FEDERICO RICCI TERSENGHI
Curriculum Vitae
ai fini della pubblicazione

Roma, 05/09/2019

Surname and Name:	**Ricci Tersenghi, Federico**
Current Position:	Associate Professor in Theoretical Physics (SSD FIS/02, SC 02/A2) at Sapienza University of Rome
Spoken Languages:	Italian (native), Spanish (as native), English (fluent), French (moderate)

Education

1990 – 1995 Graduate studies in Physics at the Physics Department of the University of Rome "La Sapienza" with an average mark of 29.94/30.
July 14, 1995. Degree on Physics Cum Laude. Thesis advisor: Prof. Giorgio Parisi.

November, 1995 Ranked first at the admission test for the Ph.D program at Scuola Normale Superiore in Pisa.

November, 1995 – October, 1998 Ph.D. student in Physics at the Physics Department of the University of Rome "La Sapienza". Thesis on *Off-equilibrium dynamical studies in disordered systems*. Advisor: Prof. Giorgio Parisi. **March 15, 1999** Ph.D. degree in Physics.

November, 1998 – October, 2000 Post-Doc at the Condensed Matter Group of the "Abdus Salam" International Center for Theoretical Physics (ICTP) in Trieste (Italy).

Academic appointments

November, 2000 – October, 2001 Visiting Scientist at the Condensed Matter Group of the "Abdus Salam" International Center for Theoretical Physics (ICTP) in Trieste (Italy).

September, 2001 – February, 2002 Contract for scientific collaboration within the research group of Prof. Giorgio Parisi at Sapienza University of Rome.

March, 2002 – 2010 Assistant Professor (Ricercatore) at the Physics Department of Sapienza University of Rome (SSD FIS/02).

May – June, 2006 Invited to the Isaac Newton Institute in Cambridge (UK) for the programme on *"Principles of the Dynamics of Non-Equilibrium Systems"*.

2007 Invited as a Visiting Assistant Researcher to the University of California at Berkeley for 7 months (January 15 – August 15, 2008). For personal reasons he had to decline the invitation.

2011 – present Associate Professor at the Physics Department of Sapienza University of Rome

(SSD FIS/02, SC 02/A2).

March – April, 2012 Visiting Professor for one month at the LPTMS of Université Paris Sud.

February – March, 2015 Visiting Professor for one month at Insitut Henri Poincaré, Paris.

March – April, 2016 Visiting Professor for one month at the LPTMS of Université Paris Sud.

January – February, 2019 Invited to the Kavli Institute for Theoretical Physics in Santa Barbara (CA) for the program entitled *"The rough high-dimensional landscape problem"*.

May – June, 2019 Invited to the Galileo Galilei Institute for Theoretical Physics in Florence for the program entitled *"Breakdown of ergodicity in isolated quantum systems: from glassiness to localization"*.

Teaching experience

All following courses, unless differently specified, have been given at Sapienza University of Rome.

2018–2019 No teaching (sabbatical leave).

2017–2018 Teacher of *Meccanica Statistica* (6 CFU, LM Matematica) and *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2016–2017 Teacher of *Meccanica Statistica* (6 CFU, LM Matematica) and *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2015–2016 Teacher of *Meccanica Statistica* (6 CFU, LM Matematica) and *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2014–2015 Teacher of *Meccanica Statistica* (6 CFU, LM Matematica) and *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2013–2014 Teacher of *Fisica* (6 CFU, LT Informatica) and *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2012–2013 Teacher of *Fisica* (6 CFU, LT Informatica) and *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2011–2012 Teacher of *Fisica* (6 CFU, LT Informatica) and *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2010–2011 Teacher of *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2009–2010 Teacher of *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2008–2009 Teacher of *Laboratorio di Fisica Computazionale I* (6 CFU, LT Fisica).

2007–2008 Teacher of *Laboratorio di Fisica Computazionale II* (6 CFU, LT Fisica) and *Calcolo delle Probabilità* (6 CFU, LT Fisica).

2006–2007 Teacher of *Laboratorio di Fisica Computazionale II* (6 CFU, LT Fisica) and *Calcolo delle Probabilità* (6 CFU, LT Fisica).

2005–2006 Teacher of *Laboratorio di Fisica Computazionale II* (6 CFU, LT Fisica) and *Calcolo delle Probabilità* (6 CFU, LT Fisica).

2004–2005 Teacher of *Laboratorio di Fisica Computazionale II* (6 CFU, LT Fisica).

2003–2004 Teacher of *Laboratorio di Fisica Computazionale II* (6 CFU, LT Fisica) and *Fisica Medica* (6 CFU, LCU Medicina).

2002–2003 Teaching assistant to *Laboratorio di Fisica Computazionale I* and *Modelli e Metodi Matematici per la Fisica*, and teacher of the Ph.D. course *Physics of Disordered Systems*.

2000–2001 Teaching assistant to *Combinatorial Optimization, Algorithms and Random Structures*, at the "Abdus Salam" ICTP (Trieste, Italy).

Coauthor (with L.M. Barone, E. Marinari, G. Organtini) of the **textbook** *Programmazione Scientifica* (650 pages, in Italian) edited by Pearson Education (Milan, 2006) and of the **textbook** *Scientific Programming: C-language, algorithms and models in science* (712 pages) edited by World Scientific (Singapore, 2013). These books are meant as didactic support for 3 courses on Computational Physics (6 CFU each). Given the long selling performance of the former, a second edition has been published by Pearson in 2019.

Invited lecturer to the following International Schools of Physics:

- *"Advanced Cavity Applications"* at the Boulder School for Condensed Matter and Materials Physics on 'Frustrated and Disordered Systems'. Boulder, Colorado (USA). July 3–28, 2017.
- *"Thermodynamics and out of equilibrium dynamics in disordered systems"* at the Spring College on the Physics of Complex Systems. ICTP, Trieste. April 10 – May 5, 2017.
- *"Open questions in the long-time dynamics of glassy systems"* at the Netadis Summer Retreat. Bovec (Slovenia). July 5–19, 2015.
- *"A statistical mechanics approach to optimization problems"* at the 2$^{\text{nd}}$ Asian-Pacific School on 'Statistical Physics and Interdisciplinary Applications'. Beijing. March 3–14, 2008.
- *"Optimization and inference"* at the 1$^{\text{st}}$ Latin-American School and Conference on 'Statistical Physics and Interdisciplinary Applications'. La Havana, Cuba. February 28 – March 12, 2005.

Honors

2019 'Outstanding Referee' award from American Physical Society.
2018 Award of $2,500 from the Rice Family Fund for participating to the program "The Rough High-Dimensional Landscape Problem" in KITP (Santa Barbara, CA, USA).
2017 'Premialità' (rewarding) by Sapienza University for the merits in teaching and research.
2016 Highest marks in the VQR 2011–2014 (evaluation of research quality).
2014 Abilitazione Scientifica Nazionale (national scientific qualification) to Full Professor in Theoretical Physics (SC 02/A2).
2012 Highest marks in the VQR 2004–2010 (evaluation of research quality).
2008 Prize "Tomassoni-Chisesi" of € 13,333 assigned by *Fondazione Roma Sapienza* for the relevant contributions given to the progress of Physics.
1992, 1994 Prize in Physics "E. Persico" assigned by the *Accademia Nazionale dei Lincei*.

Grants and projects

2019–2020 PI and Scientific Coordinator of the PRIN project "Statistical mechanics and complexity" (total budget € 600,000 and local budget € 107,000).
2018 PI of the FFABR (basic research funding) awarded by MIUR (€ 3,000).
2017–2019 PI of the research project on "Study of memory effects in the long time out of equilibrium dynamics of spin glass models" funded by Sapienza University of Rome with € 13,800.
from 2016 National coordinator of the INFN Research Network on "Equilibrium and Non-Equilibrium Statistical Mechanics of disordered systems, paradigms and Applications: from the amorphous state to systems biology and brain functioning" (ENESMA).

2015–2017 PI of the research project on "Optimizing complex systems via biased dynamics and quantum fluctuations" funded by Sapienza University of Rome with € 9,000.

2014–2016 PI of the research project on "Numerical simulations of discrete approximations to spin glasses with continuous variables" funded by Sapienza University of Rome with € 13,000.

2013–2015 PI of the research project on "Inverse problems in complex Ising models" funded by Sapienza University of Rome with € 7,000.

2012–2013 PI of the research project on "Large scale numerical simulations of models with long range interactions" funded by Sapienza University of Rome with € 8,000.

2012–2013 PI of the research project on "Inverse Ising problem and graph reconstruction" funded by Sapienza University of Rome with € 12,000.

2010–2015 PI of the FIRB project on "Inference and optimization in complex systems: from the thermodynamics of spin glasses to message passing algorithms" funded with € 412,200.

2005 PI of "Progetto di Supercalcolo" INFM–CINECA project for parallel computing: roughly 30,000 hours awarded.

2002 PI of "Progetto Giovani Ricercatori" awarded by the Sapienza University of Rome (€ 5,500).

2016–2019 Participant to the PRIN (research project of national interest) on "Statistical mechanics and complexity" funded with € 440,000.

2012–2015 Participant to the PRIN (research project of national interest) on "Statistical mechanics of disordered and complex systems" funded with € 835,100.

2006–2008 Participant to the PRIN (research project of national interest) on "Complex problems in statistical mechanics and field theory" funded with € 221,000.

2004–2007 Participant to the ECC Integrated Project EVERGROW, with the role of coordinator of the workpackage on "Belief and survey".

2002–2006 Participant to the ECC MTR Network DYGLAGEMEM.

2002–2006 Participant to the ECC MTR Network STIPCO.

Affiliations

- from 2010: Researcher associated to Consiglio Nazionale delle Ricerche (CNR).
- from 2009: Researcher associated to Istituto Nazionale di Fisica Nucleare (INFN).
- 2001–2009: Researcher associated to Istituto Nazionale di Fisica della Materia (INFM).
- 1995–2000: Researcher associated to Istituto Nazionale di Fisica Nucleare (INFN).

Research activities

KEY WORDS: Disordered systems statistical mechanics. Glasses and spin glasses. Large scale numerical simulations. Advanced Monte Carlo methods. Out of equilibrium and glassy dynamics. Constraint satisfaction problems. Cavity method. Message passing algorithms. Optimization.

I have a solid background in statistical mechanics methods for studying disordered models, both from the analytical point of view (replica and cavity methods) and on the numerical tools (advanced Monte Carlo methods, large scale numerical simulations, message passing algorithms). My research interests have been primarily focused on understanding fundamental models for spin glasses and structural glasses. I am particularly interested in the out of equilibrium behavior of disordered

and complex models, the so called aging or glassy dynamics.

In parallel I have developed new powerful tools to extend the statistical mechanics approach to the study of constraint satisfaction problems and statistical inference problems, central issues in theoretical computer science and information theory. The finding of several unexpected phase transitions has strongly revitalised these fields of research. I keep working on the connection between these thermodynamics phase transitions and the behavior of algorithm searching for solutions.

Research groups where I have mostly contributed:

- Chimera group on disordered systems in the Physics Department of Sapienza University;
- Condensed Matter group in ICTP at Trieste;
- Janus Collaboration between Spanish and Italian universities for the development of special purpose computers to simulate and study spin glass models.

Outside these research groups, I have regular scientific collaborations with researchers in ENS (Paris), LPTMS (Univ. Paris Sud), CEA (Saclay), and Stanford University, among others.

Summary of scientific achievements

Listed below are some of the main scientific results achieved during my career, together with some key references and number of citations in Google Scholar.

- World-leading numerical simulations of spin glass models

  Spin glasses are considered the prototype of complex models in theoretical physics and understanding their physical behavior at low temperature (i.e. in the glass phase) has been always considered (and still is) an extremely challenging task. Beyond the interest in theoretical physics, spin glass models are often used as benchmarks for optimization algorithms: the complicated energy landscape of some of these models makes the search for the ground states as difficult as 'finding a needle in a haystack'.

  The study of spin glasses via numerical simulations requires the use of very powerful computers, together with the best performing algorithms and the most clever theoretical analysis. Since the times of my Ph.D. I participated with a leading role in the most advanced numerical simulations of spin glass models. We used special-purpose supercomputers from Ape100, to ApeMille and finally to the reprogrammable FPGA-based processors developed by the Janus collaboration between Italian and Spanish universities.

  Among the main achievements it is worth citing the connection between equilibrium properties in the spin glass phase and the measurements taken in the out of equilibrium regime while the system is slowly relaxing. In [1] we showed that measuring correlation and response functions in the off-equilibrium regime allows to reconstruct the equilibrium order parameter in the spin glass phase with a much smaller computational effort.

  Results from numerical simulations of spin glasses performed during my Ph.D. thesis were collected in [2] that became a sort of review of the state of the art on the subject.

  More recently, within the Janus collaboration, we have achieved world leading performances for numerical simulations of spin glass models both in terms of sizes and times. This achieve-

ment allowed us to approach so closely the experimental time and length scales, such that a comparison between numerical and experimental data is now possible as we did in [3].

[1] *Violation of the fluctuation-dissipation theorem in finite-dimensional spin glasses*, E. Marinari, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo, J. Phys. A **31**, 2611–2620 (1998). Cited 171 times.

[2] *Replica symmetry breaking in short-range spin glasses: Theoretical foundations and numerical evidences*, E. Marinari, G. Parisi, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo and F. Zuliani, J. Stat. Phys. **98**, 973–1047 (2000). Cited 214 times.

[3] *Aging rate of spin glasses from simulations matches experiments*, Janus Collaboration: M. Baity-Jesi, et al., Phys. Rev. Lett. **120**, 267203 (2018).

- The discovery of the Gardner line in discontinuous mean-field spin glasses

  Mean field spin glass models showing a discontinuous phase transition — the so-called random first order transition — were usually solved by the ansatz where the replica symmetry is broken once (1RSB). It was known that they may present a phase with a full replica symmetry breaking (FRSB), but the 1RSB to FRSB transition found by Gardner was considered irrelevant, because it takes place at very low temperatures, well below the temperature region close to the dynamical phase transition, which is the interesting one for the glassy physics.

  In [4] we discovered that the 1RSB to FRSB transition may take place at any temperature, even very close to the dynamical phase transition if one considers not only the equilibrium states, but also the metastable states. Thus we defined a line of critical points that we called the Gardner line. Given that the relaxation dynamics in these glassy models gets trapped in metastable states, the Gardner line that we discovered is actually very relevant to describe the asymptotic behavior of the glassy dynamics.

  [4] *On the nature of the low-temperature phase in discontinuous mean-field spin glasses*, A. Montanari and F. Ricci-Tersenghi, Eur. Phys. J. B **33**, 339–346 (2003). Cited 116 times.

- The statistical mechanics of hard optimization problems

  Random constraint satisfaction problems play a central role in theoretical computer science as prototypical models for hard optimization. In this class one finds fundamental NP-hard problems which are expected to require exponential (in system size) resources to be solved.

  I belong to the restricted group of theoretical physicists that developed the statistical mechanics tools to study and deeply understand this class of problems, thus opening a new and fertile interdisciplinary field between theoretical physics and theoretical computer science.

  The analytic solution to the simplest (but non trivial) random satisfiability problem that we achieved in [5,6] pioneered this kind of study, making a precise connection with glassy models in physics and proposing a new mechanism at the origin of the computational complexity observed in these problems. The picture that emerged from our work was very clear: when the search for a solution is hard this is due to the presence of a very large number of local minima in the energy landscape (metastable states) that one can count with the appropriate statistical mechanics tools. I have been asked to write a Perspective in Science on this issue [*Being Glassy Without Being Hard to Solve*, F. Ricci-Tersenghi, Science **330** (2010) 1639].

The methods we developed in [4] to identify the instability of 1RSB solutions were improved in [7] and applied to random constraint satisfaction problems. We thus uncovered that the 1RSB solutions to satisfiability problems were actually exact in certain ranges. This stimulated even more the search for rigorous proofs of the results obtained by the statistical mechanics tools. In [8] we achieved the first rigorous results supporting the picture we put forward based on the statistical mechanics computations, and this stimulated many subsequent mathematically rigorous studies.

Our effort to describe in a very detailed way the phases and the phase transitions taking place in random constraint satisfaction problems culminated with the work in [9], where the complete and most comprehensive picture was presented. The resulting phase diagram is very rich and this stimulated a lot of research both in physics and mathematics to better understand its consequences (e.g. for the behavior of algorithms). The ideas we introduced in [9] spread and became basic concepts in the field, thus helping the cross-fertilization.

[5] *Simplest random K-satisfiability problem*,
F. Ricci-Tersenghi, M. Weigt and R. Zecchina,
Phys. Rev. E **63**, 026702 (2001). Cited 113 times.

[6] *Two solutions to diluted p-spin models and XORSAT problems*,
M. Mezard, F. Ricci-Tersenghi and R. Zecchina,
J. Stat. Phys. **111**, 505–533 (2003). Cited 233 times.

[7] *Instability of one-step replica-symmetry-broken phase in satisfiability problems*,
A. Montanari, G. Parisi and F. Ricci-Tersenghi,
J. Phys. A **37**, 2073–2091 (2004). Cited 121 times.

[8] *On the Solution-Space Geometry of Random Constraint Satisfaction Problems*,
D. Achlioptas and F. Ricci-Tersenghi,
STOC '06: Proceedings of the thirty-eighth annual ACM symposium on Theory of computing (Seattle, WA, USA), 130–139 (2006). Cited 123 times.

[9] *Gibbs States and the Set of Solutions of Random Constraint Satisfaction Problems*,
F. Krzakala, A. Montanari, F. Ricci-Tersenghi, G. Semerjian and L. Zdeborova,
PNAS **104**, 10318–10323 (2007). Cited 367 times.

- Planted models with a glass transition

A planted model is like a random model with the addition of a known solution. The planted solution should not alter the complex energy landscape of the random model. It can be thought as the crystalline state in a glass-forming liquid. Planted models naturally arise also in Bayesian inference problems and recently they acquired a very important role.

Actually the first planted model was introduced and solved in [10] within the context of glassy mean field models. It is a solvable model that we used to show that the presence of a crystalline state (or the presence of a known solution in the context of satisfiability problems) does not change the behavior of the glassy dynamics (or the behavior of searching algorithms). This observation led us to propose planted models as very hard benchmarks for solving algorithms [11], because they present both a complex energy landscape and a known solution.

[10] *A ferromagnet with a glass transition*,
S. Franz, M. Mézard, F. Ricci-Tersenghi, M. Weigt and R. Zecchina,
Europhys. Lett. **55**, 465–471 (2001). Cited 99 times.

[11] *Hiding solutions in random satisfiability problems: A statistical mechanics approach*, W. Barthel, A.K. Hartmann, M. Leone, F. Ricci-Tersenghi, M. Weigt and R. Zecchina, Phys. Rev. Lett. **88**, 188701 (2002). Cited 71 times.

- New tools and models for the study of strongly disordered systems

  During my career I have tried several new tools and models to improve the numerical study of strongly disordered systems, which is always a very challenging task. Among the successful ones I like to mention the method introduced in [12] to measure responses in glassy models without applying any external field and the one-dimensional model with long range interactions introduced in [13]. Contrary to previous long-range models that were fully connected and thus required simulation times scaling quadratically with the system size, our model is diluted, that is every variable interacts with a finite number of other variables, and this allows for a tremendous speed-up of the simulation. In order to have the same physics of fully-connected models where the intensity of the coupling decays with the distance, in [13] we proposed to have links between variables with a probability that decays with the distance. Thanks to this new class of diluted models we have been able to achieve the best ever evidence for a spin glass phase in the presence of a magnetic field outside the mean-field regime [14].

  [12] *Measuring the fluctuation-dissipation ratio in glassy systems with no perturbing field*, F. Ricci-Tersenghi, Phys. Rev. E **68**, 065104 (2003). Cited 75 times.

  [13] *Dilute one-dimensional spin glasses with power law decaying interactions*, L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo, Phys. Rev. Lett. **101**, 107203 (2008). Cited 93 times.

  [14] *Ising Spin-Glass Transition in a Magnetic Field Outside the Limit of Validity of Mean-Field Theory*, L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo, Phys. Rev. Lett. **103**, 267201 (2009). Cited 72 times.

- Development of a field theory for the fluctuations in glasses formers liquids

  In [15] we developed a field-theoretical description of dynamical heterogeneities and fluctuations in supercooled liquids close to the dynamical transition predicted by the mode coupling theory. These fluctuations may have different sources and we have been able to identify the most relevant ones, which are those associated to variations of the 'self-induced disorder' in the initial condition of the dynamics. The resulting field theory is a cubic one with an effective random field term, which implies an upper critical dimension of the theory equal to 8. We tested the theory against numerical simulations in mean-field glassy models via finite size scaling at the dynamical critical point.

  [15] *Field Theory of Fluctuations in Glasses*, S. Franz, G. Parisi, F. Ricci-Tersenghi and T. Rizzo, Eur. Phys. J. E, **34**, 102 (2011). Cited 89 times.

- Understanding and solving the inverse Ising problem

  The inverse Ising problems is an inference problem where one is asked to infer the couplings and the fields of an Ising Hamiltonian from either a set of spin configurations or from the

magnetizations and the correlations computed sampling the Gibbs-Boltzmann distribution. It is a very hard inference problem because the exact solution would require the computation, at each step of the algorithm, of an entire partition function. For this reason the problem is usually solved under some mean-field approximation or imposing some additional constraint (e.g. sparsity in the graph of interactions) and the use of regularizers.

In [16] I made the first comprehensive comparison of several mean-field approximations to solve this problem, uncovering that some approximations that should be in principle better are actually worst. Moreover I derived the explicit solution based on the Bethe approximation, which is the most advanced mean-field approximation. I also discovered some weaknesses of the mean-field approximations that make the corresponding inference algorithm of scarse use in practical problems.

In order to solve the problem in practical cases we introduced in [17] a new algorithm based on maximizing the pseudo-likelihood, which showed the best performances so far. Moreover the algorithm we proposed can infer a sparse interaction graph without the need of any additional regularizer and thus provides unbiased estimated for the Hamiltonian parameters.

[16] *The Bethe approximation for solving the inverse Ising problem: a comparison with other inference methods*,
F. Ricci-Tersenghi,
J. Stat. Mech. P08015 (2012). Cited 79 times.

[17] *Pseudolikelihood Decimation Algorithm Improving the Inference of the Interaction Network in a General Class of Ising Models*,
A. Decelle and F. Ricci-Tersenghi,
Phys. Rev. Lett. **112**, 070603 (2014). Cited 52 times.

- Clarifying the relation and the crossover between long-range and short-range models

  It is very well known that models defined in d dimensions, but interacting through long-range interactions decaying as an inverse power law of the distance, may have the same critical behavior of short-range models defined in larger dimensions D. In [18] we made a thorough study of the relation between critical exponent of long-range and short-range ferromagnetic Ising models discovering that the assumed relation is valid only close to the upper critical dimension and needs to be improved lowering the dimensionality. Moreover we discovered that at the lower critical value of the decay exponent where the short range behavior is recovered there are huge finite size effects that makes critical exponents estimation very difficult. By taking finite size corrections into account the theory by Sak perfectly fits the data without the need for new theories that were presented recently. The reason beyond the huge finite size effects has been clarified in [19] were logarithmic corrections have been found at the lower critical value of the decay exponent. This picture has been later confirmed by other analytical studies.

  [18] *Relations between Short Range and Long Range Ising models*,
  M.C. Angelini, G. Parisi, and F. Ricci-Tersenghi,
  Phys. Rev. E **89**, 062120 (2014). Cited 54 times.

  [19] *The crossover region between long-range and short-range interactions for the critical exponents*,
  E. Brezin, G. Parisi and F. Ricci-Tersenghi,
  J. Stat. Phys. **157**, 855–868 (2014). Cited 29 times.

- The discovery of phase transitions in semidefinite relaxations

  The work presented in [20] represents one more clear success of the application of the statistical mechanics formalism to problems coming from the computer science. Semidefinite relaxation are a very common approximation at the time of solving non-convex optimization problems, however the range of validity of such approximation was unknown in most cases. In [20] we reformulated the problem in terms of a statistical physics model and we found that a phase transition takes place by changing the signal-to-noise ratio. The behavior of the solving algorithm is strictly related to a phase transition, and thanks to this we could prove how optimal the semidefinite relaxation is depending on the problem under study.

  [20] *Phase Transitions in Semidefinite Relaxations*,
  A. Javanmard, A. Montanari and F. Ricci-Tersenghi,
  PNAS **113**, E2218–E2223 (2016). Cited 74 times.

- The best solver for random constraint satisfaction problems

  Building on ideas coming from the statistical physics description of the space of solutions in hard optimization problems, we have proposed in [21] a new message passing algorithm for solving random k-satisfiability problems that shows the best ever performances.

  [21] *The Backtracking Survey Propagation Algorithm for Solving Random K-SAT Problems*,
  R. Marino, G. Parisi and F. Ricci-Tersenghi,
  Nature Comm. **7**, 12996 (2016). Cited 20 times.

- A complete theory for the phase transitions in Bayesian inference problems

  Inference problems within the so-called teacher-student scenario can be reformulated as planted models in statistical physics. It is well known that Bayes-optimal algorithms, as e.g. those based on the Bethe approximation and the belief propagation algorithm, show performances strictly related to the phase transitions that the statistical physics model undergoes. In [22] we presented the first complete theory for the phase transitions in planted models corresponding to Bayesian inference problems.

  [22] *Typology of phase transitions in Bayesian inference problems*,
  F. Ricci-Tersenghi, G. Semerjian and L. Zdeborova,
  Phys. Rev. E **99**, 042109 (2019). Cited 9 times.

Scientific publications

Author of **2** books:

L.M. Barone, G. Organtini, E. Marinari, F. Ricci-Tersenghi
Programmazione scientifica
650 pages, Pearson Education Italia (2006)
Second Edition published in 2019

L.M. Barone, G. Organtini, E. Marinari, F. Ricci-Tersenghi
Scientific programming: C-language, algorithms and models in science
716 pages, World Scientific, Singapore (2013)

The full list of the scientific publications is at the end of this cv. Number of citations reported in the following tables have been extracted from databases on 3/9/2019.

	Google Scholar	ISI-WoS	Scopus
Number of products	135	128	134
Total citations	4500	2924	3224
Citations per product	33.33	22.84	24.06
Hirsch (H) index	37	30	33
Normalized H index	1.85	1.50	1.65

In the period after 1/1/2004 (i.e. in the last 15 years) number of scientific works and citations are reported in the following table.

	ISI-WoS	Scopus
Number of products	89	95
Total citations	1505	1632
Citations per product	16.91	17.18
Hirsch (H) index	21	22

Selected publications for the present evaluation

Listed below are the **16** publications in the period after 1/1/2009 selected for the present evaluation. For each publication is reported the impact factor (**IF**) extracted from JCR relative to the year of publication (only for year 2019 data is not available and 2018 data have been used instead) and the number of citations (**NC**) extracted respectively from Google Scholar/ISI-WoS/Scopus databases.

1. *Ising Spin-Glass Transition in a Magnetic Field Outside the Limit of Validity of Mean-Field Theory*,
   L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
   Phys. Rev. Lett. **103**, 267201 (2009).
   IF 7.328, **NC** 72/57/65.

2. *On the cavity method for decimated random constraint satisfaction problems and the analysis of belief propagation guided decimation algorithms*,
   F. Ricci-Tersenghi and G. Semerjian,
   J. Stat. Mech. P09001 (2009).
   IF 2.670, **NC** 53/31/39.

3. *Elusive Glassy Phase in the Random Field Ising Model*,
   F. Krzakala, F. Ricci-Tersenghi and L. Zdeborova,
   Phys. Rev. Lett. **104**, 207208 (2010).
   IF 7.622, **NC** 52/34/41.

4. *Replica cluster variational method*,
   T. Rizzo, A. Lage-Castellanos, R. Mulet and F. Ricci-Tersenghi,
   J. Stat. Phys. **139**, 375 (2010).
   IF 1.447, **NC** 28/20/19.

5. *Field Theory of Fluctuations in Glasses*,
   S. Franz, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
   Eur. Phys. J. E, **34**, 102 (2011).
   IF 1.944, **NC** 89/58/49.

6. *On the Solution-Space Geometry of Random Constraint Satisfaction Problems*,
   D. Achlioptas, A. Coja-Oghlan and F. Ricci-Tersenghi,
   Random Struct. Alg. **38**, 251–268 (2011).
   IF 1.034, **NC** 69/33/43.

7. *The Bethe approximation for solving the inverse Ising problem: a comparison with other inference methods*,
   F. Ricci-Tersenghi,
   J. Stat. Mech. P08015 (2012).
   IF 1.866, **NC** 79/56/59.

8. *Critical Slowing Down Exponents of Mode Coupling Theory*,
   F. Caltagirone, U. Ferrari, L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
   Phys. Rev. Lett. **108**, 085702 (2012).
   IF 7.943, **NC** 48/35/33.

9. *Critical parameters of the three-dimensional Ising spin glass*,
   Janus Collaboration: M. Baity-Jesi, R. A. Baños, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, F. Mantovani, E. Marinari, V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, M. Pivanti, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, P. Tellez, R. Tripiccione and D. Yllanes,
   Phys. Rev. B **88**, 224416 (2013).
   IF 3.664, **NC** 61/43/38.

10. *Pseudolikelihood Decimation Algorithm Improving the Inference of the Interaction Network in a General Class of Ising Models*,
    A. Decelle and F. Ricci-Tersenghi,
    Phys. Rev. Lett. **112**, 070603 (2014).
    IF 7.512, **NC** 52/30/33.

11. *Relations between Short Range and Long Range Ising models*,
    M.C. Angelini, G. Parisi, and F. Ricci-Tersenghi,
    Phys. Rev. E **89**, 062120 (2014).
    IF 2.288, **NC** 54/37/35.

12. *Phase Transitions in Semidefinite Relaxations*,
    A. Javanmard, A. Montanari and F. Ricci-Tersenghi,

Proceedings of the National Academy of Sciences **113**, E2218–E2223 (2016).
IF 9.661, **NC** 74/25/24.

13. *The Backtracking Survey Propagation Algorithm for Solving Random K-SAT Problems*,
R. Marino, G. Parisi and F. Ricci-Tersenghi,
Nature Comm. **7**, 12996 (2016).
IF 12.124, **NC** 20/10/11.

14. *Approximating the XY model on a random graph with a q-states clock model*,
C. Lupo and F. Ricci-Tersenghi,
Phys. Rev. B **95**, 054433 (2017).
IF 3.836, **NC** 9/8/8.

15. *Matching Microscopic and Macroscopic Responses in Glasses*,
Janus Collaboration: M. Baity-Jesi, E. Calore, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, E. Marinari V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, R. Tripiccione and D. Yllanes,
Phys. Rev. Lett. **118**, 157202 (2017).
IF 8.839, **NC** 11/9/9.

16. *Typology of phase transitions in Bayesian inference problems*,
F. Ricci-Tersenghi, G. Semerjian and L. Zdeborova,
Phys. Rev. E **99**, 042109 (2019).
IF 2.353 (anno 2018), **NC** 9/0/0.

Thesis supervised and reviewed

Supervisor of 23 undergraduate (B.Sc.) thesis and 29 master (M.Sc.) thesis in Physics.

Supervisor of the following 8 Ph.D. thesis in Physics:

- *On the optimal use of the Bethe approximation for models on graphs with loops* by Gabriele Perugini (2017).
- *Critical properties of disordered XY model on sparse random graphs* by Cosimo Lupo (2016).
- *Statistical physics of linear and bilinear inference problems* by Christophe Schülke (2016).
- *Finite size corrections to disordered systems: mean field results and applications to finite dimensions* by Carlo Lucibello (2014).
- *Random magnets on random graphs* by Flaviano Morone (2013).
- *Boolean constraint satisfaction problems for reaction networks* by Alessandro Seganti (2013).
- *Renormalization group and critical properties of long range models* by Maria Chiara Angelini (2012).
- *The multi p-spin model: comparing TAP states and out-of-equilibrium dynamics* by Tommaso Castellani (2006);

Currently supervising the Ph.D. thesis of Giampaolo Folena (from 2016), Angelo Cavaliere (from 2017), Rafael Diaz (from 2017) and Gianmarco Perrupato (from 2018).

Reviewer and/or member of the final examination commission for the following Ph.D. thesis:

- Claudia Battistin, *Dynamics of randomly connected neural networks and inference in the presence of hidden nodes*, Norwegian University of Science and Technology, December 6^{th}, 2018.
- Enrico Maria Malatesta, *Random Combinatorial Optimization Problems: Mean Field and Finite-Dimensional Results*, Università degli Studi di Milano, December, 2018.
- Alessandro Tartaglia, *Coarsening and percolation in 2d kinetic Ising models & Quench dynamics of the isolated $p = 2$ spherical spin glass model*, Sorbonne Université, September 27^{th}, 2018.
- Luca Saglietti, *Out of Equilibrium Statistical Physics of Learning*, Politecnico di Torino, April 9^{th}, 2018.
- Maxime Sevelev, *Phase diagram, jamming and glass transitions in the non-convex perceptron*, Université de Paris Sud XI (Orsay), October 6^{th}, 2017.
- Anna Paola Muntoni, *Statistical mechanics approaches to optimization and inference*, Politecnico di Torino, April 5^{th}, 2017.
- Corrado Rainone, *Following the evolution of metastable glassy states under external perturbations: compression and shear-strain*, ENS Paris and Università "La Sapienza" di Roma, December 21^{st}, 2015.
- Marco Baity Jesi, *Energy Landscape in 3-Dimensional Heisenberg Spin Glasses*, Universidad Complutense de Madrid, October 16^{th}, 2015.
- Jean Barbier, *Statistical physics and approximate message passing algorithms for sparse linear estimation problems in signal processing and coding theory*, ENS Paris, September 18^{th}, 2015.
- Hong-Li Zeng, *Connectivity inference with asynchronously updated kinetic Ising models*, Aalto University, June, 2014.
- Guido Uguzzoni, *Statistical mechanics models for biological systems: cooperativity in biochemistry and affinity maturation of antibodies*, Università di Parma, March 11^{th}, 2014.
- Jason Sakellariou, *Inverse Inference in the Asymmetric Ising Model*, Université de Paris Sud XI (Orsay), February 22^{th}, 2013.
- Beatriz Seoane Bartolomé, *Spin glasses, the quantum annealing, colloidal glasses and crystals: exploring complex free-energy landscapes*, Universidad Complutense de Madrid, January 25^{th}, 2013.
- Michele Castellana, *The Renormalization Group for Disordered Systems*, Université de Paris Sud XI (Orsay) and Università "La Sapienza" di Roma, January 31^{st}, 2012 (president of the commission).
- David Yllanes Mosquera, *Rugged Free-Energy Landscapes in Disordered Spin Systems*, Universidad Complutense de Madrid, October 21^{st}, 2011.
- Aurelien Decelle, *Statistical physics of disordered networks. Spin Glasses on hierarchical lattices and community inference on random graphs*, Université de Paris Sud XI (Orsay), October 11^{th}, 2011.
- Timothy Rogers, *New results on the spectral density of Random Matrices*, King's College London, September 17^{th}, 2010.
- Thierry Mora, *Geometrie et inference dans l'optimization et en théorie de l'information*, Université de Paris Sud XI (Orsay), September 24^{th}, 2007.

Conferences organized

- *Artificial Intelligence: Art or Science?*. SISSA, Trieste. November 12–13, 2019.
- *40 years of Replica Symmetry Breaking*. Sapienza University, Roma. September 10–13, 2019.
- *Disordered serendipidity: a glassy path to discovery*. Sapienza University, Roma. September 19–21, 2018.
- *SIF 101st National Congress*. Sapienza University, Roma. September 21–25, 2015. Roughly 600 participants.
- Workshop on *Critical Phenomena in Random and Complex Systems*. Villa Orlandi, Anacapri. September 9–12, 2014.
- School and workshop on *Spin Glass and Beyond: An old tool for new problems*. Cargese, France. August 25 - September 6, 2014.
- Autumn school on *Statistical physics, Optimization, Inference and Message-Passing algorithms*. Les Houches, France. September 30 – October 11, 2013.
  The lectures notes have been collected in a book *Statistical Physics, Optimization, Inference, and Message-Passing Algorithms*, edited by F. Krzakala, F. Ricci-Tersenghi, L. Zdeborova, R. Zecchina, E. W. Tramel and L. F. Cugliandolo. Oxford University Press (2015).
- Meeting on *Bridging statistical physics and optimization, inference and learning*. Les Houches, France. February 20–24, 2012.
- *ECCS'08. The 5th European Conference on Complex Systems*. Hebrew University, Jerusalem. September 14–19, 2008. Roughly 300 participants.
- *Wandering with Curiosity in Complex Landscapes: A scientific conference in honor of Giorgio Parisi for his 60th birthday*. Sapienza University and Accademia dei Lincei, Roma. September 8–10, 2008. Roughly 200 participants.
- *EPS – CMD 22, 2008. The 22nd General Conference of the Condensed Matter Division of the European Physical Society*. Sapienza University, Roma. August 25–29, 2008. Roughly 600 participants.
- Conference on *Common Concepts in Statistical Physics and Computer Science*, satellite of STATPHYS 23. ICTP, Trieste. July 2–6, 2007.
- Meeting on *Statistical Physics of Glasses, Spin Glasses, Information Processing and Combinatorial Optimization*. Les Houches, France. February 20–24, 2006.
- Meeting on *Statistical Physics of Disordered Systems and its Applications*. Accademia dei Lincei, Roma. September 5–8, 2005.
- Meeting on *Statistical Physics of Glasses, Spin Glasses, Information Processing and Combinatorial Optimization*. Les Houches, France. January 31 – February 4, 2005.
- School and Conference on *Fundamental Aspects of Complexity*. ICTP, Trieste. September 6–10, 2004. More than 120 participants.
- Workshop on *Statistical Physics and Computational Problems: Beyond the Analogy*. Institut Henri Poincaré, Paris. June 14–16, 2004.

Experience as editor and reviewer

Associate editor for Journal of Statistical Physics.

Editor of the lecture notes *Statistical Physics, Optimization, Inference, and Message-Passing Algorithms*, edited by F. Krzakala, F. Ricci-Tersenghi, L. Zdeborova, R. Zecchina, E.W. Tramel

and L.F. Cugliandolo. Oxford University Press (2015).

Guest Editor for the Special Issue on *Statistical Physics of Disordered Systems: from real materials to optimization and codes*, J. Phys. A **36** (2003).

Referee for the following journals:

- Science
- Nature Physics
- Nature Communications
- Scientific Reports
- Proceeding of the National Academy of Science
- Physical Review X
- Physical Review Letters
- Physical Review B
- Physical Review E
- Europhysics Letters
- Journal of Physics A: Mathematical and General
- The European Physical Journal B
- Journal of Statistical Mechanics: Theory and Experiment
- Journal of Statistical Physics
- Physica A
- Nuclear Physics B
- Frontiers in Physics
- Plos One
- PLOS Computational Biology
- SIAM Journal on Discrete Mathematics
- IEEE Transactions on Information Theory
- Journal of Experimental Algorithmics

APS **Outstanding Referee** in 2019.

Publons **Peer Review Award** in 2018 (top 1% of reviewers in Physics).
Publons **Peer Review Award** in 2017 (top 1% of reviewers in Mathematics).
Data available at `http://publons.com/a/488125/`.

Reviewer for ANVUR, the Italian national agency for the evaluation of university and research, and for ANR, the French national research agency.

Oral presentations

- *On the use of simulated annealing based algorithms to solve sparse hard inference problems.*
  Invited speaker at the workshop on 'Science of Data Science'. ICTP, Trieste. September 30 – October 4, 2019.
- *Limits of algorithms in random constraint satisfaction problems.*
  Invited speaker at the summer school on 'Glasses, Jamming, and Slow Dynamics'. Beg-Rohu, France. June 24 – July 6, 2019.
- *Ergodicity breaking in off-equilibrium dynamics of glassy mean-field models.*

Invited speaker at the program entitled 'Breakdown of ergodicity in isolated quantum systems: from glassiness to localization'. Galileo Galilei Institute for Theoretical Physics, Florence. May 30, 2019.

- *Memories from the ergodic phase: the awkward dynamics of spherical mixed p-spin models.*
  Invited speaker at the Simons Collaboration seminar. Ecole Normale Superieure, Paris. April 11, 2019.
- *Unexpected behavior in out-of-equilibrium dynamics of mean field spin glasses.*
  Invited speaker at the KITP conference on 'Rough Landscapes: From Physics to Algorithms'. University of California at Santa Barbara (USA). January 7–11, 2019.
- *Belief Propagation and Monte Carlo based algorithms to solve inference problems on sparse random graphs.*
  Invited speaker at the workshop on 'Applications of Partition Functions'. CIB-EPFL, Lausanne, Switzerland. November 12–16, 2018.
  Invited speaker at the workshop on 'Physics, Inference and Learning (PIL2018)'. Bejing, China. November 1–3, 2018.
  Invited speaker at the workshop on 'Statistical Physics and Machine Learning back together'. Cargese, France. August 20–31, 2018.
- *On the complex behaviour of disordered models in a field.*
  Invited speaker at the Statistical Physics seminar. SISSA, Trieste. March 13, 2018.
- *Discussion on the talk "First steps towards a non-perturbative RG approach for spin glasses in finite dimensions" by Marco Tarzia.*
  Invited speaker at the workshop on 'Beyond Mean Field Theory: Renormalisation Group and Non Perturbative approaches to Disordered and Glassy Systems'. Sapienza University, Rome. January 3–5, 2018.
- *Advanced Cavity Applications.*
  Invited lecturer at the 2017 Boulder School for Condensed Matter and Materials Physics on 'Frustrated and Disordered Systems'. Boulder, Colorado (USA). July 3–28, 2017.
- *Thermodynamics and out of equilibrium dynamics in disordered systems.*
  Invited lecturer at the Spring College on the Physics of Complex Systems. ICTP, Trieste. April 10 – May 5, 2017.
- *Community Detection via Semidefinite Programming.*
  Invited speaker at the workshop on 'Statistical physics, Learning, Inference and Networks'. Les Houches, France. February 26 – March 3, 2017.
- *Critical properties of the disordered XY model on random graphs.*
  Invited speaker at the workshop on 'Renormalization Group Theory of Disordered Systems'. Ecole Normale Supérieure, Paris. July 25–27, 2016.
- *Phase Transitions in Semidefinite Relaxations (a fast and robust algorithm for community detection).*
  Invited speaker at the workshop on 'Statistical Physics of Disordered Systems and Its Applications' (SPDSA2017). Akiu Resort Hotel Sakan, Sendai, Japan. February 8–9, 2017.
  Invited speaker at the workshop on 'Phase transitions in discrete structures'. Goethe University, Frankfurt. July 25–29, 2016.
  Invited speaker at the 'Kolmogorov meets Turing' workshop on 'Stochastics, Optimization, Algorithms, and Games'. LUISS, Rome. May 18, 2016.
  Invited speaker at the workshop on 'Random Instances and Phase Transitions'. Simons Institute for the Theory of Computing, Berkeley, USA. May 4, 2016.

ANC seminar. Informatics Forum, Edinburgh. February 2, 2016.
Invited speaker at the International Meeting on High-Dimensional Data Driven Science. Mielparque, Kyoto. December 14–17, 2015.

- *Improved mean-field approximations for inferring marginals and model parameters.*
  Invited speaker at the workshop on 'New Frontiers in Non-equilibrium Physics'. YITP, Kyoto. July 21–24, 2015.
- *Open questions in the long-time dynamics of glassy systems.*
  Invited lecturer at the Netadis Summer Retreat. Bovec (Slovenia). July 5–19, 2015.
- *Spin glasses in a field.*
  Invited speaker at the 113$^{\text{th}}$ Statistical Mechanics Conference. Rutgers University, New Jersey. May 10–12, 2015.
- *Steps to go beyond the Bethe approximation in disordered models: large deviations of critical correlations and loop corrections.*
  Invited speaker at the workshop on 'Critical Phenomena in Random and Complex Systems'. Villa Orlandi, Anacapri. September 9–12, 2014.
- *A modified kinetic inverse Ising method for the inference of synaptic spatial structure and characteristic times.*
  Invited speaker at the workshop on 'Modelling and inference for dynamics in complex and disordered systems'. NORDITA, Stockholm. June 11–13, 2014.
- *The analysis of BP guided decimation algorithm.*
  Invited speaker at the EPSRC symposium on 'Statistical Mechanics: Phase transitions in discrete structures and computational problems'. University Warwick, UK. May 5–9, 2014.
- *A brief introduction to the inverse Ising problem and some algorithms to solve it.*
  Golosino seminar. ESPCI, Paris. March 18, 2014.
- *Mean-field method with correlations determined by linear response.*
  Invited speaker at the 99$^{\text{th}}$ SIF National Congress. SISSA, Trieste. September 25, 2013.
- *Making maximum entropy and linear response estimates consistent.*
  Invited speaker at the workshop on 'Statistical Physics of Disordered Systems and Its Applications' (SPDSA2013). Akiu Resort Hotel Sakan, Sendai, Japan. March 20–21, 2013.
- *Phase transitions and computational complexity: a physicist point of view.*
  Invited speaker at the workshop on 'Limits of Theorem Proving'. IASI–CNR, Rome. September 25–27, 2012.
- *Some recent results on the inverse Ising problem.*
  Invited speaker at the workshop on 'Common Concepts in Machine Learning and Statistical Physics'. ICTP, Trieste. August 29–31, 2012.
- *Adding loops to mean field approximation for disordered models.*
  Séminaire du LPTMS, Université Paris Sud, France. April 3, 2012.
- *Complex stochastic dynamics in spin glasses and optimization problems.*
  Invited speaker at the 7$^{\text{th}}$ Vienna Central European Seminar on 'Complex Stochastic Dynamics'. Vienna, Austria. November 26–28, 2010.
- *Analytic description of an optimization algorithm: Beliefs Inspired Decimation.*
  Invited speaker at the workshop on 'Statistical physics of complexity, optimization and systems biology'. Les Houches, France. March 7–12, 2010.
- *A glassy phase in the random field Ising model?*
  Invited speaker at the workshop on 'Techniques and Challenges from Statistical Physics'. Centre de Recerca Matematica, UAB, Barcelona. October 14–16, 2009.

- *Replica Cluster Variational Method.*
  Invited speaker at 'Physics of Algorithms 2009' Conference. Santa Fe, New Mexico. August 31 – September 4, 2009.
- *Optimization problems statistical mechanics.*
  ISC, CNR, Rome. April 16, 2009.
  Mathematics Department, Third University of Rome. March 17, 2009.
  Physics Department, Florence University. February 11, 2009.
- *On message guided algorithms for solving constraint satisfaction problems.*
  Invited speaker at the workshop on 'Statistical Mechanics'. Institut Henri Poincaré, Paris. December 8–12, 2008.
- *The (many) phase transitions in random constraint satisfaction problems.*
  Invited speaker at the 5th European Conference on Complex Systems. Hebrew University, Jerusalem. September 14–19, 2008.
  Invited speaker at the workshop on 'Phase Transitions, Combinatorial Problems & Message Passing'. BIRS, Banff, Canada. June 8–13, 2008.
  Invited speaker at the workshop on 'Physics of distributed information systems'. NORDITA, Stockholm. May 15–17, 2008.
- *A statistical mechanics approach to optimization problems.*
  Invited Lecturer at the 2nd Asian-Pacific School on 'Statistical Physics and Interdisciplinary Applications'. Beijing. March 3–14, 2008.
  Tokyo Institute of Technology, Tokyo. November 1, 2007.
  Kyoto University, Kyoto. October 23, 2007.
- *On the solution-space geometry of random constraint satisfaction problems.*
  IASI, CNR, Rome. June 16, 2006.
  Seminario Interdipartimentale di Algoritmica, Dipartimento di Informatica, Univ. of Rome "La Sapienza". April 3, 2006.
  COSPICO 05, Common trends in statistical physics, information theory, and combinatorial optimization. ECCS'05 satellite meeting. Cité Internationale Universitaire de Paris. November 17, 2005.
- *Optimization and Inference.*
  Invited Lecturer at the 1st Latin-American School and Conference on 'Statistical Physics and Interdisciplinary Applications'. La Havana, Cuba. February 28 – March 12, 2005.
- *Temperature cycle experiments in numerical simulations of spin models.*
  Invited speaker at the Workshop on 'Lengthscales and Heterogeneous Dynamics in Glassy Materials'. New College, Oxford, UK. September 22–25, 2004.
- *Measuring the fluctuation-dissipation ratio with no perturbing field.*
  Sphinx General Meeting. Hotel Capoboi, Villasimius, Sardinia. September 14–21, 2003.
- *On the nature of the low-temperature phase in discontinuous mean-field spin glasses.*
  Les Houches DYGLAGEMEM/STIPCO Meeting. Les Houches, France. March 3–7, 2003.
- *Alternative solutions to diluted p-spin models and random XORSAT problems.*
  Invited speaker at the International Conference on 'Typical-case Complexity, Randomness and Analysis of Search Algorithms'. ICTP, Trieste. September, 2002.
- *Computational complexity and statistical mechanics.*
  Universidad de Extremadura, Badajoz, Spain. April 4, 2002.
- *Unfrustrated models with a glass transition.*
  Invited speaker at the International Congress on 'Unifying Concepts in Glass Physics'. Ac-

cademia dei Lincei, Roma. February 27 – March 2, 2002.

- *Optimization and statistical mechanics.*
  Univ. de La Habana, La Havana, Cuba. January, 2001.
- *Exact solutions for ferromagnetic and spin glass models on diluted hypergraphs.*
  Invited speaker at the 2001 General SPHINX Conference. Castelvecchio Pascoli, Tuscany. August 29 – September 6, 2001.
- *Numerical simulations of glassy systems in the out-of-equilibrium regime.*
  Invited speaker at the IV International Discussion Meeting on 'Relaxations in Complex Systems'. Heraklion, Crete. June 17–24, 2001.
- *Geometrical properties of LDPC codes.*
  Invited speaker at the Workshop on 'Statistical Physics and Capacity-Approaching Codes'. ICTP, Trieste. May 21–25, 2001.
- *Statistical mechanics of combinatorial optimization problems.*
  Invited speaker at VI Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi. Parma. May 29–31, 2001.
  Invited speaker at XX Convegno di Fisica Teorica e Struttura della Materia. Fai della Paganella, Trentino. March 25–28, 2001.
- *Chaotic, memory and cooling rate effects in spin glasses: Is the Edwards-Anderson model a good spin glass?.*
  Invited speaker at the Fifth Claude Itzykson Meeting on 'Dynamics of Nonequilibrium Systems'. CEA/Saclay, Paris. June 20–23, 2000.
- *Hyper-SAT: a 3-spin model on a hyper-graph.*
  Invited speaker at the Research Workshop on 'Graph Theory and Statistical Physics'. ICTP, Trieste. May 22–25, 2000.
- *Absence of aging in the remanent magnetization in Migdal-Kadanoff spin glasses.*
  Les Houches Sphinx Meeting on 'Statistical Physics of Glassy and Non-Equilibrium Systems.' Les Houches, France. January 24–28, 2000.
- *Finite-dimensional spin glasses in the aging regime: replica symmetry breaking and ultrametricity.*
  INFMeeting, Catania, Sicily. June 14–18, 1999.
- *Phase transition in a disordered model for the RNA secondary structure.*
  Univ. de Barcelona. October 19, 1999.
  Univ. Complutense de Madrid. April 14, 1999.
- *Violation of the fluctuation-dissipation relation in spin glasses.*
  STATPHYS XX, Paris. July 20–24, 1998.
  ICTP, Trieste. March 31, 1998.
- *Evidenze numeriche di rottura spontanea della simmetria di replica nei vetri di spin finitodimensionali.*
  Dipartimento di Fisica. Università di Roma "La Sapienza". November 25, 1997.
- *Simulazioni di un vetro di spin in 4, 6 ed 8 dimensioni.*
  Dipartimento di Fisica. Università di Roma "La Sapienza". April 16, 1997.

Administrative and management experience

from 2012 Member of the *Collegio dei docenti* (Board of faculties) of the Ph.D. school in Physics

at Sapienza University.

2011–2018 Member of the Physics Department *Team qualità*, controlling and reporting on the organization and the quality level of the teaching activities.

2012–2018 President of the *Commissione per la pianificazione della didattica* of the Physics Department, coordinating the assignment of teaching duties to all the members of the Physics Department (roughly 150 professors).

2011–2014 Member of the Faculty of Science board (*Commissione spazi*) for the optimization of the use of common areas and lecturing rooms.

2011–2013 Member of the Faculty of Science *Giunta di Facoltà* (restricted board assisting the Faculty Dean, whose members are elected).

2008–2012 Person in charge of managing and optimizing the use of the 14 lecturing rooms of the Physics Department.

2004–2008 Member of the Faculty of Science board awarding research grants.

Scientific communication activities

May 15, 2018 Invited speaker to a public science lecture on "I computer e le simulazioni numeriche da Fermi a oggi" (Computers and numerical simulations from Fermi times to nowadays) within the science festival "I mille nomi di Fermi" (The thousand names of Fermi) held at the Physics Department of Sapienza University of Rome.

March 15, 2016 Invited speaker to a *Caffè Scienza* (café scientifique) entitled "Computo ergo sum: simulare il cervello" on recent advances in neural networks and machine learning, held at the 'asSaggi science bookshop' in Rome.

May 31, 2015 Invited speaker to a *Caffè Scienza* (café scientifique) entitled "Computo ergo sum" on recent advances in neural networks, held in Matera, Italy.

March 13, 2012 Invited speaker to a *Caffè Scienza* on "Computer and complexity" held at the 'asSaggi science bookshop' in Rome.

2007–2011 Co-organizer of a series of *Caffè Scienza* in Rome, roughly one per month.

2010 Author of the journalistic article "Optimizing by Passing Messages" published by Atomium Culture

2006 Author of the entry on "Simulazioni di processi fisici mediante calcolatore" (Computer simulations of physical processes) for the Treccani encyclopedia, the first Italian encyclopedia.

2005 Scientific supervision on the production by Sky Italia (italian broadcast network) of short cartoons explaining some every-day phenomena on a scientific basis.

Complete list of publications

- *Strong ergodicity breaking in aging of mean field spin glasses*,
  M. Bernaschi, A. Billoire, A. Maiorano, G. Parisi and F. Ricci-Tersenghi,
  preprint arXiv:1906.11195 (2019), submitted to PNAS.
- *New loop expansion for the Random Magnetic Field Ising Ferromagnets at zero temperature*,
  M.C. Angelini, C. Lucibello, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  preprint arXiv:1906.04437 (2019), submitted to PNAS.
- *How to iron out rough landscapes and get optimal performances: Replicated Gradient Descent*

and its application to tensor PCA,
G. Biroli, C. Cammarota and F. Ricci-Tersenghi,
preprint arXiv:1905.12294 (2019), submitted to NeurIPS'19.

- *Memories from the ergodic phase: the awkward dynamics of spherical mixed p-spin models*,
G. Folena, S. Franz and F. Ricci-Tersenghi,
preprint arXiv:1903.01421 (2019), submitted to PRL.
- *A fast and accurate algorithm for inferring sparse Ising models via parameters activation to maximize the pseudo-likelihood*,
S.Franz, F. Ricci-Tersenghi and J. Rocchi,
preprint arXiv:1901.11325 (2019), submitted to PRL.
- *SpaRTA - Tracking across occlusions via global partitioning of 3D clouds of points*,
A. Cavagna, S. Melillo, L. Parisi and F. Ricci-Tersenghi,
preprint arXiv:1802.05878 (2018), submitted to IEEE Transactions on Pattern Analysis and Machine Intelligence.
- *The Mpemba effect in spin glasses is a persistent memory effect*,
M. Baity-Jesi, E. Calore, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Lasanta, A. Maiorano, E. Marinari V. Martin-Mayor, J. Moreno-Gordo, A. Muñoz-Sudupe, D. Navarro, G. Parisi, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, R. Tripiccione and D. Yllanes,
Proceedings of the National Academy of Sciences **116**, 15350–15355 (2019).
- *Monte Carlo algorithms are very effective in finding the largest independent set in sparse random graphs*,
M.C. Angelini and F. Ricci-Tersenghi,
Phys. Rev. E **100**, 013302 (2019).
- *The random field XY model on sparse random graphs shows replica symmetry breaking and marginally stable ferromagnetism*,
C. Lupo, G. Parisi and F. Ricci-Tersenghi,
J. Phys. A: Math. Theor. **52**, 284001 (2019).
- *Typology of phase transitions in Bayesian inference problems*,
F. Ricci-Tersenghi, G. Semerjian and L. Zdeborova,
Phys. Rev. E **99**, 042109 (2019).
- *Biased landscapes for random constraint satisfaction problems*,
L. Budzynski, F. Ricci-Tersenghi and G. Semerjian,
J. Stat. Mech. 023302 (2019).
- *Aging rate of spin glasses from simulations matches experiments*,
Janus Collaboration: M. Baity-Jesi, E. Calore, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, E. Marinari V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, R. Tripiccione and D. Yllanes,
Phys. Rev. Lett. **120**, 267203 (2018).
- *One-loop topological expansion for spin glasses in the large connectivity limit*,
M.C. Angelini, G. Parisi and F. Ricci-Tersenghi,
Europhys. Lett. **121**, 27001 (2018).
- *Dynamic variational study of chaos: spin glasses in three dimensions*,
A. Billoire, L.A. Fernandez, A. Maiorano, E. Marinari, V. Martin-Mayor, J. Moreno-Gordo, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,

J. Stat. Mech. 033302 (2018).

- *An improved Belief Propagation algorithm finds many Bethe states in the random field Ising model on random graphs*,
  G. Perugini and F. Ricci-Tersenghi,
  Phys. Rev. E **97**, 012152 (2018).
- *Comparison of Gabay-Toulouse and de Almeida-Thouless instabilities for the spin glass XY model in a field on sparse random graphs*,
  C. Lupo and F. Ricci-Tersenghi,
  Phys. Rev. B **97**, 014414 (2018).
- *Loop expansion around the Bethe approximation through the M-layer construction*,
  A. Altieri, M.C. Angelini, C. Lucibello, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  J. Stat. Mech. 113303 (2017).
- *Numerical construction of the Aizenman-Wehr metastate*,
  A. Billoire, L.A. Fernandez, A. Maiorano, E. Marinari, V. Martin-Mayor, J. Moreno-Gordo, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  Phys. Rev. Lett. **119**, 037203 (2017).
- *Matching Microscopic and Macroscopic Responses in Glasses*,
  Janus Collaboration: M. Baity-Jesi, E. Calore, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, E. Marinari V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, R. Tripiccione and D. Yllanes,
  Phys. Rev. Lett. **118**, 157202 (2017).
- *Gauge-free cluster variational method by maximal messages and moment matching*,
  E. Dominguez, A. Lage-Castellanos, R. Mulet and F. Ricci-Tersenghi,
  Phys. Rev. E **95**, 043308 (2017).
- *Improving variational methods via pairwise linear response identities*,
  J. Raymond and F. Ricci-Tersenghi,
  Journal of Machine Learning Research **18**(6), 1–36 (2017).
- *Approximating the XY model on a random graph with a q-states clock model*,
  C. Lupo and F. Ricci-Tersenghi,
  Phys. Rev. B **95**, 054433 (2017).
- *A simple analytical description of the non-stationary dynamics in Ising spin systems*,
  E. Dominguez, G. Del Ferraro and F. Ricci-Tersenghi,
  J. Stat. Mech. 033303 (2017).
- *A statics-dynamics equivalence through the fluctuationissipation ratio provides a window into the spin-glass phase from nonequilibrium measurements*,
  Janus Collaboration: M. Baity-Jesi, E. Calore, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, E. Marinari V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, R. Tripiccione and D. Yllanes,
  Proceedings of the National Academy of Sciences **114**, 1838–1843 (2017).
- *The Backtracking Survey Propagation Algorithm for Solving Random K-SAT Problems*,
  R. Marino, G. Parisi and F. Ricci-Tersenghi,
  Nature Comm. **7**, 12996 (2016).
- *Data quality for the inverse Ising problem*,
  A. Decelle, F. Ricci-Tersenghi and P. Zhang,

J. Phys. A: Math. Theor. **49** 384001 (2016).

- *Solving the inverse Ising problem by mean-field methods in a clustered phase space with many states*,
  A. Decelle and F. Ricci-Tersenghi,
  Phys. Rev. E **94**, 012112 (2016).
- *Performance of a community detection algorithm based on semidefinite programming*,
  F. Ricci-Tersenghi, A. Javanmard and A. Montanari,
  J. Phys.: Conf. Ser. **699**, 01201 (2016).
- *Phase Transitions in Semidefinite Relaxations*,
  A. Javanmard, A. Montanari and F. Ricci-Tersenghi,
  Proceedings of the National Academy of Sciences **113**, E2218–E2223 (2016).
- *Egalitarianism in the rank aggregation problem: a new dimension for democracy*,
  P. Contucci, E. Panizzi, F. Ricci-Tersenghi and A. Sirbu,
  Qual. Quant. **50**, 1185–1200 (2016).
- *Quasi equilibrium construction for the long time limit of glassy dynamics*,
  S. Franz, G. Parisi, F. Ricci-Tersenghi and P. Urbani,
  J. Stat. Mech. P10010 (2015).
- *Multiple phases in modularity-based community detection*,
  C. Schülke and F. Ricci-Tersenghi,
  Phys. Rev. E **92**, 042804 (2015).
- *Cross correlations of the American baby names*,
  P. Barucca, J. Rocchi, E. Marinari, G. Parisi and F. Ricci-Tersenghi,
  Proceedings of the National Academy of Sciences **112**, 7943–7947 (2015).
- *Explicit generation of the branching tree of states in spin glasses*,
  G. Parisi, F. Ricci-Tersenghi and D. Yllanes,
  J. Stat. Mech. P05002 (2015).
- *Infinite volume extrapolation in the one-dimensional bond diluted Levy spin-glass model near its lower critical dimension*,
  L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  Phys. Rev. B **91**, 064202 (2015).
- *Inferring Synaptic Structure in presence of Neural Interaction Time Scales*,
  C. Capone, C. Filosa, G. Gigante, F. Ricci-Tersenghi and P. del Giudice,
  PLoS ONE 10, e0118412 (2015).
- *The crossover region between long-range and short-range interactions for the critical exponents*,
  E. Brezin, G. Parisi and F. Ricci-Tersenghi,
  J. Stat. Phys. **157**, 855–868 (2014).
- *Anomalous finite size corrections in random field models*,
  C. Lucibello, F. Morone, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  J. Stat. Mech. P10025 (2014).
- *Message passing and Monte Carlo algorithms: Connecting fixed points with metastable states*,
  A. Lage-Castellanos, R. Mulet and F. Ricci-Tersenghi,
  Europhys. Lett. **107**, 57011 (2014).
- *Finite size corrections to disordered Ising models on Random Regular Graphs*,
  C. Lucibello, F. Morone, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  Phys. Rev. E **90**, 012146 (2014).

- *Relations between Short Range and Long Range Ising models*,
  M.C. Angelini, G. Parisi, and F. Ricci-Tersenghi,
  Phys. Rev. E **89**, 062120 (2014).
- *Large Deviations of Correlation Functions in Random Magnets*,
  F. Morone, G. Parisi, and F. Ricci-Tersenghi,
  Phys. Rev. B **89**, 214202 (2014).
- *Large Deviations in Monte Carlo Methods*,
  A. Pelissetto and F. Ricci-Tersenghi,
  in Large Deviations in Physics, Lecture Notes in Physics **885**, 161–191 (2014).
- *The three dimensional Ising spin glass in an external magnetic field: the role of the silent majority*,
  Janus Collaboration: M. Baity-Jesi, R. A. Baños, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, F. Mantovani, E. Marinari, V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, M. Pivanti, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, P. Tellez, R. Tripiccione and D. Yllanes,
  J. Stat. Mech. P05014 (2014).
- *Diluted Mean-Field Spin-Glass Models at Criticality*,
  G. Parisi, F. Ricci-Tersenghi, and T. Rizzo,
  J. Stat. Mech. P04013 (2014).
- *Dynamical transition in the D=3 Edwards-Anderson spin glass in an external magnetic field*,
  Janus Collaboration: M. Baity-Jesi, R. A. Baños, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, F. Mantovani, E. Marinari, V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, M. Pivanti, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, P. Tellez, R. Tripiccione and D. Yllanes,
  Phys. Rev. E **89**, 032140 (2014).
- *Spatial correlation functions and dynamical exponents in very large samples of 4D spin glasses*,
  L. Nicolao, G. Parisi, and F. Ricci-Tersenghi,
  Phys. Rev. E **89**, 032127 (2014).
- *Searching for feasible stationary states in reaction networks by solving a Boolean constraint satisfaction problem*,
  A. Seganti, A. De Martino, and F. Ricci-Tersenghi,
  Phys. Rev. E **89**, 022139 (2014).
- *The statistical mechanics of random set packing and a generalization of the Karp-Sipser algorithm*,
  C. Lucibello and F. Ricci-Tersenghi,
  International Journal of Statistical Mechanics **2014**, 136829 (2014).
- *Pseudolikelihood Decimation Algorithm Improving the Inference of the Interaction Network in a General Class of Ising Models*,
  A. Decelle and F. Ricci-Tersenghi,
  Phys. Rev. Lett. **112**, 070603 (2014).
- *Janus II: a new generation application-driven computer for spin-system simulations*,
  Janus Collaboration: M. Baity-Jesi, R. A. Baños, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, F. Mantovani, E. Marinari, V. Martin-Mayor,

J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, M. Pivanti, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, P. Tellez, R. Tripiccione and D. Yllanes,
Computer Physics Communications **185**, 550–559 (2014).

- *Critical parameters of the three-dimensional Ising spin glass*,
Janus Collaboration: M. Baity-Jesi, R. A. Baños, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, D. Iñiguez, A. Maiorano, F. Mantovani, E. Marinari, V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, M. Pivanti, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, P. Tellez, R. Tripiccione and D. Yllanes,
Phys. Rev. B **88**, 224416 (2013).
- *Finite size corrections to disordered systems on Erdös-Rényi random graphs*,
U. Ferrari, C. Lucibello, F. Morone, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
Phys. Rev. B **88**, 184201 (2013).
- *Correcting beliefs in the mean-field and Bethe approximations using linear response*,
J. Raymond and F. Ricci-Tersenghi,
IEEE International Conference on Communications Workshops (ICC), pp.1429-1433 (2013).
- *Boolean constraint satisfaction problems for reaction networks*,
A. Seganti, A. De Martino and F. Ricci-Tersenghi,
J. Stat. Mech. P09009 (2013).
- *Comment on "Evidence of Non-Mean-Field-Like Low-Temperature Behavior in the Edwards-Anderson Spin-Glass Model"*,
A. Billoire, L.A. Fernandez, A. Maiorano, E. Marinari, V. Martin-Mayor, G. Parisi, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo and D. Yllanes,
Phys. Rev. Lett. **110**, 219701 (2013).
- *Mean-field method with correlations determined by linear response*,
J. Raymond and F. Ricci-Tersenghi,
Phys. Rev. E **87**, 052111 (2013).
- *Glassy critical points and random field Ising model*,
S. Franz, G. Parisi and F. Ricci-Tersenghi,
J. Stat. Mech. L02001 (2013).
- *A note on weakly discontinuous dynamical transitions*,
S. Franz, G. Parisi, F. Ricci-Tersenghi, T. Rizzo and P. Urbani,
J. Chem. Phys. **138**, 064504 (2013).
- *Replica cluster variational method: the replica symmetric solution for the 2D random bond Ising model*,
A. Lage-Castellanos, R. Mulet, F. Ricci-Tersenghi and T. Rizzo,
J. Phys. A: Math. Theor. **46**, 135001 (2013).
- *Ensemble renormalization group for disordered systems*,
M. C. Angelini, G. Parisi and F. Ricci-Tersenghi,
Phys. Rev. B **87**, 134201 (2013).
- *Compressed sensing with sparse, structured matrices*,
M.C. Angelini, F. Ricci-Tersenghi and Y. Kabashima
Proc. Fiftieth Annual Allerton Conference, p. 808 (2012).
- *Reconfigurable computing for Monte Carlo simulations: Results and prospects of the Janus project*,

Janus Collaboration: M. Baity-Jesi, R. A. Baños, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, M. Guidetti, D. Iñiguez, A. Maiorano, F. Mantovani, E. Marinari, V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, M. Pivanti, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, P. Tellez, R. Tripiccione and D. Yllanes,
Eur. Phys. J. Special Topics **210**, 33–51 (2012).

- *The Bethe approximation for solving the inverse Ising problem: a comparison with other inference methods*,
  F. Ricci-Tersenghi,
  J. Stat. Mech. P08015 (2012).
- *Critical Slowing Down Exponents of Mode Coupling Theory*,
  F. Caltagirone, U. Ferrari, L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  Phys. Rev. Lett. **108**, 085702 (2012).
- *A numerical study of the overlap probability distribution and its sample-to-sample fluctuations in a mean-field model*,
  G. Parisi and F. Ricci-Tersenghi,
  Phil. Mag. **92**, 341 (2012).
- *Characterizing and Improving Generalized Belief Propagation Algorithms on the 2D Edwards-Anderson Model*,
  E. Dominguez, A. Lage-Castellanos, R. Mulet, F. Ricci-Tersenghi and T. Rizzo,
  J. Stat. Mech. P12007 (2011).
- *Field Theory of Fluctuations in Glasses*,
  S. Franz, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  Eur. Phys. J. E, **34**, 102 (2011).
- *Sample-to-sample fluctuations of the overlap distributions in the three-dimensional Edwards-Anderson spin glass*,
  Janus Collaboration: R. Alvarez Baños, A. Cruz, L.A. Fernandez, J.M. Gil-Narvion, A. Gordillo-Guerrero, M. Guidetti, D. Iñiguez, A. Maiorano, F. Mantovani, E. Marinari, V. Martin-Mayor, J. Monforte-Garcia, A. Muñoz-Sudupe, D. Navarro, G. Parisi, S. Perez-Gaviro, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo, S.F. Schifano, B. Seoane, A. Tarancon, R. Tripiccione and D. Yllanes,
  Phys. Rev. B **84**, 174209 (2011).
- *Replica Field Theory of the Dynamical Transition in Glassy Systems*,
  S. Franz, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  arXiv:1105.5230 (2011).
- *Inference algorithm for finite-dimensional spin glasses: Belief Propagation on the dual lattice*,
  A. Lage-Castellanos, R. Mulet, F. Ricci-Tersenghi and T. Rizzo,
  Phys. Rev. E **84**, 046706 (2011).
- *Critical behaviour of large scale dynamical heterogeneities in glasses: a complete theory*,
  S. Franz, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
  preprint arXiv:1008:0996, proceedings of the conference StatphysHK, Hong-Kong, July 2010.
- *On the Solution-Space Geometry of Random Constraint Satisfaction Problems*,
  D. Achlioptas, A. Coja-Oghlan and F. Ricci-Tersenghi,
  Random Struct. Alg. **38**, 251–268 (2011).
- *Bond diluted Levy spin-glass model and a new finite size scaling method to determine a phase transition*,

L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
Phil. Mag. **91**, 1917–1925 (2011).

- *Entropic long range order in a 3D spin glass model*,
M.C. Angelini and F. Ricci-Tersenghi,
J. Stat. Mech. P02002 (2011).
- *No spin glass phase in ferromagnetic random-field random-temperature scalar Ginzburg-Landau model*,
F. Krzakala, F. Ricci-Tersenghi, D. Sherrington and L. Zdeborova
J. Phys. A: Math. Theor. **44**, 042003 (2011).
- *Being Glassy Without Being Hard to Solve*,
F. Ricci-Tersenghi
Science **330**, 1639 (2010).
- *Properties of the perturbative expansion around the mode-coupling dynamical transition in glasses*,
S. Franz, G. Parisi, F. Ricci-Tersenghi and T. Rizzo,
arXiv:1001.1746 (2010).
- *Finite size scaling of the de Almeida-Thouless instability in random sparse networks*,
H. Takahashi, F. Ricci-Tersenghi and Y. Kabashima,
Phys. Rev. B **81**, 174407 (2010).
- *A Non-Disordered Glassy Model with a Tunable Interaction Range*,
F. Liers, E. Marinari, U. Pagacz, F. Ricci-Tersenghi and V. Schmitz,
J. Stat. Mech. L05003 (2010).
- *Elusive Glassy Phase in the Random Field Ising Model*,
F. Krzakala, F. Ricci-Tersenghi and L. Zdeborova,
Phys. Rev. Lett. **104**, 207208 (2010).
- *Replica cluster variational method*,
T. Rizzo, A. Lage-Castellanos, R. Mulet and F. Ricci-Tersenghi,
J. Stat. Phys. **139**, 375 (2010).
- *On the cavity method for decimated random constraint satisfaction problems and the analysis of belief propagation guided decimation algorithms*,
F. Ricci-Tersenghi and G. Semerjian,
J. Stat. Mech. P09001 (2009).
- *Ising Spin-Glass Transition in a Magnetic Field Outside the Limit of Validity of Mean-Field Theory*,
L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
Phys. Rev. Lett. **103**, 267201 (2009).
- *Random Formulas Have Frozen Variables*,
D. Achlioptas and F. Ricci-Tersenghi,
SIAM J. Comput. **39**, 260 (2009).
- *Dilute one-dimensional spin glasses with power law decaying interactions*,
L. Leuzzi, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
Phys. Rev. Lett. **101**, 107203 (2008).
- *Mosaic length and finite interaction-range effects in a one dimensional random energy model*,
S. Franz, G. Parisi and F. Ricci-Tersenghi,
J. Phys. A. **41**, 324011 (2008).
- *Entropic effects in the very-low-temperature regime of diluted Ising spin glasses with discrete*

couplings,
T. Jörg and F. Ricci-Tersenghi,
Phys. Rev. Lett. **100**, 177203 (2008).

- *Clusters of solutions and replica symmetry breaking in random k-satisfiability*,
A. Montanari, F. Ricci-Tersenghi and G. Semerjian,
J. Stat. Mech. P04004 (2008).
- *Solving Constraint Satisfaction Problems through Belief Propagation-guided decimation*,
A. Montanari, F. Ricci-Tersenghi and G. Semerjian,
Proceedings of the 45th Annual Allerton Conference on Communication, Control, and Computing (Monticello, IL, USA), 352–359 (2007).
- *Gibbs States and the Set of Solutions of Random Constraint Satisfaction Problems*,
F. Krzakala, A. Montanari, F. Ricci-Tersenghi, G. Semerjian and L. Zdeborova,
Proceedings of the National Academy of Sciences **104**, 10318–10323 (2007).
- *The stable set problem and the thinness of a graph*,
C. Mannino, G. Oriolo, F. Ricci and S. Chandran,
Operations Research Letters **35**, 1–9 (2007).
- *On the Solution-Space Geometry of Random Constraint Satisfaction Problems*,
D. Achlioptas and F. Ricci-Tersenghi,
STOC '06: Proceedings of the thirty-eighth annual ACM symposium on Theory of computing (Seattle, WA, USA), 130–139 (2006).
- *Off-equilibrium confined dynamics in a glassy system with level-crossing states*,
B. Capone, T. Castellani, I. Giardina and F. Ricci-Tersenghi,
Phys. Rev. B **74**, 144301 (2006).
- *Multivesicular release at developing schaffer collateral-CA1 synapses: An analytic approach to describe experimental data*,
F. Ricci-Tersenghi, F. Minneci, E. Sola, E. Cherubini and L. Maggi,
J. Neurophysiol. **96**, 15–26 (2006).
- *Aging, memory and rejuvenation: some lessons from simple models*,
F. Krzakala and F. Ricci-Tersenghi,
J. Phys: Conf. Series **40**, 42–49 (2006).
- *Spin glass models with ferromagnetically biased couplings on the Bethe lattice: analytic solutions and numerical simulations*,
T. Castellani, F. Krzakala and F. Ricci-Tersenghi,
Eur. Phys. J. B **47**, 99–108 (2005).
- *Edwards-Anderson spin glasses undergo simple cumulative aging*,
A. Maiorano, E. Marinari and F. Ricci-Tersenghi,
Phys. Rev. B **72**, 104411 (2005).
- *Cooling-schedule dependence of the dynamics of mean-field glasses*,
A. Montanari and F. Ricci-Tersenghi,
Phys. Rev. B **70**, 134406 (2004).
- *Non-equilibrium critical dynamics of the ferromagnetic Ising model with Kawasaki dynamics*,
C. Godreche, F. Krzakala and F. Ricci-Tersenghi,
J. Stat. Mech. P04007 (2004).
- *Instability of one-step replica-symmetry-broken phase in satisfiability problems*,
A. Montanari, G. Parisi and F. Ricci-Tersenghi,
J. Phys. A **37**, 2073–2091 (2004).

- *Aging dynamics of heterogeneous spin models*,
  A. Montanari and F. Ricci-Tersenghi,
  Phys. Rev. B **68**, 224429 (2003).
- *Measuring the fluctuation-dissipation ratio in glassy systems with no perturbing field*,
  F. Ricci-Tersenghi,
  Phys. Rev. E **68**, 065104 (2003).
- *Bicolouring random hypergraphs*,
  T. Castellani, V. Napolano, F. Ricci-Tersenghi and R. Zecchina,
  J. Phys. A. **36**, 11037–11053 (2003).
- *On the nature of the low-temperature phase in discontinuous mean-field spin glasses*,
  A. Montanari and F. Ricci-Tersenghi,
  Eur. Phys. J. B **33**, 339–346 (2003).
- *Two solutions to diluted p-spin models and XORSAT problems*,
  M. Mezard, F. Ricci-Tersenghi and R. Zecchina,
  J. Stat. Phys. **111**, 505–533 (2003).
- *Microscopic description of aging dynamics: Fluctuation-dissipation relations, effective temperature, and heterogeneities*,
  A. Montanari and F. Ricci-Tersenghi,
  Phys. Rev. Lett. **90**, 017203 (2003).
- *Learning to Compete and Coordinate in a Complex World*,
  M. Marsili, R. Mulet and F. Ricci-Tersenghi,
  Lecture Notes in Economics and Mathematical Systems **521**, 61–74 (2003).
- *Dynamic phase transition for decoding algorithms*,
  S. Franz, M. Leone, A. Montanari and F. Ricci-Tersenghi,
  Phys. Rev. E **66**, 046120 (2002).
- *Complexity transitions in global algorithms for sparse linear systems over finite fields*,
  A. Braunstein, M. Leone, F. Ricci-Tersenghi and R. Zecchina,
  J. Phys. A **35**, 7559–7574 (2002).
- *Zero-temperature properties of RNA secondary structures*,
  E. Marinari, A. Pagnani and F. Ricci-Tersenghi,
  Phys. Rev. E **65**, 041919 (2002).
- *Hiding solutions in random satisfiability problems: A statistical mechanics approach*,
  W. Barthel, A.K. Hartmann, M. Leone, F. Ricci-Tersenghi, M. Weigt and R. Zecchina,
  Phys. Rev. Lett. **88**, 188701 (2002).
- *Direct sampling of complex landscapes at low temperatures: The three-dimensional $\pm J$ Ising spin glass*,
  A.K. Hartmann and F. Ricci-Tersenghi,
  Phys. Rev. B **66**, 224419 (2002).
- *Learning to coordinate in a complex and nonstationary world*,
  M. Marsili, R. Mulet, F. Ricci-Tersenghi and R. Zecchina,
  Phys. Rev. Lett. **87**, 208701 (2001).
- *Exact solutions for diluted spin glasses and optimization problems*,
  S. Franz, M. Leone, F. Ricci-Tersenghi and R. Zecchina,
  Phys. Rev. Lett. **87**, 127209 (2001).
- *A ferromagnet with a glass transition*,
  S. Franz, M. Mézard, F. Ricci-Tersenghi, M. Weigt and R. Zecchina,

Europhys. Lett. **55**, 465–471 (2001).
- *Aging effects and dynamic scaling in the 3D Edwards-Anderson spin glasses: a comparison with experiments*,
  M. Picco, F. Ricci-Tersenghi and F. Ritort,
  Eur. Phys. J. B **21**, 211–217 (2001).
- *Phase coexistence and finite-size scaling in random combinatorial problems*,
  M. Leone, F. Ricci-Tersenghi and R. Zecchina,
  J. Phys. A **34**, 4615–4626 (2001).
- *Comment on "Two time scales and violation of the fluctuation-dissipation theorem in a finite dimensional model for structural glasses" – Reply*,
  F. Ricci-Tersenghi, G. Parisi, D.A. Stariolo and J.J. Arenzon,
  Phys. Rev. Lett. **86**, 4717 (2001).
- *Chaotic, memory, and cooling rate effects in spin glasses: Evaluation of the Edwards-Anderson model*,
  M. Picco, F. Ricci-Tersenghi and F. Ritort,
  Phys. Rev. B **63**, 174412 (2001).
- *Comment on "Glassy transition in a disordered model for the RNA secondary structure" – Reply*,
  A. Pagnani, G. Parisi and F. Ricci-Tersenghi,
  Phys. Rev. Lett. **86**, 1383 (2001).
- *The use of optimized Monte Carlo methods for studying spin glasses*,
  E. Marinari, G. Parisi, F. Ricci-Tersenghi and F. Zuliani,
  J. Phys. A **34**, 383–390 (2001).
- *Simplest random K-satisfiability problem*,
  F. Ricci-Tersenghi, M. Weigt and R. Zecchina,
  Phys. Rev. E **63**, 026702 (2001).
- *Glassy dynamics near zero temperature*,
  F. Ricci-Tersenghi and R. Zecchina,
  Phys. Rev. E **62**, R7567–R7570 (2000).
- *Dynamics of the frustrated Ising lattice gas*,
  J.J. Arenzon, F. Ricci-Tersenghi and D.A. Stariolo,
  Phys. Rev. E **62**, 5978–5985 (2000).
- *Coupled Ising models with disorder*,
  P. Simon and F. Ricci-Tersenghi,
  J. Phys. A **33**, 5985–5991 (2000).
- *Absence of ageing in the remanent magnetization in Migdal-Kadanoff spin glasses*,
  F. Ricci-Tersenghi and F. Ritort,
  J. Phys. A **33**, 3727–3734 (2000).
- *Two time scales and violation of the fluctuation-dissipation theorem in a finite dimensional model for structural glasses*,
  F. Ricci-Tersenghi, D.A. Stariolo and J.J. Arenzon,
  Phys. Rev. Lett. **84**, 4473–4476 (2000).
- *Off-equilibrium dynamics at very low temperatures in three-dimensional spin glasses*,
  E. Marinari, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  J. Phys. A **33**, 2373–2382 (2000).
- *Replica symmetry breaking in short-range spin glasses: Theoretical foundations and numerical*

evidences,
E. Marinari, G. Parisi, F. Ricci-Tersenghi, J.J. Ruiz-Lorenzo and F. Zuliani,
J. Stat. Phys. **98**, 973–1047 (2000).

- *Glassy transition in a disordered model for the RNA secondary structure*,
  A. Pagnani, G. Parisi and F. Ricci-Tersenghi,
  Phys. Rev. Lett. **84**, 2026–2029 (2000).
- *Ultrametricity in three-dimensional Edwards-Anderson spin glasses*,
  S. Franz and F. Ricci-Tersenghi,
  Phys. Rev. E **61**, 1121–1124 (2000).
- *On the origin of ultrametricity*,
  G. Parisi and F. Ricci-Tersenghi,
  J. Phys. A **33**, 113–129 (2000).
- *Universality in the off-equilibrium critical dynamics of the three-dimensional diluted Ising model*,
  G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  Phys. Rev. E **60**, 5198–5201 (1999).
- *Generalized off-equilibrium fluctuation-dissipation relations in random Ising systems*,
  G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  Eur. Phys. J. B **11**, 317–325 (1999).
- *Small window overlaps are effective probes of replica symmetry breaking in three-dimensional spin glasses*,
  E. Marinari, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  J. Phys. A **31**, L481–L487 (1998).
- *Dynamics of the four-dimensional spin glass in a magnetic field*,
  G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  Phys. Rev. B **57**, 13617–13623 (1998).
- *Violation of the fluctuation-dissipation theorem in finite-dimensional spin glasses*,
  E. Marinari, G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  J. Phys. A **31**, 2611–2620 (1998).
- *Mean field dynamical exponents in finite-dimensional Ising spin glass*,
  G. Parisi, P. Ranieri, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  J. Phys. A **30**, 7115–7131 (1997).
- *Equilibrium and off-equilibrium simulations of the 4d Gaussian spin glass*,
  G. Parisi, F. Ricci-Tersenghi and J.J. Ruiz-Lorenzo,
  J. Phys. A **29**, 7943–7957 (1996).