# Séminaire de Probabilités et Statistiques

## Mardi 11 avril à 15h30
Laboratoire Dieudonné
Salle de Conférences

## Romain Couillet
(Centrale-Supélec)

### *A Random Matrix Framework for BigData Machine Learning*

The recent interest for automating classification, clustering, detection, estimation of the massively large and heterogeneous data made available by modern computer and communication technologies, and the fast deployment of deep learning approaches, has spurred a new need for mathematical tools to apprehend bigdata machine learning.

In this talk, I will argue that random matrix theory (RMT) is a key enabler to meet this challenge. After a brief introduction of the basic concepts, I will show how RMT helps understand and improve spectral clustering methods (community detection of graphs, kernel data clustering), semi-supervised learning, robust statistical approaches, and neural networks alike. Beyond the theoretical considerations, I shall exemply the actual machine learning performance gains achieved by the RMT framework through examples in image classification, graph labeling, portfolio optimization in statistical finance, angle-of-arrival estimation in array processing, etc.