



# Summer School on Statistical Physics & Machine Learning

Session CXVI

August 3-28, 2020

**Organizers:** Gérard Ben Arous, Surya Ganguli, Florent Krzakala & Lenka Zdeborová

**Overview:** The school is aimed primarily at the growing audience of theoretical physicists, applied mathematicians and colleagues from other computational fields interested in machine learning, neural networks, and high-dimensional data analysis. We shall cover basics and frontiers of high-dimensional statistics, machine learning, theory of computing and statistical learning, and the relevant mathematics and probability theory. We will put a special focus in particular on methods of statistical physics and their results in the context of current questions and theories related to these problems. The school will also cover some examples of applications of machine learning methods in physics research, as well as other emerging applications of wide interest. Open questions and directions will be presented as well.

**Website:** [leshouches2020.krzakala.org](http://leshouches2020.krzakala.org)

## Lectures:

Boaz Barak (Harvard)	Computational hardness perspective
Giulio Biroli (ENS, Paris)	High-dimensional dynamics
Michael Jordan (UC Berkeley)	Optimization, diffusion & economics
Marc Mézard (ENS, Paris)	Message passing algorithms
Yann LeCun (Facebook AI, NYU)	Challenges and directions in machine learning
Remi Monasson (ENS, Paris)	Statistical physics or learning in neural networks
Andrea Montanari (Stanford)	High-dimensional statistics & neural networks
Maria Schuld (Univ. KwaZulu Natal & Xanadu)	Quantum machine learning
Haim Sompolinsky (Harvard & Hebrew Univ.)	Statistical mechanics of deep neural networks
Nathan Srebro (TTI-Chicago)	Optimization and implicit regularisation
Miles Stoudenmire (Flatiron, NYC)	Tensor network methods
Pierre Vandergheynst (EPFL, Lausanne)	Graph signal processing & neural networks

**Topical Seminars:** topical seminars will be given during the event including:

Christian Borgs (UC Berkeley), Jennifer Chayes (UC Berkeley), Shirley Ho (Flatiron NYC), Levent Sagun (Facebook), ...

**Registration:** The online application can be found on <https://houches.univ-grenoble-alpes.fr/>. Applications must reach the School before March 15, 2020 in order to be considered by the selection committee. The full cost per participant, including housing, meals and the book of lecture notes is given on the website. Further information can be found on the website. One can also contact the School at:

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**Location:** Les Houches is a village located in Chamonix valley, in the French Alps. Established in 1951, the Physics School is situated at 1150 m above sea level in natural surroundings, with breathtaking views on the Mont-Blanc mountain range, conducive to reflection and discussion.