

Marc Mézard Biography

February 20, 2023. Patrick Charbonneau

(Jean Marcel) Marc Mézard (August 29, 1957—) was born in Aurillac, France, son of Pierre Mézard and Michèle Eurin, both physicians. There, he attended lycée Émile-Duclos (1970-1974), and passed the *baccalauréat* in physics and mathematics (1974) with *félicitations du jury*, before moving to Paris to attend classes préparatoires at Lycée Louis-le-Grand (1974-1976).

In 1976, Mézard entered École normale supérieure (ENS), where he obtained the diplôme d'études approfondies in physics (1978) and the agrégation de sciences physiques (teaching licence, 1980), in parallel to completing a thèse de 3e cycle (1980) entitled “Observables inclusives dans la diffusion profondément inélastique de neutrinos”, under the supervision of Claude Bouchiat and Philippe Meyer. While serving as Centre national de recherche scientifique (CNRS) attaché de recherche in the Laboratoire de physique théorique (LPT) of ENS, (1981-1984), he completed a thèse d'état (1984) entitled “Etude de la théorie de champ moyen des verres de spin et de son interprétation physique”, also under Bouchiat's supervision. Mézard then went for a two-year postdoctoral fellowship supported by a European Community fellowship at Sapienza Università di Roma (1984-1986), under the joint supervision of Miguel Virasoro and Giorgio Parisi. He later returned to LPT-ENS as CNRS chargé de recherche (1987-1989) and then as CNRS directeur de recherche (1989-1998), before moving to Université Paris-Sud, in Orsay (as directeur de recherche 1re classe, 1999-2010, and classe exceptionnelle, 2010-2012). In parallel, he served as part-time professor at École Polytechnique (1987-2012) and as director of the Laboratoire de Physique Théorique et Modèles Statistiques (2010-2012) at Université Paris-Sud. He subsequently served director of ENS (2012-2022) and as interim president of the newly created Université Paris Sciences Lettres in 2017. Since 2022, he is professor in the computer science department of Bocconi University in Milano, Italy. Over the years, Mézard took sabbatical leaves at the Kavli Institute for Theoretical Physics in Santa Barbara, California (1997-1998), and at the University of Oldenburg, Germany (2009-2010), as a Humboldt Foundation award recipient.

Mézard was initially trained as a high-energy theorist but chose to complete his thesis work on the statistical physics of disordered systems, in close collaboration first with Miguel Virasoro and then with David Gross, both ENS visitors at the time, and remotely with Giorgio Parisi, then in Rome. These collaborations notably uncovered the ultrametric properties of the Sherrington-Kirkpatrick model, the fluctuations of the order parameter function, the one-step replica symmetry breaking solution of p -spin models, and the relationship between the random energy model and replica symmetry breaking. Mézard carried on to making key methodological advances in the field (he notably invented the cavity method with Parisi and Virasoro), as well as to apply spin glass ideas to a rich variety of problems, including optimization, neural networks, random heteropolymers, structural glasses and constrained satisfaction, as well as some side steps in finance (portfolio

optimization and book ordering dynamics) and economics (wealth distribution). He also actively worked on teaching and training scholars in the physics of spin glasses, leading various European collaborations on that theme and co-authoring *Spin Glass Theory and Beyond* (1987), *Information, Physics, and Computation* (2009), and *Spin Glass Theory and Far Beyond: Replica Symmetry Breaking After 40 Years* (2023).

Mézard is a member of the European Academy of Sciences (2012) and a Chevalier de la légion d'honneur (2013). He received the CNRS médaille de bronze (1985) and médaille d'argent (1990) as well as the Prix Suzanne et Anatole Abragam (1988), and the Grand Prix Ampère de l'Électricité de France (1996) of the French Academy of science for "déga-ger l'organisation des très nombreux états d'un système désordonné, et à élucider la si-gnification physique de la théorie approchée que Giorgio Parisi avait proposée pour ré-soudre un modèle de verre de spin". He further received the Onsager Prize of the Ameri-can Physical Society (2016) "for groundbreaking work applying spin glass ideas to ensem-bles of computational problems, yielding both new classes of efficient algorithms and new perspectives on phase transitions in their structure and complexity", and the Prix des Trois Physiciens (2021). He has given several prestigious lectures, including the Loeb Lectures at Harvard University (2014), the Boole-Shannon Lecture at MIT (2015), and the Bernoulli lecture at EPFL Lausanne (2018).