

Marc Mézard - Curriculum vitae, May 2022

Ecole normale supérieure - PSL University, 45 rue d'Ulm, 75005 Paris, France

email: marc.mezard@ens.psl.eu

Born : August 29, 1957

Education

Studies at École normale supérieure (Paris), 1976-1980. Degrees:

Master in Physics 1978

Thèse 3eme cycle in Theoretical Physics 1980

Agrégation teaching degree in Physical Sciences 1980

Thèse Etat 1984: "Study of the mean field theory of spin glasses and its physical interpretation", supervisor C. Bouchiat.

Appointments

Professor, Bocconi University	2022-
Director, École Normale Supérieure (Paris)	2012-2022
Research Director (<i>classe exceptionnelle</i>), CNRS	2010-2022
Director of LPTMS, Université Paris Sud	2010-2012
Visiting Scientist, Oldenburg University	2009-2010
Research Director (<i>Ire classe</i>), CNRS, Université Paris Sud	1999-2010
Part-time professor, Ecole Polytechnique	1987-2012
Visiting Scientist, KITP, Santa Barbara	1998-1999
Research Director, CNRS, Laboratoire de Physique Théorique ENS	1989-1998
Postdoctoral fellow, Rome University La Sapienza	1984-1986
Junior Researcher, CNRS, Laboratoire de Physique Théorique ENS	1981-1989
Assistant Professor (<i>agrégé préparateur</i>) at École normale supérieure	1980-1981

Distinctions

2016 : Onsager Prize of the American Physical Society (with G. Parisi and R. Zecchina)

2013 : Chevalier de la Légion d'honneur

2012 : Elected to the European Academy of Sciences

2009 : Humboldt Gay-Lussac Prize of the Humboldt Foundation (Germany)

1996 : Prize « Ampère » of the French Academy of Sciences (with C. De Dominicis)

1990 : Silver medal of CNRS

1988 : Prize « Suzanne et Anatole Abragam » of the French Academy of Sciences

1985 : Bronze medal of CNRS

Selected lectures

07/2021 : Plenary lecture, ACM-GECCO Conference, Lille (online)

01/2020 : Turing Lectures, ICTS Bangalore

01/2020 : Salam Lectures, ICTP Trieste

01/2018 : Bernoulli lecture, EPFL Lausanne

11/2015 : Boole-Shannon Lecture, MIT

05/2014 : Loeb Lectures, Harvard University

06/2013 : Simons Institute for the Theory of Computing (Berkeley), inaugural conf., invited lecture

10/2004 : Plenary lecture, Information Theory Workshop (San Antonio)
12/2003 : Plenary lecture, NIPS conference (Vancouver)
07/2002 : Plenary lecture, STATPHYS conference (Cancun)
07/1997 : Plenary lecture, International Conference of Mathematical Physics (Brisbane)

In the last 25 years, around 150 invited lectures at international conferences and many « colloquia » in top Universities, among which Princeton, Chicago, Stanford, Berkeley, Rome, UC Santa Barbara, Geneva, KTH Stockholm, Göttingen, IBM Yorktowns, King's College, Oxford, ICTP Trieste, ENS, CUNY, Helsinki, ENS-Lyon, UC Santa Cruz, TU München, Barcelona, CEA Saclay, UC San Diego.

Teaching

Part-time associate professor at Ecole Polytechnique from 1987 to 2003. Courses taught:

- Quantum mechanics
- Statistical physics
- Symmetries in quantum physics and condensed matter physics

Part-time full professor at Ecole Polytechnique from 2003 to 2012

- Statistical physics: in charge of the main course and the coordination of 10 associate professors
- Statistical Field Theory (creation with Antoine Georges of this new course at the undergrad level)
- Statistical physics of complex systems (creation with Jean-Philippe Bouchaud of this new course at the undergrad level, including elements of statistical physics, information theory, economics and finance)

Occasional Graduate and Post-Graduate courses at ENS and at several summer schools, including 5 long series of courses at Beg-Rohu summer school (last ones in 2011, 2018)

- 2022: Fundamentals of Physics, Bocconi University
- 2022: PhD Course on Complex systems in physics, information theory and computer science

Books

1987 : « *Spin glass theory and beyond* », M. Mézard, G. Parisi and M.-A. Virasoro, World Scientific
2009 : « *Information, Physics and Computation* », M. Mézard and A. Montanari, Oxford Univ.Press

Book chapters

"Out of equilibrium dynamics in spin-glasses and other glassy systems",

J.-P. Bouchaud, L.F. Cugliandolo, J. Kurchan and M. Mézard, in *Spin glasses and Random fields*, A.P. Young ed., World Scientific (1997).

"First steps in Glass Theory", M. Mézard, in *More is different*, N.P. Ong and R.N. Bhatt eds., Princeton University Press (2001).

"Theory of random solid states", Marc Mézard, in *Stealing the Gold; a celebration of the pioneering physics of Sam Edwards*, Paul M. Goldbart, N. Goldenfeld and D. Sherrington eds. Clarendon Press, Oxford 2004.

"Glasses and replicas", Marc Mézard and Giorgio Parisi, in *Structural Glasses and Supercooled Liquids: Theory, Experiment, and Applications*, V. Lubchenko and P. Wolynes Eds, Wiley 2012.

Selected Publications

- *On the nature of the spin glass phase*, Mézard, Parisi, Sourlas, Toulouse, Virasoro, Phys. Rev. Lett. 52 (1984) 1156
- *The simplest spin glass*, D. Gross and M. Mézard, Nucl. Phys. B240 [FS12] (1984) 431.
- *Replicas and optimization*, M. Mézard and G. Parisi, J. Physique Lett. 46 (1985) L771
- *SK model : the replica solution without replicas*, M. Mézard, G. Parisi and M.A. Virasoro, Europhys. Lett. 1 (1985) 77.
- *Learning in feedforward layered networks: the tiling algorithm*, M. Mézard and J.P. Nadal, J.Physics A22 (1989) 2191.
- *Replica field theory for random manifolds*, M. Mézard and G. Parisi, J. Phys. I 1 (1991) 809.
- *Thermodynamics of glasses: a first principle computation*, M. Mézard and G. Parisi, J. Phys. Condens. Matter 11 (1999) A157-A165.
- *Wealth condensation in a simple model of economy*, J.-P. Bouchaud and M. Mézard, Physica A, 282, 536 (2000).
- *The Bethe lattice spin glass revisited*, M. Mézard and G. Parisi, Eur. Phys. J. B 20 (2001) 217
- *Analytic and Algorithmic Solution of Random Satisfiability Problems*, M. Mézard, G. Parisi, R. Zecchina, Science 297 (2002) 812
- *The random K-satisfiability problem: from an analytic solution to an efficient algorithm*, Marc Mézard, Riccardo Zecchina, Phys. Rev. E 66 (2002) 056126.
- *Lattice Glass Models*, G.Biroli and M. Mézard, Phys. Rev. Lett. 88 (2002) 025501.
- *Statistical properties of stock order books: empirical results and models*, J.-P. Bouchaud, M. Mézard and M. Potters, Quantitative Finance 2 (2002) 251
- *Survey propagation: an algorithm for satisfiability*, A. Braunstein, M. Mézard, R. Zecchina, Random Structures and Algorithms 27 (2005) 201-226
- *Clustering of solutions in the random satisfiability problem*, M. Mézard, T. Mora, R. Zecchina, Phys. Rev. Lett. 94 (2005) 197205
- *Reconstruction on trees and spin glass transition*, Marc Mézard, Andrea Montanari, J. Stat. Phys. 124 (2006) 1317-1350
- *Statistical physics-based reconstruction in compressed sensing*, Florent Krzakala, Marc Mézard, Francois Sausset, Yifan Sun and Lenka Zdeborova, Phys. Rev. X 2 (2012) 021005
- *Belief Propagation Reconstruction for Discrete Tomography*, Emmanuelle Gouillart, Florent Krzakala, Marc Mézard, Lenka Zdeborova, Inverse Problems 29, 3 (2013) 035003.
- *Modeling the influence of data structure on learning in neural networks: the hidden manifold model*, Sebastian Goldt, Marc Mézard, Florent Krzakala, Lenka Zdeborová, Phys. Rev. X 10 (2020)
- *Epidemic mitigation by statistical inference from contact tracing data*, Antoine Baker et al., arXiv:2009.09422, PNAS, July 2021

Bibliometric indices (January 2021)

More than 170 publications in international refereed journals, one patent.

12000 citations and h-index=57 (according to Scopus)

28000 citations and h-index=78 (according to Google Scholar)

(NB The book *Spin glass theory and beyond* has received alone around 6000 citations, counted by GS but not by Scopus).

Administrative Responsibilities, Boards and Grants

- Director, École normale supérieure - PSL University, 15 Departments (Science, Humanities and Social Sciences), 150 faculties (plus 400 CNRS researchers), 2200 students, yearly budget 130 M€. The director's responsibilities are similar to those of a President and Provost (2012-Present).
- Acting President of PSL University, 2017.
- Director, Laboratoire de Physique Théorique et Modèles Statistiques (LPTMS), Université Paris Sud (2010-2012).
- Board member, PSL University (2012-present)
- Board member, Ecole normale supérieure de Lyon (2012-present)
- Board member, Paris School of Economics (2012-present)
- Board member, Foundation « La main à la pâte » (2012-present)
- Board member, Foundation CFM (Capital Fund Management) (2014-present)
- Creator and 1st Director, Excellency laboratory « PALM » (Physics : Atoms Light Matter), involving 700 physicists in Saclay (2011-2012)
- Leader, ANR Grant « QuDEC » on Quantum decoherence (2012)
- Participant, ANR Grant « QPPRJCCQ » lead by B. Douçot on Quantum Computing (2010)
- Participant, ANR Grant ``UNLOC'' lead by D. Simon on Constraint Satisfaction Problems (2009)
- Principal coordinator of a European ``Research training network » of 10 European laboratories (2002-2006)
- Principal coordinator of a European ``Human Capital and Mobility » network of 13 European laboratories (1993-1997)
- Chief Scientific Director, « *Journal of Statistical Mechanics: Theory and Experiment (JSTAT)* » 2009-present
- Previously editor of *Europhysics Letters*, *Physica A*, *International Journal of Neural Networks*, *Complexus*, *Journal of Statistical Physics*
- Seminar organizer, LPTMS Orsay 2000-2007
- Co-Organizer, Les Houches Summer School on « Complex systems », 2006
- Scientific board of ICTP (Trieste) (2021- present)
- Board of trustees of the Cyprus Research and Educational Foundation (2022-)
- Co-Organizer, Les Houches Workshop on « Recent advances in understanding artificial and biological neural networks », 2023

Collaborators (selection):

P. Abry (Lyon), J. Barbier (Trieste), A. Barrat (Marseille), E. Bertin (Lyon), G. Biroli (Paris), J.P. Bouchaud (Paris), L. Cugliandolo (Paris), V. Dotsenko (Paris), A. Engel (Oldenburg), M. Feigelman (Moscow), S. Franz (Saclay), A. Georges (Paris and New-York), I. Giardinà (Rome), S. Goldt (Trieste), E. Guillard (Paris), D.J. Gross (Santa Barbara), A. Hartmann (Oldenburg), J. Hertz (Copenhagen), L. Ioffe (Paris and Santa Barbara), Y. Kabashima (Tokyo), A. Kamenev (Minneapolis), W. Krauth (Paris), F. Krzakala (Lausanne), J. Kurchan (Paris), R. Monasson (Paris), T. Mora (Paris), A. Montanari (Stanford), J.P. Nadal (Paris), R. A. Neher (Basel), G. Parisi (Rome), L. Peliti (Rome), O. Rivoire (Paris), Y. Roudi (Stockholm), B. Shraiman (Santa Barbara), M. Tarzia (Paris), C. Toninelli (Paris), G. Toulouse (Paris), M.-A. Virasoro (Rome), J.S. Yedidia (Boston), A.P. Young (Santa-Cruz), F. Zamponi (ENS), A. Zee (Santa Barbara), L. Zdeborova (Lausanne), R. Zecchina (Milano), P. Zhang (Beijing)

PhD supervised (15): W. Krauth, J. Yedidia (one year), R. Monasson, I. Kocher, A. Hazareesing, A. Barrat, M. Müller, M. Ratieville, O. Rivoire, T. Mora, L. Zdeborova, M. Castellana, J. Sakellariou, A. Lokhov, F Camilli