittorio Loreto**, Andrea Molino, Juergen Mueller, Jan Peters, Ferdinando Ricciuti, Fabio Saracino, Vito D. P. Servedio, Gerd Stumme, Jan Theunis, Francesca Tria, Joris Van den Bossche, *Participatory patterns in an international air quality monitoring initiative*, *PLoS ONE* **10(8)**, e0136763. doi:10.1371/journal.pone.0136763 (2015).

Since 2005 I have been investigating information dynamics in techno-social systems, coupling the theoretical modelling and the statistical data analysis with innovative data gathering tools and the design and realisation of web-based experiments.

Online social systems The rise of Web 2.0 has dramatically changed the way we view the relation between on-line information and on-line users and prompts a new research agenda which complements the "Web Science" vision with analytical tools and modelling paradigms from the theory of complex networks. Many popular Web applications are now exploiting user-driven information networks built by means of social annotations. Social annotations are freely established associations between Web resources and metadata (keywords, categories, ratings) performed by a community of Web users with little or no central coordination. A mechanism of this kind which has swiftly become well-established is that of collaborative tagging, whereby Web users associate free-form keywords called "tags" with on-line content such as Web pages, digital photographs, bibliographic references and other media. On these subjects I have coordinated one of the first European project in this new area, **TAGora**, whose aim was that of investigating how from the uncoordinated actions of millions of users a loose categorisation system emerged, commonly referred to as folksonomy, that displays an emergent semantics and can be effectively used to navigate through a large and heterogeneous body of resources. Two early papers in the field were published in the Proceedings of the National Academy of Sciences.

ICT, participatory sensing and citizen science There is now overwhelming evidence that the current organisation of our economies and societies is seriously damaging biological ecosystems and human living conditions in the very short term, with potentially catastrophic effects in the long term. A lot can and must be done from the technology and policy point of view: for example building passive houses, developing renewable energy, and so on. However, it is only when people become fully aware of their particular environmental situation and its future consequences that the needed behavioural changes will truly happen. With a growing realisation that only through bottom-up actions we can deal with today's challenges, there is an urgent need to create an ICT fabric that can support the local actions of citizens by supporting collaborative monitoring, exposing actionable local information, and enabling an evidence-based dialogue among stakeholders. On these subjects I recently coordinated the EU STREP Project **EveryAware**. The goal of this project is to

enhance social awareness about environmental issues emerging in urban habitats through the use of ICT tools especially designed to gather user-generated and user-mediated information. The idea is that the availability of locally-relevant digital data, together with their analysis, processing and visualisation should trigger a bottom-up improvement of social strategies. EveryAware combines digital technologies to gather data and opinions with established and novel theoretical methods to analyse them, with the ultimate goal of providing real-time, user-centred results through standard and largely available communication networks. The integration of participatory sensing with the monitoring of subjective opinions is novel and crucial, as it exposes the mechanisms by which the local perception of an environmental issue, corroborated by quantitative data, evolves into socially-shared opinions, and how the latter, eventually, drive behavioural change. Currently two main case studies are ongoing: one focused on **Noise Pollution** and one on **Air Quality** through a suitably constructed and calibrated Sensor Box: a portable device that measures concentrations of pollutants in the air and localise them through a GPS. We also launched a large scale **International challenge**.

2.3 Information Theory and Complexity

Key papers:

D. Benedetto, E. Caglioti and **V. Loreto** : *Language Trees and Zipping*, *Phys. Rev. Lett.* **88**, 048702 (2002).

A. Puglisi, D. Benedetto, E. Caglioti, **V. Loreto** and A. Vulpiani, *Data Compression and Learning in time sequences analysis*, *Physica D* **180**, 92 (2003).

A. Baronchelli, D. Benedetto, E. Caglioti and **V. Loreto**: *Artificial sequences and complexity measures*, *J. Stat. Mech.*, P04002 (2005).

In nature many systems and phenomena are often represented in terms of sequences or strings of characters. In experimental investigations of physical processes, for instance, one typically has access to the system only through a measuring device which produces a time record of certain observable, i.e. a sequence of data. On the other hand other systems are intrinsically described by string of characters, e.g. DNA and protein sequences, language. In this area I have introduced a new automatic method for the extraction of information codified as sequences of characters. Together with Dario Benedetto and Emanuele Caglioti I have patented an automatic method for context classification of sequences of characters. The method follows a data-compression oriented information theory approach to define a concept of remoteness between pairs of sequences or strings of characters on the basis of their relative information content (relative entropy). The notion of remoteness between two bodies of knowledge is the key point to implement suitable algorithms for context recognition (e.g., for a text, recognition of the language in which it is written, the subject treated and its author) as well as context classification, i.e. a hierarchical organization of corpora of sequences on the basis of the mutual entropic content of pairs of elements in the corpus. This body of work triggered an extensive **press coverage**.

2.4 Sustainable cities

Cities are the economic and social engines of modern nations. Within cities, technological innovations are typically born; they are the places where the most relevant historical events occur. Though, it is no surprise that people are increasingly moving from the countryside to metropolitan areas, attracted by the opportunities offered by the cities.

Cities are, however, affected by many issues that hinder citizens' quality of life. As an example, cities are well-known for their level of economic inequality and for the presence of social and ethnic segregation. These phenomena might prevent a large part of cities' population from accessing opportunities and venues, confining them to the lowest strata of wellness and wealth.

Infrastructures are cities' backbone, and due to their relevance, researchers from many areas have devoted a lot of effort to understanding their functioning and the development of monitoring and planning tools. Infrastructures are, indeed, another example of urban criticality. Poor planning and malfunction of public transportation can prevent citizens from having a satisfying life, economic activities to flourish, and in general a city to achieve its full potential.

On these topics, I am leading the **Sustainable Cities** team at Sony CSL committed to providing new tools for the understanding and monitoring of urban environments, focusing on all those aspects that could contribute to make them more sustainable. The Sustainable Cities research merges methods and frameworks ranging from Machine Learning, Data Science, Statistical Physics and Complex Systems Physics, in a novel and potentially ground-breaking approach. All the projects realised in this area are gathered under the Whatif-Machine framework: all the tools and studies are designed to allow the general public or decision makers to explore new scenarios in an easy and understandable way.

2.5 Infosphere

Understanding and healing the information dynamics of society is intrinsically important and it is essential in democracies. As a collective decision-making process, democracy is efficient if the population can access quality information and join a constructive social dialogue. On the other hand, democracy has a narrow margin of action on information and interconnection dynamics, since the freedom of thought, expression and association are founding and defining the value of democracy itself. So we need to find a way to deal with these problems without giving up our freedoms.

On these topics, I coordinate the **Infosphere** team at Sony Computer Science Laboratories - Rome, which is tackling the challenge of redesigning Information Technologies to make information more accessible and social dialogue more transparent, understandable, and healthy. The challenge has a high degree of complexity, therefore it needs to be tackled from several, interacting sides. Our team is based in Rome and it intensively cooperate with the homologous team at Sony Computer Science Laboratories - Paris and we cooperate with journalists, editors, national authorities, and institutions. Our final aim is to improve our societies' information dynamics through new IT tools built around human information processing, both at the individual and the collective level, and to contrast real and present dangers to our democracies.

2.6 Augmented Creativity

Being creative means using one's abilities to find innovative and original solutions to particular problems or needs. That's why supporting people in being more creative, helping them find original paths to brilliant, innovative, and practical solutions, is of the utmost importance.

On these topics, I coordinate the **Augmented Creativity** team at Sony Computer Science Laboratories - Rome, which is investigating the ability of AI to understand the complexity of open-ended systems for producing new interesting ideas, paths, and solutions coherent with the general context. To achieve this, we exploit the well known AI capabilities of processing information from the outside world, integrating it with the capability of exploring the world of novelties before they

occur. The team regularly participates to EU project in the framework of the **S+T+ARTS**.

3 Coordination and management activities

I have an extensive experience in coordinating research groups both scientifically and strategically. This includes all the activities from fund raising (at the National and mostly at the international level), selecting and hiring people, coordinating the activities of several working groups in a timely and efficient way, enforcing delivery deadlines, supervising junior and experienced researchers.

3.1 Research projects coordination

- Coordinator for Sony CSL - Rome of the ScientIA started in July 2022, in collaboration with the Centre national de la recherche scientifique (CNRS) in Paris, France, for the 2022-2025. ScientIA aims to investigate the mechanisms favouring the spread of AI technologies, the effects of this disrupting innovation on scientific cultures and practices, and the social consequences of the AI-induced transformation of the scientific ecosystem.
- General Coordinator of the project *KREYON Unfolding the dynamics of creativity, novelties and innovation* funded by the Templeton Foundation (2014-2017) (650 KEUR). The project addresses the dynamics of novelties - a fundamental factor in the evolution of human societies, biological systems and technology - with the aim to unfold and quantify the underlying mechanisms through which creativity emerges and innovations diffuse, compete and stabilise.
- General European Coordinator of the European STREP project *EveryAware* (2011-2014) (2 Millions Euros). EveryAware intends to integrate environmental monitoring, awareness enhancement and behavioural change by creating a new technological platform combining sensing technologies, networking applications and data-processing tools. From this perspective the management have to be timely and careful in order to perfectly integrate all the needed components: electronics for the sensing technologies, software for mobile apps and web-gaming platforms, data gathering, storage and analysis tools, modelling and analytical techniques.
- Co-coordinator of the ESF EUROUNDERSTANDING project *DRUST: Digging at the Roots of Understanding* (2011-2014) (100 KEuro). DRUST collaborative research project (CRP) brings together eminent European research groups that cover the full breadth of Cognitive Science, Artificial Intelligence, Linguistics, Physics and Computer Science in an interdisciplinary examination of how different types of common ground support interpersonal and intercultural understanding. Communication plays a key role for such an understanding but only to the extent that dialog partners have sufficient common ground. Misunderstandings occur because most dimensions on which common ground can exist are not universally shared and not a priori present. In this framework our Unit is providing the data analysis and modelling support borrowed from the experience gathered in modelling social dynamics phenomena.
- Coordinator of the Sapienza Ateneo project *Sistemi complessi classici e quantistici* (2010-2013) (120 KEuro). This project was articulated in two main research lines, one devoted to complex classical systems and one focused on quantum complex many-body systems. Though apparently far apart, both topics have an intrinsic unity due to the theoretical and numerical tools adopted to investigate the emerging collective properties of both classical and quantum systems.

- Coordinator for the Physics Dept. of the PRIN project *Information dynamics in techno-social systems*, funded by the Italian Ministry for University and Research (2008-2010).
- General European Coordinator of the European STREP project *TAGora* (2006-2009) (2 Millions Euros). TAGora has been the very first project dealing with the dynamics of online social communities. Back in 2005 a new paradigm was quickly gaining impact in large-scale information systems: Social Tagging. In applications like Flickr, Connotea, Citeulike, Delicious, etc. people no longer made passive use of online resources - they took on an active role and enrich resources with semantically meaningful information. Such information consisted of terminology (or tags") freely associated by each user to resources and shared with users of the online community. Despite its intrinsic anarchist nature, the dynamics of this terminology system spontaneously led to patterns of terminology common to the whole community or to subgroups of it. Surprisingly, this emergent and evolving semiotic system provided and still does a very efficient navigation system through a large, complex and heterogeneous sea of information. TAGora proposed visionary and high risk research aimed at giving a scientific foundation to these developments, so contributing to the growth of the new field of Semiotic Dynamics. Semiotic Dynamics studies how semiotic relations can originate, spread, and evolve over time in populations, by combining recent advances in linguistics and cognitive science with methodological and theoretical tools of complex systems and computer science.
- Coordinator for the Physics Dept. of *Sapienza Univ.* of the European Integrated Project *ECAgents* (2004-2008) (280 KEuro). ECAgents proposed visionary and high risk research to provide better understanding of the role of communication in collections of embodied and situated agents using the methodological and theoretical tools of complex systems science and computer science. The aim was that of studying how communication arises, what different types of communication systems there are or can be, what the different pre-conditions are that must be satisfied for the emergence of different types of communication systems, what kind of performances at the collective level are made possible by different communication systems, what is the role of network communication topology in such performances. The project investigates basic properties of different communication systems, from simple communication systems in animals to human language and technology-supported human communication, to clarify the nature of existing communications systems and to provide ideas for designing new technologies based on collections of embodied and communicating devices.
- Coordinator for the Physics Dept. of *Sapienza Univ.* of the European Project *ATACD* (2006-2009) (20 KEuro).
- National coordinator of the PRIN project *Meccanica statistica dei sistemi complessi*, funded by the Italian Ministry for University and Research (2005-2007) (220 KEuro).
- Coordinator for the Physics Dept. of *Sapienza Univ.* of the FIRB project *Rheological and dynamical properties of granular matter*, funded by the Italian Ministry for University and Research (80 KEuro).

3.2 Conference Organization

- 1998: Meeting *GdR Milieux Granulaires SEC*, École Supérieure de Physique et Chimie Industrielles, Paris (FRANCE), 12 June 1998.

- 2001: Workshop *Viellissement et matière desordonnée*, Carry-le-rouet, France 5-7 June 2001 (organized with D. Bideau and E. Charlaix).
- 2002: International Workshop *Aspect of Complexity and its applications*, Rome 23-25 September 2002 (organized with M. Falcioni, E. Marinari and A. Vulpiani).
- 2004: Workshop on *Theoretical and Methodological Foundations of ECAgents*, Rome, 20th September 2004.
- 2005: International Conference: *Semiotic Dynamics, Language, and Complexity*, Erice, 12-16 December 2005.
- 2005: Workshop on *Semiotic Dynamics of Language Games*, Bagnovignoni (Siena - Italy) 9-12 November 2005
- 2006: II Bagnovignoni workshop on *Semiotic Dynamics: Grammar*, Bagnovignoni (Siena - Italy) 23-26 October 2006
- 2007: Vice-chairman of **STATPHYS23**, the 23rd International Conference on Statistical Physics of the International Union for Pure and Applied Physics (IUPAP), to be held in Genova, Italy, from July 9 to 13, 2007.
- 2007: International School on Complexity: Course on *Statistical Physics of Social Dynamics: Opinions, Semiotic Dynamics, and Language*. Directors: Vittorio Loreto and Luc Steels, Ettore Majorana Foundation and Center For Scientific Culture Erice, 14-19 July 2007, Satellite Workshop of STATPHYS2.
- 2008: Session leader for the session on *Information and Communication Technologies* at the European Conference on Complex Systems ECCS08, Jerusalem, 10-19 September 2008.
- 2009: Track chair at the Hypertext 2009 conference, 29th June - July 1st 2009, Torino, Italy.
- 2009: TAGora workshop at the Hypertext 2009 conference, 29th June - July 1st 2009, Torino, Italy.
- 2010: *Paths in Complexity: Fractals, Superconductivity and Galaxies*: conference to celebrate the 60th birthday of Luciano Pietronero, Rome, 23-24 September 2010.
- 2011: Workshop PRIN on *Information dynamics in complex data structures*, Bagnovignoni 23-25 February 2011.
- 2011: *Everyaware* Kick-off meeting, Torino, 14-15 March 2011.
- 2012: Program Co-Chair of **IWSOS 2013**, the seventh International Workshop on Self-Organizing Systems, Palma de Mallorca, Spain, 8-10th May 2013.
- 2014: Workshop on *On the emergence of consensus and misunderstanding*, Rome 24-25th February 2014. Co-chair with C. Castellano, C. Cuskley and L. Steels.
- 2015-2017: Member of the Steering Committee of the European Conference of Complex Systems (ECCS).
- 2015: Organizer of the "Complex Systems" Session of the 101st National Congress of the Italian Physics Society (SIF), Rome, 21-25 September 2015.

- 2015: Organizer and coordinator of the 1st KREYON Day, September 13th – 14th, Palazzo delle Esposizioni in Rome and Physics Dept. of Sapienza University in Rome.
- 2016: Co-Chair of the Workshop on "Creativity and innovation in the evolution of language", to be held in the framework of the EVOLANG 11 Conference, New orleans 21-24 March 2016.
- 2016: Local Chair of the COMPLEXIS 2016, 1st International Conference on Complex Information Systems (<http://www.complexis.org/>), 22-24 April 2016.
- 2016: Co-director for the International Summer school on "Creativity and Evolution: Games, Language, Robots, Life, Art", Como, 5-9 September 2016. (co-director L. Steels). (<http://caes.lakecomoschool.org/>)
- 2016: Co-director for the Workshop on "Determinants of creativity and innovation in science, art and technology", satellite workshop of the 2016 Conference on Complex Systems, Amsterdam, September the 20th 2016. (<http://www.kreyon.net/ccs2016>).
- 2016 Organizer and coordinator of the 2st edition of the KREYON DAYS, October 26th–30th, Palazzo delle Esposizioni in Rome and Physics Dept. of Sapienza University in Rome.
- 2017 Organizer and coordinator of the 3rd edition of the KREYON DAYS, September 8th – 9th, Palazzo delle Esposizioni in Rome and Physics Dept. of Sapienza University in Rome.
- 2020 Organizer and Program chair of the online NETSCI conference, September 17th – 25th (<https://netsci2020.netscisociety.net/>).

4 Teaching activity

- '91-'93 Teaching activity of Mathematics and Physics in several secondary Schools.
- '07-present Supervisor of **16 Laurea students (triennale) till 2015** Simone Pompei 2007, Giorgio Gosti 2007, Lorenzo Pucci 2007, Guido Uguzzoni 2007, Nicola Catenacci 2008, Riccardo Balzan 2008, Alessandro Cerocchi 2008, Andrea Lanciano 2009, Eis Annavini 2009, Valerio Ciotti 2013, Viviana Paga 2014, Valerio Cappuccio 2014, Lancia 2015, Alessandro Del Franco 2015, Pietro Pasanisi 2015, Giulio Macilenti 2015.
- '94-present Supervisor of **29 Laurea students (Magistrale, specialistica e vecchia laurea) till 2018** Riccardo Hallgass 1994, Luigi Ciofi degli Atti 1999, Vittoria Colizza 2000, Alessandro Taloni 2000, Andrea Baronchelli 2002, Valentina Alfì 2002, Filippo Radicchi 2004, Riccardo Balzan 2006, Simone Pompei 2009, Lorenzo Pucci 2009, Pietro Gravino 2009, Lorenzo Taggi 2010, Martina Pugliese 2011, Luca Gramaglia 2011, Davide Colombi 2011, Roberta Amato 2011, Giovanna Chiara Rodi 2013, Marco Pietrosanto 2013, Pierpaolo Mastroianni 2013, Bruno Campanelli 2013, Stefano Vaccari 2013, Pietro Pugliese 2014, Greta Greco 2015, Leonardo Zavojanni 2015, Flavia D'Arpino 2015, Lorenzo Lancia 2015, Giulio Tani 2017, Margherita Lalli 2017, Annalisa Caligiuri 2017, Claudio Chiappetta 2018.
- '04-present Supervisor **17 Ph.D students** Andrea Baronchelli 2004; Patrick Mayor 2005, Ph.D. student EPFL- Switzerland; Giuliano Pascucci 2007-2010; Alessio Ansuini 2006-2009; Miguel Ibanez de Berganza 2006-2009, Simone Pompei 2010-2013, Pietro Gravino 2010-2015, Martina Pugliese 2011-2015, Bernardo Monechi 2011-2015, Suman Maity 2013-2015, Giovanni Chiara Rodi 2013-2017, William Schueller 2017-2018, Giulio Tani 2018-2021, Matteo Straccamore 2020-2023, Giordano De Marzo 2020-2023, Federica Fanelli 2023-present, Matteo Benati 2023-present.
- '07-present Mentor of **24 post-docs researchers till 2018**: Tao Gong 2007-2008; Ramon Ferrer y Cancho 2006-2007; Andrea Baldassarri 1997 and 2005-2011; Andrea Capocci 2007-2011; Vito D.P. Servedio 2006-present; Ciro Cattuto 2006-2009; Xavi Castello 2008; Animesh Mukherjee 2009-2011; Francesca Tria 2009-2010; Alina Sirbu 2011-2014; Saverio Caminiti 2011-2014; Christine Cuskley 2012-present; Stefano Ingarra 2011-2014; Fabio Saracino 2012-2014; Alvaro Ruiz-Serrano 2014-2015; Bernardo Monechi 2015-2021; Cesare Bianchi 2015-2017; Indaco Biazio 2015-2017; Pietro Gravino 2015-present; Jason Sakellariou, 2015-2016; Miguel Ibanez Berganza 2016-2020; Enrico Ubaldi 2018-2021; Lavinia Rossi-Mori 2024-present; Michele Avalle 2024-present;
- 1999-2000 Assistant professor for the course of Fisica Generale I (Prof. R. Bizzarri), Undergraduate studies in Physics, Sapienza University of Rome.
- 2000-2001 Assistant professor for the course of Fisica Generale II (Prof. R. Bizzarri), Undergraduate studies in Physics, Sapienza University of Rome.
- 2001-2005 Assistant professor for the course of Classical Mechanics and Mechanics of Continuous Systems (Prof. G. Bachelet), Undergraduate studies in Physics, Sapienza University of Rome.
- 2005-2010 Course of **Computational physics (Laboratorio di Calcolo)**, Undergraduate studies in Physics, Sapienza University of Rome.

- 2007-2014 Course of **Fisica Generale I**, Undergraduate studies in Chemistry, Sapienza University of Rome. For this course I wrote a **book** published in 2012 by Mc-Graw-Hill.
- 2009-2014 Course of **Physics of Complex Systems**, Undergraduate and graduate studies in Physics, Sapienza University of Rome.
- 2015-2017 Course of **Fisica Generale I**, Undergraduate studies in Chemistry, Sapienza University of Rome. For this course I wrote a **book** published in 2012 by Mc-Graw-Hill.
- 2015-2017 Course of **Physics of Complex Systems**, Undergraduate and graduate studies in Physics, Sapienza University of Rome.
- 2022-present Course of **Physics of Complex Systems**, Undergraduate and graduate studies in Physics, Sapienza University of Rome.
- 2022-present Course of Fisica Generale, Undergraduate studies in Geology, Sapienza University of Rome.
- 2012-2017 Member of the Ph.D. committee in Mathematics, Sapienza University of Rome.
- 2023-present Member of the Ph.D. committee in Physics, Sapienza University of Rome.

5 Referee activity

As of 2019 I serve in Editorial Board of Journal of Physics: Complexity (<https://iopscience.iop.org/journal/2632-072X>) and Complexity (<https://www.hindawi.com/journals/complexity/>).

As of 2016 I serve in the advisory board of a book series at Springer, entitled "Computational Synthesis and Creative Systems".

In the period 2015-2023 I served in the Council of Complex Systems Society and in the Steering Committee of the Conference on Complex Systems.

As of 2008 I serve the European Commission and several National and International Institutions as a consultant expert for future programs and reviewer for project proposals: e.g., FET-Open projects for the EU, Israel Science Foundation, Université unifié Sorbonne Paris Cité, Swiss National Science Foundation, Singapore NRF Competitive Research Programme.

As of 1993 I do referee activity for several international journals among which: PLoS ONE, Nature, Nature Physics, Nature Scientific Reports, PNAS, Physical Review and Physical Review Letters, Physics A, Physica D, Journal of Geophysical Research, Adaptive Behaviour, Advances in Complex Systems, International Journal of Modern Physics C, Europhysics Letters, JSTAT.

6 Scientific outcomes

6.1 Patents

Sistema informatizzato di gestione di informazione rappresentata in forma codificata, E. Caglioti, D. Benedetto, and V. Loreto, Università di Roma “La Sapienza” (2001), IT1323407.

System, method, and computer-readable medium for tracking information exchange, V Loreto, VDP Servedio, N Reisz, S Thurner, US Patent App. 16/375,017.

Text editing, V Loreto, P Gravino, US Patent App. 17/535,685.

6.2 Impact of the publications (list not updated after 2016)

The publications received over 21000 with an H-index of 54 (source: Google Scholar). The paper G. D’Anna, P. Mayor, A. Barrat and V. Loreto, *Nature*, vol. 424, 909 (2003) has been featured in the cover page of *Nature*; News and views: *Shaken sand: a granular fluid?*, P. Umbanhowar, *Nature* vol. 424, 886 (2003). News feature: *Think outside the box*, M. Buchanan, *Nature*, vol. 425, 556 (2003). The paper M. Bruno, H.P. Monteiro Melo, B. Campanelli and V. Loreto, “A universal framework for inclusive 15-minute cities”, *Nature Cities* 1 (10), 633-641 (2024), has been featured in News and Views of *Nature Cities* and *Nature*, in addition to almost 70 venues among which *The Economic* and *The Washington Post* (<https://nature.altmetric.com/details/166113405/news>).

Impact in the media: More than 300 among press releases, TV and radio broadcasts in the last few years, among which the most important on New York Times, *The Economist*, BBC, *Scientific American*, *Physics Today*, *New Scientist*, *Nature Science Update*, *Science NOW*, *Prospect Magazine*, *LiveScience*, *Libération*, *Il Sole 24 Ore*, *La Stampa*, *Corriere*, *Radio Rai 3*, *Rai Educational*, *Radio 24*, *Radio Capital*, *Eco Radio*, *Rai 3 - TG Leonardo*. Among the most important are (updated at 2016. See also <http://samarcanda.phys.uniroma1.it/vittorioloreto/press/>):

- *Granular Games*, *Nature*, Physics portal, Research Highlight November 2001.
(<http://physics.nature.com/>)
- Andrew Watson, *A gift for language*, *New Scientist*, 15 December 2001.
(<http://www.newscientist.com/>)
- Philip Ball, *Algorithm makes tongue tree*, *Nature Science Update*, 22 January 2002.
(<http://www.nature.com/nsu/020121/020121-2.html>)
- Sharmila Sohoni, *The elements of style*, *The Economist*, 7 February 2002.
(http://www.economist.com/science/displayStory.cfm?story_id=975770)
- Bruce Schecter *Fun With Your Zip Program: SortThrough Texts, and More*, *New York Times*, 30th april 2002.
(<http://www.nytimes.com/2002/04/30/science/physical/30ZIP.html>)
- Luigi Dell’Aglia *Nel mondo dei granelli di sabbia*, *Il Sole 24 Ore*, 11th September 2003.
(<http://www.neteconomy24.ilsole24ore.com/fc?cmd=art&artId=286151&chId=16&artType=Articolo&back=0>)

- Luigi Dell’Aglio *Le sfide: non-equilibrio e complessità*, Il Sole 24 Ore, 11th September 2003.
(<http://www.neteconomy24.ilsole24ore.com/fc?cmd=art&artId=286152&chId=16&artType=Articolo&back=0>)
- Italian Radio, Rai - Radio 3, *Sotto lo zip, l’autore*, Le oche di Lorenz, 11th march 2002.
(http://www.radio.rai.it/radio3/scienze/mostra_evento.cfm?Q_EV_ID=27397)
- TV broadcast, April 2004: EXPLORA, La TV delle scienze, RAI Educational. Discussion on *Networks* with Castellano C. (ECAgents), Di Bernardo D., Loreto V. (ECAgents), Parisi D. (ECAgents). (<http://www.explora.rai.it>)
- TV broadcast, April 2005: EXPLORA, La TV delle scienze, RAI Educational. Discussion on *Complexity* with P.-L. Luisi, V. Loreto, G. Parisi and L. Pietronero. (<http://www.explora.rai.it>)
- ScienceNOW Daily News, 23rd January 2007: *Folk Wisdom for Web Sites*, by John Bohannon. (<http://sciencenow.sciencemag.org/cgi/content/full/2007/123/5>)
- Scientific American, 23rd January 2007: *Tag, You’re It: Scientists Describe Collaborative Tagging Sites like Del.icio.us*.
(www.sciam.com/article.cfm?articleID=5021D304-E7F2-99DF-33DDD86F3B3ECA20)
- Italian Radio, Rai - Radio 3 Scienza, *La fisica dei sistemi complessi*, 20th September 2007.
(http://www.radio.rai.it/radio3/view.cfm?Q_EV_ID=226108)
- Italian Radio, Rai - Radio 3 Scienza, *La lingua batte dove la fisica vuole*, 23rd October 2007.
(http://www.radio.rai.it/radio3/view.cfm?Q_EV_ID=229258)
- Italian Radio, Rai - Radio 3 Scienza, *Complessita’ senza complessi*, 24th April 2008.
(http://www.radio.rai.it/radio3/view.cfm?Q_EV_ID=249235)
- Radio 24, Moebius, *Sulla formazione delle categorie*, 16th August 2008.
(<http://www.moebiusonline.eu/trasmissioni/080816trasmissione.shtml>)
- Babel’s dawn: speech, community and power, by Blair Bolles, 22nd June 2008.
(http://ebbolles.typepad.com/babels_dawn/2008/06/are-languages-r.html)
- “La supermente del mondo”, Focus, n. 197, February 2009.
(http://www.focus.it/In_edicola/default.aspx?ide=27121)
- “Tutta la complessità del social tagging”, CNR-INFM press release, June 2009.
- “Tag anti spam”, Galileonet, July 3rd 2009.
(<http://www.galileonet.it/news/11701/tag-anti-spam?print=1>)
- “La strategia del tag”, Oggiscienza, July 3rd 2009.
(<http://oggiscienza.wordpress.com/2009/07/03/la-strategia-del-tag/>)
- “Model sheds light on the language of color”, Physics Today, March 2010.
(http://ptonline.aip.org/journals/doc/PHTOAD-ft/vol_63/iss_3/20_1.shtml)

- “Così imparammo a dire rosso”, Gabriele Beccaria, Tuttoscienze, La Stampa, February 2012.
(<http://www3.lastampa.it/scienza/sezioni/news/articolo/lstp/442621/>)
- “Interactive maps help pygmy tribes fight back”, New Scientist, One Per Cent, 21st February 2012.
(<http://www.newscientist.com/blogs/onepercent/2012/02/interactive-maps-help-pygmy-tr.html>)
- “Hierarchy of Color Naming Matches the Limits of Our Vision System”. Charles Choi, LiveScience, 16th April 2012.
(<http://www.livescience.com/19704-colors-names-human-vision.html>)
- “Hierarchy of Color Naming Matches the Limits of Our Vision System”. Scientific American, 16th April 2012.
(<http://www.scientificamerican.com/article.cfm?id=how-colors-get-their-name>)
- “Na wit en zwart komt altijd rood”. Hilde Van den Eynde, De Standaard, 17th April 2012.
(<http://www.standaard.be/artikel/detail.aspx?artikelid=FA30QMJT>)
- “Come nascono i nomi dei colori”. Martina Saporiti, Galileonet, 20th April 2012
(<http://www.galileonet.it/articles/4f90049f72b7ab0f9a000002>)
- “Colours: Differing points of hue”. Philip Ball, Under the radar, BBC - Future, 27th April 2012.
(<http://www.bbc.com/future/story/20120427-when-is-a-colour-not-a-colour>)
- Moebius, Radio 24, June the 2nd 2012, EveryAware project.
(<http://www.moebiusonline.eu/trasmissioni/120602trasmissione.shtml>)
- Colorful language, Doctordisruption, 6th June 2012.
(<http://www.doctordisruption.com/language/colourful-language/>)
- Radio 3 Scienza, June the 13th 2012, Intervista con Rossella Panarese.
(<http://www.radio3.rai.it/dl/radio3/programmi/puntata/ContentItem-51e48255-52eb-4917-b454-214d2a9140dc.html>)
- “Riddled with irregularities: Why are languages so different and disorderly?” Philip Ball, Prospect Magazine, 22 August 2012.
(<http://www.prospectmagazine.co.uk/magazine/riddled-with-irregularity/>)
- Radio Capital, September 1st 2012, Interview with Fabiana Bisulli.
(<http://www.capital.it/capital/home>)
- ECO Radio, September 4th 2012, Interview on the EveryAware project with Francesco Pomilio.
(http://www.ecoradio.it/?option=com_frontpage&Itemid=1)

- “Energie sensibili”, September 12th, Interview on the EveryAware project with Federica Ionta.
(<http://www.energiesensibili.it/numero-60-2/sviluppo-sensibile/eco-tecnologia-per-uneuropa-pi-sensibile>)
- “Lo zainetto misura smog”, Maria Rosa Pavia, Corriere.it, August 31st 2012
(http://www.corriere.it/ambiente/12_agosto_08/zainetto-misura-smog_ea32bb6c-e132-11e1-9040-4b74873c03cd.shtml)
- “Veleni, arriva lo zainetto antismog”, Livia Ermini, Il Venerdì di Repubblica, August 31st 2012.
- “Laboratorio in spalla”, TG Leonardo, November 8th 2012.
- “L’umore degli elettori social in un gioco online”, La Stampa, January the 30th 2013.
- “laPENSOcosì: esperimento scientifico per misurare l’umore degli elettori”, LINKIESTA, M. Boscolo and E. Tola, January the 30th 2013.
- “Scopri la tua anima di elettore con gli algoritmi sul Web”, Tuttoscienze, La Stampa, February the 2nd 2013.
- Interview on Ecoradio about Widenoise, Luciana Biondi, February the 5th 2013.
- Interview on Ecoradio about laPENSOcosì, Luciana Biondi, February the 26th 2013.
- “Torino, in giro con Everyaware a controllare la qualità dell’aria”, S. Bencivelli, La Stampa, TUTTOGREEN, September 2013.
- “Io e i miei studenti in giro a misurare lo smog” (My students and me, monitoring smog around), S. Bencivelli, La Repubblica, February the 24th 2014.
- The Mathematics of Novelties and Innovations. Samuel Arbesman, 08.06.14 Wired
(<http://www.wired.com/2014/08/themathematicsofnoveltiesandinnovations/>)
- The mathematics of discovering new things. Rachel Feltman, The Washington Post, August 1, 2014. (<http://tinyurl.com/pqs6wnu>)
- News Picks: Mathematical model explores evolution through correlated novelties, Physics Today 04 agosto 2014.
(<http://tinyurl.com/nquljx7>)
- Mathematics of Novelty and Innovation, ASTD.org, by Ryann K. Ellis, August the 6th 2014.
(<https://www.td.org/Publications/Blogs/Science-of-Learning-Blog/2014/08/Mathematics-of-Novelty-and-Innovation>)
- Le dinamiche sociali nell’era di internet, by Cinzia Belmonte, Sapere, June 2015.
- La magia dei numeri e le bolle ghiacciate per scoprirsi creativi, Corriere della Sera, by Natalia Distefano, September the 13th 2015.
(<http://bit.ly/1P2UE0j>)

- Kreyon Day: creatività e innovazione a Roma, Le Scienze, by Giulia Alice Fornaro, September the 11th 2015.
(<http://bit.ly/1LVNwPx>)
- Fra creatività e innovazione al Kreyon Day di Roma, Ansa, September the 7th 2015.
(<http://bit.ly/1P2V9rM>)
- Kreyon Day, una giornata di creatività condivisa, Oggiscienza, by Valentina Tudisca, September the 10th, 2015.
(<http://bit.ly/1Nysklf>)
- Kreyon Day, la creativit in mostra, Galineonet.it, September the 11th, 2015.
(<http://bit.ly/1S7JKXp>)
- Kreyon Day, giornata dedicata alla creatività, Sapere Scienza, September the 13th 2015.
(<http://bit.ly/1LVPBuE>)
- Il Kreyon Day, Radio 3 Scienza, by Marco Motta, September the 12th 2015.
(<http://bit.ly/1OVpNov>)
- Siamo Noi, TV2000, January the 20th 2016. Interview about Everyaware.
(<https://goo.gl/8dWX00>)

6.3 20 selected publications

- 1) **V. Loreto**, L. Pietronero, A. Vespignani and S. Zapperi: *Renormalization group approach to the critical behaviour of the Forest-Fire model*, *Physical Review Letters* **75**, 465 (1995). [[PDF](#)]
- 2) E. Caglioti, **V. Loreto**, H.J. Herrmann, and M. Nicodemi, *A "Tetris-like" Model for the Compaction of Dry Granular Media*, *Phys. Rev. Lett.* **79**, 1575 (1997). [[PDF](#)]
- 3) E. Caglioti, **V. Loreto**, *Entropy for relaxation dynamics in granular media*, *Phys. Rev. Lett.* **83**, 4333 (1999). [[PDF](#)]
- 4) A. Barrat, J. Kurchan, **V. Loreto** and M. Sellitto, *Edwards' Measures for Powders and Glasses*, *Phys. Rev. Lett.* **85**, 5034 (2000). [[PDF](#)]
- 5) A. Baldassarri, S. Krishnamurthy, **V. Loreto** and S. Roux, *Coarsening and Slow-Dynamics in Granular Compaction*, *Phys. Rev. Lett.* **87**, 224301-1 (2001). [[PDF](#)]
- 6) D. Benedetto, E. Caglioti and **V. Loreto** : *Language Trees and Zipping*, *Phys. Rev. Lett.* **88**, 048702 (2002). [[PDF](#)]
- 7) G. D'Anna, P. Mayor, A. Barrat, **V. Loreto** and F. Nori, *Observing Brownian motion in vibro-fluidized granular matter*, *Nature*, **424**, 909 (2003). Featured in the cover page and in the *News & Views* paper: P. Umbanohwar, *Shaken sand - a granular fluid?*, *Nature* **424**, 886 (2003). [[PDF](#)]

- 8) F. Radicchi, C. Castellano, F. Cecconi, **V. Loreto** and D. Parisi: *Defining and identifying communities in networks*, *Proc. Natl. Acad. Sci. USA (PNAS)* **101**, 2658-2663 (2004). [\[PDF\]](#)
- 9) **V. Loreto** and L. Steels, *Emergence of language*, *Nature Physics*, **3**, 758-760 (2007). [\[PDF\]](#)
- 10) C. Cattuto, **V. Loreto** and L. Pietronero, *Semiotic Dynamics and Collaborative Tagging*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **104**, 1461-1464 (2007). [\[PDF\]](#)
- 11) A. Puglisi, A. Baronchelli and **V. Loreto**: *Cultural route to the emergence of linguistic categories*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **105**, 7936-7940 (2008). [\[PDF\]](#)
- 12) C. Castellano, S. Fortunato and **V. Loreto**, *Statistical physics of social dynamics*, *Rev. Mod. Phys.*, **81** 591-646 (2009). [\[PDF\]](#)
- 13) C. Cattuto, A. Barrat, A. Baldassarri, G. Schehr and **V. Loreto**, *Collective dynamics of social annotation*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **106**, 10511-10515 (2009). [\[PDF\]](#)
- 14) T. Gong, A. Baronchelli, A. Puglisi and **V. Loreto**, *Modelling the emergence of universality in color naming patterns*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **107**, 2403-2407 (2010). [\[PDF\]](#)
- 15) F. Tria, E. Caglioti, **V. Loreto** and A. Pagnani, *A Stochastic Local Search algorithm for distance-based phylogeny reconstruction*, *Molecular Biology and Evolution*, **27**, 2587-2595 (2010). [\[PDF\]](#)
- 16) **V. Loreto**, A. Mukherjee and F. Tria, *On the origin of the hierarchy of colour names*, *Proc. Natl. Acad. Sci. USA (PNAS)*, **109**(18), 6819-6824 (2012). [\[PDF\]](#)
- 17) F. Tria, B. Galantucci and **V. Loreto**, *Naming a structured world: a cultural route to duality of patterning*, *PLoS ONE*, **7**(6), e37744 (2012). [\[PDF\]](#)
- 18) R. Marchetti, A. Taloni, E. Caglioti, **V. Loreto**, and L. Pietronero, *Stationary growth and unique invariant harmonic measure of cylindrical DLA*, *Phys. Rev. Lett* **109**, 065501, (2012). [\[PDF\]](#)
- 19) F. Tria, **V. Loreto**, V.D.P. Servedio and S.H. Strogatz and, *The dynamics of correlated novelties*, *Nature Scientific Reports* **4**, 5890, doi:10.1038/srep05890 (2014).
- 20) Nils Haug, Lukas Geyrhofer, Alessandro Londei, Elma Dervic, Amlie Desvars-Larrive, **Vittorio Loreto**, Beate Pinior, Stefan Thurner and Peter Klimek, *Ranking the effectiveness of worldwide COVID-19 government interventions*, *Nature Human Behaviour* **4**, 1303-1312 <https://doi.org/10.1038/s41562-020-01009-0> (2020).

6.4 5 most cited publications

- 1) C. Castellano, S. Fortunato and **V. Loreto**, *Statistical physics of social dynamics*, *Rev. Mod. Phys.*, **81** 591-646 (2009). **Citations: 3222, Scopus; Citations: 5097, Google Scholar**
- 2) F. Radicchi, C. Castellano, F. Cecconi, **V. Loreto** and D. Parisi: *Defining and identifying communities in networks*, *Proc. Natl. Acad. Sci. USA (PNAS)* **101**, 2658-2663 (2004). **Citations: 2040, Scopus; Citations: 3302, Google Scholar**

- 3) Nils Haug, Lukas Geyrhofer, Alessandro Londei, Elma Dervic, Amlie Desvars-Larrive, **Vittorio Loreto**, Beate Pinior, Stefan Thurner and Peter Klimek, *Ranking the effectiveness of worldwide COVID-19 government interventions*, *Nature Human Behaviour* **4**, 1303-1312 <https://doi.org/10.1038/s41562-020-01009-0> (2020). **Citations: 1054, Scopus; Citations: 1693, Google Scholar**
- 4) A. Baronchelli, M. Felici, E. Caglioti, **V. Loreto** and L. Steels, *Sharp Transition towards Shared Vocabularies in Multi-Agent Systems*, *J. Stat. Mech.* P06014 (2006). **Citations: 286, Scopus; Citations: 531, Google Scholar**
- 5) D. Benedetto, E. Caglioti and **V. Loreto** : *Language Trees and Zipping*, *Phys. Rev. Lett.* **88**, 048702 (2002). **Citations: 285, Scopus; Citations: 554, Google Scholar**

6.5 Invited and Contributed talks (updated at 2024)

- 1997 *Dix-septieme Rencontre de Physique Statistique*: Paris 30-31 January 1997: *Contributed talk Geometrical Frustration and Logarithmic Relaxations in Dry Granular Media.*
- 1997 *XVI Congresso di Fisica Teorica e Struttura della Materia* : Fai della Paganella, 23-26 March 1997: *Invited talk Modelli di Meccanica Statistica per la Sismicità.*
- 1997 *European Geophysical Society General Assembly*, Vienna 21-25 april 1997: *Contributed talk: Fractal Geometry and Earthquakes Statistics.*
- 1997 Workshop: *Interdisciplinary Theoretical Physics*, Torino, Villa Gualino, 5-12 April 1997: *Contributed talk.*
- 1997 *Convegno Nazionale di Meccanica Statistica*, Parma, 23-26 June 1997: *Invited talk.*
- 1997 *Adriatico Research Conference: "The Dynamics of Complexity"*, 26-29 August 1997: *Contributed talk: Tetris-like model for Compaction and Segregation in Dry Granular Media.*
- 1997 *International Conference in honor of Giovanni Paladin: "Disorder and Chaos"*, Rome, 22-24 September 1997.
- 1997 *V Latin American Workshop on Nonlinear Phenomena*, Canela, Brazil 28/9-3/10 1997: *Contributed talk.*
- 1997 *Dry Granular Media meeting*: Paris 28.11.1997: *Contributed talk About the role of entropy in granular media.*
- 1998 *XXth IUPAP International Conference on Statistical Physics - STATPHYS 20*, Paris, 20-24 Luglio 1998: *Contributed talk.*
- 1998 Workshop on Physics of Granular Matter, 22 - 24 October, 1998, Scuola Normale Superiore, Pisa (Italy) *Invited talk INFM-FORUM and CNR-GNSM*
- 1999 Workshop on non-equilibrium dynamic systems, 7 - 11 Giugno, 1999, Dipartimento di Fisica, Università di Porto, Porto, (Portogallo), *Contributed talk.*
- 2001 *VI Convegno Nazionale di Fisica Statistica*, Parma, 29-31 May 2001: *Invited talk.*

- 2001 *XXIth IUPAP International Conference on Statistical Physics - STATPHYS 21*, Cancun MEXICO, 15-21 Luglio 2001: *Contributed talk*.
- 2001 *Research Workshop on "Challenges in Granular Physics"* 7 - 11 August, 2001 Miramare, Trieste, Italy. *Invited talk Towards a thermodynamical description of dense granular media*.
- 2002 *7th Granada Seminar Computational and Statistical Physics* 2-7 September 2002, Granada, Spain. *Invited talk A Data Compression Approach to Information Retrieval*.
- 2003 *VIII Latin American Workshop on Nonlinear Phenomena*, Salvador, Brazil 28/9-3/10 2003: *Contributed talk*.
- 2004 *Journées de la Matière Condensée*, Nancy, France 31/8-3/9/2004: *Invited talk Thermodynamique des systèmes granulaires*
- 2005 *Workshop: Stochasticity and nonlinearity on three continents*, Santa Fe, USA march 2005, *Invited Speaker*.
- 2005 *Workshop: Semiotic dynamics in Language Games*, Bagnovignoni, 9-12 November 2005, *Invited Speaker*.
- 2005 *Workshop: Semiotic Dynamics and Emergent Grammar. One-day satellite Workshop related to the European Conference on Complex Systems*, Paris, 18 November 2005, *Invited Speaker*.
- 2006 *Workshop on New Directions in Complex Systems*, Istanbul, 3-9 September 2006, Turkey *Contributed Speaker*.
- 2006 *Workshop on Language simulations*, Warsaw, 11-14 September 2006, Poland *Invited Speaker*.
- 2006 Conference on: *Complex systems from physics to biology and social sciences*, Lisbon, 22-25 November 2006, *Invited Speaker*.
- 2007 DPG Conference, Working Group Physics of Socio-Economic Systems, *Contributed Talk Non-equilibrium phase transitions in negotiation dynamics*, Spring Meeting of the German Physical Society (DPG), Regensburg (Germany), March 26-30th, 2007.
- 2007 *Cultural route to the emergence of linguistic agreement*, EPFL, Lausanne, November 13, 2006 *Invited Seminar*.
- 2007 *Language Games: a physicist point of view*, Seminar on Language, Evolution, and the Brain (SLEB), International Institute of Advanced Studies (IIAS), Kyoto (Japan), April 23-27th, 2007 *Invited Speaker*.
- 2007 *Cultural route to the emergence of linguistic categories*, Language Engineering Group, Chinese University of Hong Kong, Hong Kong, May 4th, 2007 *Invited Seminar*.
- 2007 *Conventions and opinions formation in negotiation dynamics*, Workshop IACIA, Interacting Agents, Complexity and Inter-Disciplinary Applications, 5th October 2007, Dresden, Germany *Invited Speaker*.
- 2007 *Convention and opinion formation in negotiation dynamics*, Bologna, Mathematics Dept., 18th October 2007, *Invited Seminar*.

- 2007 *Dinamica dell'informazione nelle comunità on line*, Convegno *Conoscere la complessità: viaggio tra le scienze*, CSI-Piemonte, 22nd-23rd November 2007 Torino, Italy. *Invited Speaker*.
- 2007 *La nascita del consenso*, Secondo ciclo di conferenze sul tema *Armonie del cosmo: le "due culture"*, Teatro dell'Opera, Roma, Italy, 31st May 2007.
- 2008 *Complessità, informazione e altre storie*, Secondo ciclo di conferenze sul tema *Armonie del cosmo: le "due culture"*, Teatro dell'Opera, Roma, Italy, 15th May 2008.
- 2008 *Cultural route to the emergence of names and linguistic categories*, *International workshop on Sociophysics, Status and Perspectives*, ISI Foundation, 26th-29th May 2008, Torino, Italy. *Invited Speaker*.
- 2008 EU-China Summer School on *Internet, Sciences, and Society*, 1st-4th June 2008, Warsaw, Poland. *Invited Speaker*.
- 2008 Workshop on "Coarse thinking and decision making", Venice, 25-26 June 2008. *Invited speaker*.
- 2008 *Collective dynamics of social annotation*, European Conference on Complex Systems ECCS'08, Jerusalem, 10-19 September 2008. *Invited Speaker*.
- 2009 Conference on Statistical Mechanics of Game Theory, Mariehamn, Åland, Finland, 27-20 May 2009 *Invited Speaker*.
- 2009 Workshop on: *At the roots of Complexity: The emergence of structures in Matter, Brain, Life, Language*, 22-24th June 2009, Torino, Italy, *Invited Speaker*.
- 2009 Convegno Nazionale di Meccanica Statistica, 24-26th May 2009, Parma, Italy, *Invited Speaker*.
- 2009 Conference TextGraphs-4: Graph-based Methods for Natural Language Processing, 6-7th August 2009, Singapore *Invited Speaker*.
- 2009 Conference Changing Cultures: Cultures of Change 10-12th December 2009 University of Barcelona, Barcelona, Spain *Invited Speaker*.
- 2010 *Collective dynamics of social annotation*, Workshop Monumentum.doc, Università' di Torino, 11-12th January 2010 *Invited Speaker*.
- 2010 *On the origin of universal categorization patterns: an in-silico experiment*, One-day seminar on experimental approaches to the study of communication and sign-use, Center for Semiotics, Aarhus, Denmark, 26th March 2010 *Invited Speaker*.
- 2010 *Statistical physics of social dynamics*, Invited seminar at the Dept. of Statistics, Sapienza Univ. of Rome, 19th April 2010.
- 2010 *Consenso e dissenso in comunità sociali*, Invited talk at the workshop on *Gossip: aspetti cognitivi, computazionali e sociali*, Istituto di Scienze e Tecnologie della Cognizione, Roma, June the 14th 2010.
- 2011 *Statistical physics of language dynamics*, Yeshiva University, New York Galantucci 14th April 2011, *Invited Seminar*.

- 2011 *Statistical physics of language dynamics*, ETH Zurich, CCSS Colloquium, 3rd May 2011, *Invited Colloquium*.
- 2011 *Collective behaviour and opinion shifts*, The Internet Of Things For A Sustainable Future, ESF Exploratory Workshop, Vielsalm 9-13 May 2011, *Invited Speaker*.
- 2011 *Statistical physics of language dynamics*, Torino University, 20/5/2011, *Invited Colloquium*.
- 2011 *Statistical physics of language dynamics*, workshop on Complexity in Language: Developmental and Evolutionary Perspectives, Collegium de Lyon, ENS, May 23-25 2011, *Invited Speaker*.
- 2011 *New avenues for social dynamics*, LUISS University, 27th June Rome, 2011, *Invited Seminar*.
- 2011 *EveryAware: Enhancing environmental awareness through social information technologies*, 1st Dialogue on Platforms for collective awareness and action, Brussels September the 9th. *Invited Short Talk*.
- 2012 *New developments in language dynamics*. Modelli Matematici per le Applicazioni (MOMA) Seminars, Mathematics Dept. Sapienza University of Rome, *Invited Seminar*.
- 2012 *Citizen Science in the EU project EveryAware*, The 2nd Citizen Cyberscience Summit, London Feb 16th-18th, 2012, *Invited Talk*.
- 2012 *New platforms for web-gaming and social computation*, Workshop on Web Epistemics ZIF Bielefeld, February 15th-17th, 2012. *Invited Talk*.
- 2012 *On the Origin of the Hierarchy of Color Names*, Evolang IX Kyoto, The 9th International Conference on the Evolution of Language, Kyoto, Japan, 13-16 March 2012. *Contributed Talk*.
- 2012 *Consensus in Language Dynamics*, Meeting of the ESF-funded DRUST project, Bologna 10-11 April 2012. *Invited Talk*.
- 2012 *A Cultural Route to the Emergence of Duality of Patterning*, 28th ALTENBERG WORKSHOP IN THEORETICAL BIOLOGY, *Origins of Complex Communication and Language: Epigenetic Modeling and Ethological Observation*, Altenberg, Austria, July 5-8 2012. *Invited Talk*.
- 2012 *Participation, awareness and learning*, First Open Global Systems Science Conference, Brussels, November 8-10th 2012. *Invited Plenary Talk*.
- 2012 *A Cultural Route to the Emergence of Duality of Patterning*, Conference "Modeling Linguistic Networks: from Language Structures to Communication", Goethe-University Frankfurt am Main, Germany, December 9-12th 2012. *Invited Talk*.
- 2013 *Participation, awareness and learning*, Workshop on Urban Development and Global Systems Science, European Commission, Brussels February 13-14th 2013. *Invited Contribution*.
- 2013 *On the emergence of linguistic conventions*, Modelling Emerging Norms workshop, Interacting Minds Centre, Aarhus University, March 6-8 2013. *Invited Talk*.

- 2013 *Modelling innovation as expansion into the adjacent possible*, Deutsche Physikalische Gesellschaft (DPG) conference, SOE: Fachverband Physik sozio-ökonomischer Systeme Regensburg, March 11-15th 2013. *Invited Talk not delivered for health reasons.*
- 2013 *Environmental awareness and learning: a race against time*, 14th Swiss Global Change Day, Bern, April 16th 2013. *Invited Talk.*
- 2013 *Consensus dynamics in social systems*, University of Liverpool, April 23rd 2013. *Invited Seminar.*
- 2013 *The dynamics of correlated novelties*, Northeastern University, Boston, USA, September 4th 2013. *Invited Seminar.*
- 2013 *The dynamics of correlated novelties*, Wolfram Data Summit, Washington DC, USA, 5-6th September 2013. *Invited Plenary Talk.*
- 2013 *Analyzing Language Dynamics using Complex Systems Science*, International Summer School on Agent-based Computational Models of Creativity, Cortona, Italy, 15-20th September 2013. *Invited Talk.*
- 2013 *Participatory sensing and social computation*, INSITE Workshop: Games, Science & Society October 10-11, 2013 International Institute Applied Systems Analysis, Laxenburg, Austria. *Invited Talk*
- 2013 *Games, prediction and Learning*, International Game Competition for Education and Research, Paris, December 14-15th 2013. *Invited Talk*
- 2014 *Participatory sensing and social computation*, Conference on *Citizens Science and Smart Cities Summit*, Ispra, Italy, February 5-7th, 2014. *Invited Talk*
- 2014 *Modelling the emergence of creoles languages*, Conference on *Time and space in linguistics: interdisciplinary computational approaches*, Aarhus, Denmark, January 15-16, 2014. *Invited Talk*
- 2014 *Gaming for learning*, STOA Workshop on *New learning and teaching technology options* at the European Parliament, Brussels, Belgium, April 8th 2014. *Invited Talk*
- 2014 *Participatory science, awareness and learning*, Event *Borsa della Ricerca*, panel on *Comunicare la scienza: l'importanza della ricerca partecipata*, Bologna, Italy, May 14th 2014. *Invited Talk*
- 2014 *Triggering novelty and innovation in human activities*, Workshop on *Creativity and universality in language and music*, Paris, France, June 16-20, 2014. *Invited Talk*
- 2015 *Participatory science, awareness and learning*, Invited lecture at the Zentrum für Kunst und Medientechnologie Karlsruhe (ZKM) of Karlsruhe, February the 10th, 2015. *Invited Lecture*
- 2015 *Triggering novelties and innovation in human activities*, Invited seminar at the London Institute for Mathematical Sciences, London, February the 11th, 2015. *Invited Talk*
- 2015 *Lo studio delle dinamiche sociali nell'era di Internet*, Caffè Scienza in Rome, Libreria Asaggi, March the 17th 2015. *Invited public event*

- 2015 *Triggering novelties and innovation in human activities*, School for Advanced Studies in the Social Sciences, Paris, March the 27th, 2015. *Invited Seminar*
- 2015 *Modeling the emergence of contact languages*, Interactions: Mathematical sciences to the proof of human and social sciences. Faculté de Droit du Panthéon, Université de Paris Panthéon-Sorbonne, Paris, May 28-29th, 2015. *Invited Speaker*
- 2015 *Optimal learning paths in information networks*, Workshop on *Language Dynamics*, Ca' Foscari University, Venice, 17-19th September 2015. *Invited Speaker*
- 2015 Series of invited lectures on *Participation, gaming and learning* at the Lipari School on Computational Complex Systems, Jacob T. Schwartz International School for Scientific Research, Lipari, 12-18th July 2015. *Invited Speaker*
- 2015 *Creativity, Innovation and Learning*, 3rd Chess Palace International Teachers Conference, Budapest, October the 17th 2015. *Invited Speaker*
- 2016 *Gaming, innovation and learning: new tools to face societal challenges*, Invited seminar at IIASA, International Institute for Applied Systems Analysis, Wien, February the 26th, 2016. *Invited Seminar*
- 2016 *Creativity, innovation and learning*, Visions for Complexity, Opening Conference of the Complexity Science Hub Vienna, May 23rd 2016, *Invited Speaker*.
- 2016 *Play, creativity and the adjacent possible* at the Lipari School on Computational Complex Systems, Jacob T. Schwartz International School for Scientific Research, Lipari, 10-17th July 2016. *Invited Speaker*
- 2016 Summit on *Human problem solving and artificial intelligence*, Sandbjerg, Denmark, 28-30 November 2016. *Invited Talk*
- 2017 *Re-inventing society in the digital age*, Complexity Science Hub Vienna, May 2017 *Invited Speaker*.
- 2017 *Novelties, innovation and the adjacent possible*, Institute for New Economic Thinking, Oxford, May 31st 2017 *Invited Seminar*.
- 2017 *Gaming the future: new tools for participation, awareness and decision-making*, European Forum Alpbach 24-26 August 2017 (<https://goo.gl/jMN75g>) *Keynote speech*.
- 2017 *Birth of possible*, TED talk at TEDatBCG event, Milan October the 4th 2017. *Keynote speech*. (<https://www.ted.com/watch/ted-institute/ted-bcg>)
- 2018 *Novelties, innovation and the adjacent possible*, Invited seminar at the Imperial College in London, January the 30th 2018.
- 2018 *Unfolding the restructuring of the adjacent possible*, Invited talk at the Workshop on "Emerging creativity in Cultural Evolution", Sandbjerg, Denmark, March 1st 2018.
- 2018 *Not even ivory: complexity science can (and should) game the future*, Invited speech at the Conference "Where do we go from here??", Complexity Science Hub Vienna, May the 24th-25th 2018.

- 2018 *Exploring the adjacent possible: play, anticipation, surprise*, Invited talk at the Workshop on "Economic Fitness and Complexity", Thessaloniki, Conference of Complex Systems, September the 26th, 2018.
- 2018 *On the stability of consensus in language and opinion dynamics*, Keynote speech at the Workshop on "Opinions and language dynamics", Thessaloniki,, Conference of Complex Systems, September the 26th, 2018.
- 2018 *On the stability of consensus in language and opinion dynamics*, Keynote speech at the Workshop on "Opinions and language dynamics", Thessaloniki,, Conference of Complex Systems, September the 26th, 2018.
- 2018 *Towards an augmented creativity*, Invited speech at the Workshop on "Driving Innovation through creativity and the arts", ICT 2018 conference, Vienna, December the 5th 2018.
- 2019 *Exploring the adjacent possible: play, anticipation, surprise*, Colloquium at the University of Bern, Institut of Theoretical Physics, Bern March the 20 2019.
- 2019 V. Loreto and A. Londei, "L'esperienza del nuovo per l'uomo e le macchine. La scrittura tra anticipazione e sorpresa", La Nuvola conference center, Rome, December 7th (2019).
- 2019 "Exploring the adjacent possible: play, anticipation, surprise", invited seminar at the "Cycle thmatique sur la complexité", University of Cergy-Pontoise, December 2nd (2019). [PDF attached]
- 2019 "Towards an augmented creativity", Workshop on "Intellectual property in the era of artificial intelligence", Bologna November 22nd (2019).
- 2019 "Learning the future: how humans and machines experience the new", Invited talk at the Maker Faire, European Edition, Rome, October 19th (2020).
- 2019 Invited contributor and rapporteur at the High-level symposium on "Are social media changing our brains? Towards an interdisciplinary view on Social Media" organized by the European Commission, ICT Directorate, Rome, October 7th-8th (2019).
- 2019 "The experience of the new for humans and machines", Santa Fe, US, August 20th-23rd (2019).
- 2019 "AI and Music Research", Conversation between Ludger Brmmer and Vittorio Loreto, Linz at the Ars Electronica Festival, September 7th (2019).
- 2019 "Exploring the adjacent possible: play, anticipation, surprise", invited talk during the workshop AIXMusic Industry Application Oriented Research, Linz, September 8th (2019).
- 2019 "Mathematics and the birth of new ideas", Invited talk at the Pint of Science, Paris, May 21st (2019).
- 2019 "My text is smarter than me", Invited talk at the event ?Il casone di Higgs?, May 5th (2019).
- 2019 "Rise and fall of echo-chambers", Contributed talk at the Conference on Complex Systems, Singapore, September 28th (2019).

- 2019 "Exploring the adjacent possible: play, anticipation, surprise", Invited talk at the XXIV National Workshop on Statistical Physics and Complex Systems, Parma, June 24th-26th (2019).
- 2020 "The science of the new", series of lectures at the Winter School organized by the Complexity Science Hub of Vienna, March 22-27 (2020).
- 2020 "Statistical Physics of Social Dynamics", invited talk at the workshop of the Sapienza University of Rome Ateneo 2020 project, January 31st (2020).
- 2021 "What-if scenarios for urban regeneration", MEET MEDIA GURU open lecture in the framework of a series "Around mobility", organised by MEET in Milan (<https://www.meetcenter.it/en/home-page/>) December the 2nd (2021). See video at: [<https://www.youtube.com/watch?v=awcHoDj8JJ4>]
- 2021 "Nuovi strumenti per una rigenerazione urbana", Invited Talk to the Workshop on "Missione Mezzogiorno nel PNRR", organised by SVIMEZ and FORMAP, Rome, July the 7th (2021).
- 2021 "Looking into the past and the future: what do algorithms allow us to see?", Invited Talk to "First Yehuda Elkana Fellowship workshop" (<https://www.iwm.at/event/yehuda-elkana-fellowship-workshop-2021>), June 21-25 (2021).
- 2021 "What-if scenarios for urban regeneration", Keynote talk, at the "Urban Complex Systems" Workshop (<https://urbcompsys.github.io/>), Satellite of the Conference on Complex Systems 2021, October 27th (2021).
- 2021 "Artificial creativity: Augmented creativity: how humans and machines experience the unknown", Keynote talk, at the "SPARKS, Serendipity Forum" Workshop, organised by CERN (<https://sparks.web.cern.ch/publicevent>) September 18th (2021). See video at: [<https://www.youtube.com/watch?v=o2>]
- 2021 Panelist at the debate on "Fostering alliances across Europe: the importance of STARTS Regional Centers", within the STARTS Urban Fest (<https://www.startsurbanfest.eu/>), June 29-30 (2021).
- 2021 Panelist at the debate on "Championing environmental sustainability in the profession", June 4th, (2021).
- 2021 "Exploring the adjacent possible: play, anticipation, surprise", Invited seminar at the "Statistical and Nonlinear physics" Lecture of the Physics Dept. of Buffalo University, May, 8th (2021).
- 2021 "Exploring the adjacent possible: play, anticipation, surprise", Keynote talk, at the 16th European Conference on Innovation and Entrepreneurship (ECIE) 2021 (<https://www.academic-conferences.org/conferences/ecie/>), 16-17 September 2021
- 2022 Invited seminar at Business Strategy Event organised by Sony Italy, "Sustainable Cities", September the 28th 2022.
- 2022 Keynote speaker on "Exploring the adjacent possible: from the general concept to applied scenarios" at the Workshop on "Can innovation be predicted? Exploring the Adjacent Possible", June the 13th 2022.

- 2022 Invited speaker on "What-if scenarios for urban regeneration" at the Lipari School on Computational Complex and Social Systems: Data Science: Models, Algorithms, AI and Beyond, July 17-23, 2022 Lipari Island, Italy.
- 2022 Invited contribution at the Round Table on "Tecnologie verdi, transizione ecologica e lotta alle disuguaglianze", Centro Ricerche Enrico Fermi, Aprile the 21st 2022.
- 2022 Keynote speaker on "What-if scenarios for urban regeneration", French Regional Conference On Complex Systems (FRCCS 2022), 20-22 JUIN 2022, Paris.
- 2022 Invited Talk at the Workshop celebrating Domenico Parisi, "The challenge of the dialogue for individuals and disciplines", Rome, May the 7th 2022
- 2023 Invited seminar at the ENS Paris, "Exploring the adjacent possible: play, anticipation, surprise", March the 13th 2023.
- 2023 Invited seminar at "Future Urbanism dialogue" organised by CSL Tokyo and University of Melbourne, "Sustainable Cities", February, the 8th 2023.
- 2024 Invited panelist at the Roma REgeneration Forum, "New tools for urban regeneration", February 20th, 2024.
- 2024 Invited Talk at the INFN BIOPHYS 2023 Workshop, 18-20 September 2023, Rimini, "New scenarios for inclusive and sustainable cities".
- 2024 Invited Talk at the "Co-Creating the Future Participatory Cities and Digital Governance", Vienna, September 11th-13th, 2023.
- 2024 Invited Talk on "New tools for urban regeneration" at the "Economic Complexity & Fitness" Summer School, July 8th-12th, 2023, CREF, Rome.
- 2024 Keynote talk on "Exploring the adjacent possible: play, anticipation, surprise" at the SG Symposium: Exploring the hidden knowledge space: Ideas, patents, people, April 4th 2023, ETH Zurich.
- 2024 Panelist at the panel discussion in celebration of Europe Day 2024 & ahead of the European Parliament elections 6-9 June, "European Values: Challenges from AI to Elections", Rome, Residence of the Belgian Ambassador to the Holy See, May 16th 2024.

7 Full publications list

7.1 International Reviews

- 1) G. Dattoli, **V. Loreto**, C. Mari, M. Richetta e A. Torre: *Biunitary Transformations and Ordinary Differential Equations - I, Il Nuovo Cimento* Vol. **106 B**, N. 12, 1991.
- 2) G. Dattoli, **V. Loreto**, C. Mari, M. Richetta e A. Torre: *Biunitary Transformations and Ordinary Differential Equations - II, Il Nuovo Cimento* Vol. **106 B**, N. 12, 1991.
- 3) G. Dattoli, **V. Loreto**, C. Mari, M. Richetta e A. Torre: *Biunitary Transformations and Ordinary Differential Equations - III, Il Nuovo Cimento* Vol. **106 B**, N. 12, 1991.
- 4) G. Dattoli, L. Giannessi, **V. Loreto** e C. Mari: *Cavity Length Adjustment and Output FEL Intensity Optimization, IEEE Journal of Quantum Electronics*, Vol.**27**, N.11, 1991.
- 5) G. Dattoli, S. Cabrini, L. Giannessi, **V. Loreto**: *Exact Treatment of Spontaneous Emission in Helical and Solenoidal Magnetic Field, Il Nuovo Cimento* Vol.**14D**, N.7, 1992.
- 6) G. Dattoli, L. Giannessi, S. Cabrini, **V. Loreto**: *Gain Saturation in Bunched Free Electrons Lasers, Physical Review A* Vol.**45**, 8842 (1992).
- 7) G. Dattoli, S. Cabrini, L. Giannessi, **V. Loreto**, C. Mari: *Gain Saturation in free-electron lasers, Nuclear Instruments and Methods in Physics Research* **A318**, 495-499 (1992).
- 8) R. Cafiero, **V. Loreto**, L. Pietronero, A. Vespignani and S. Zapperi: *Local Rigidity and self-organized criticality for avalanches, Europhys. Lett.* **29**, 111-116 (1995).
- 9) **V. Loreto**, L. Pietronero, A. Vespignani and S. Zapperi: *Renormalization group approach to the critical behavior of the Forest-Fire model, Physical Review Letters* **75**, 465 (1995).
- 10) E. Caglioti and **V. Loreto**: *Dynamical characterization of a class of Self-Organized Critical models of non-linear coupled oscillators*, unpublished (1995).
- 11) **V. Loreto**, A. Vespignani and S. Zapperi: *Renormalization scheme for the Forest-Fire model, Journal of Phys. A: Math. Gen.* **29**, 2981-3004 (1996).
- 12) E. Caglioti and **V. Loreto**: *Dynamical properties and predictability in a class of Self-Organized Critical Models, Physical Review E* **53**, R2953 (1996).
- 13) A. Ben Hur, R. Hallgass, **V. Loreto**: *A Renormalization procedure for Directed Sandpile models, Phys. Rev. E* **54**, 1426 (1996).
- 14) **V. Loreto**, G. Paladin, and A. Vulpiani: *Concept of complexity in random dynamical systems, Physical Review E*, **53** 2087 (1996).
- 15) V. De Rubeis, R. Hallgass, **V. Loreto**, G. Paladin, L. Pietronero and P. Tosi: *Self-affine Asperity Model for earthquakes, Physical Review Letters*, **76**, 2599 (1996).
- 16) A. Vespignani, S. Zapperi and **V. Loreto**: *Renormalization of Non-Equilibrium Systems with Critical stationary State, Phys. Rev. Lett.* **77**, 4560 (1996).
- 17) **V. Loreto**, G. Paladin, M. Pasquini and A. Vulpiani: *Characterization of Chaos in Random Maps, Physica A* **232**, 189-200 (1996).

- 18) R. Hallgass, **V. Loreto**, O. Mazzella and G. Paladin: *Earthquakes statistics and Fractal Faults*, *Phys. Rev. E* **56**, 1346 (1997).
- 19) A. Vespignani, S. Zapperi and **V. Loreto**: *Dynamically Driven Renormalization Group*, *J. Stat. Phys.* **88**, 47 (1997).
- 20) **V. Loreto**, L. Pietronero, A. Vespignani and S. Zapperi, *Phys. Rev. Lett.* **78**, 1393 (1997).
- 21) E. Caglioti, **V. Loreto**, H.J. Herrmann, and M. Nicodemi, *A "Tetris-like" Model for the Compaction of Dry Granular Media*, *Phys. Rev. Lett.* **79**, 1575 (1997).
- 22) R. Chierchia, S. Loreti, **V. Loreto**, L. Mariucci, C. Minarini and A. Mittiga, "A critical assessment of different models of the metastability in $a - Si : H$ ", *Jpn. J. Appl. Phys.* **37**, 1736 (1998).
- 23) **V. Loreto**, P. Prosini and R. Cafiero: *Anisotropy and Non-Universality in Kinetic Roughening*, *Europhys. Lett.* **42**, 389 (1998).
- 24) E. Caglioti, A. Coniglio, H.J. Herrmann, **V. Loreto**, and M. Nicodemi, *Segregation of granular mixtures in presence of compaction*, *Europhys. Lett.* **43**, 591 (1998).
- 25) A. Puglisi, **V. Loreto**, U. Marini Bettolo, A. Petri and A. Vulpiani, *Clustering and non-gaussian behavior in granular matter*, *Phys. Rev. Lett.* **81**, 3848 (1998).
- 26) A. Puglisi, **V. Loreto**, U. Marini Bettolo, A. Petri and A. Vulpiani: *Granular Gases: where standard kinetic theory fails*, INFM Highlights 1998/1999.
- 27) E. Caglioti, A. Coniglio, H.J. Herrmann, **V. Loreto**, and M. Nicodemi, *Cooperative Length Approach for Granular Media*, *Physica A* **265**, 311 (1999).
- 28) Erwan Hascoët, Hans J. Herrmann and **V. Loreto**, *Shock propagation in a granular chain*, *Phys. Rev. E* **59**, 3202 (1999).
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