

Monday  
June 17,  
2019

12:30 pm  
(CET)

The **Working Group on Risk - CREAR**, with the support of the IDS dpt, Institut des Actuaire, LabEx MME-DII, and the group BFA (SFdS), has the pleasure to invite you to the seminar by:

**Dr. Francis BACH**

INRIA

“On the global convergence of gradient descent for non convex machine learning problems”

*at ESSEC La Défense (CNIT) - Amphi 202, 12:30-1:30pm  
and ESSEC Asia Pacific - Level 3, classroom 7, 6:30-7:30pm*

Many tasks in machine learning and signal processing can be solved by minimizing a convex function of a measure. This includes sparse spikes deconvolution or training a neural network with a single hidden layer. For these problems, we study a simple minimization method: the unknown measure is discretized into a mixture of particles and a continuous-time gradient descent is performed on their weights and positions. This is an idealization of the usual way to train neural networks with a large hidden layer. We show that, when initialized correctly and in the many-particle limit, this gradient flow, although non-convex, converges to global minimizers. The proof involves Wasserstein gradient flows, a by-product of optimal transport theory. Numerical experiments show that this asymptotic behavior is already at play for a reasonable number of particles, even in high dimension. (Joint work with Lénaïc Chizat).

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# Dr. Francis BACH

## INRIA

**Francis Bach** is researcher at INRIA, leading since 2011 the Sierra project-team, which is part of the Computer Science Department at Ecole Normale Supérieure. He completed his Ph.D. in Computer Science at U.C. Berkeley, working with Professor Michael Jordan, and spent two years in the Mathematical Morphology group at Ecole des Mines de Paris, then he joined the Willow project-team at INRIA/Ecole Normale Supérieure from 2007 to 2010. Francis Bach is interested in statistical machine learning, and especially in graphical models, sparse methods, kernel-based learning, convex optimization, vision and signal processing. He obtained in 2009 a Starting Grant, then, in 2016, a Consolidator Grant from the European Research Council. Francis also received in 2012 the INRIA young researcher prize. In 2015, he was program co-chair of the International Conference in Machine learning (ICML).