

# Workshop on Learning and Inference from Structured Data: Universality, Correlations and Beyond



**3 - 7 July 2023**  
**An ICTP Meeting**  
**Trieste, Italy**

Further information:  
<http://indico.ictp.it/event/10184/>  
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This workshop will focus on the modelisation and statistical analysis of large structured data sets as appearing in modern signal processing and machine learning. Recurrent questions will be: what are “good” models of high-dimensional data which are realistic enough while remaining analytically tractable, and what are their universality properties?

## Description:

Many modern problems (e.g. compressed sensing, community detection, PCA and tensor decomposition) seek to infer some latent signal from high-dimensional noisy data. A theoretical analysis is often challenging due to the subtle correlations and structured dependencies among the observed features. Remarkably, many of these systems exhibit universal statistics i.e., similar properties as a surrogate random system. There has been substantial recent progress at the intersection of statistical physics, statistics, probability and machine learning in rigorously establishing these empirical observations, and these properties have been critically exploited for statistical learning.

This workshop will focus on these recent interdisciplinary investigations, with a view towards discovering new connections among the diverse approaches to these problems of common interest.

## Topics:

- High-dimensional statistics and inference
- Statistical learning
- Models of structured data
- Universality
- Statistical mechanics

## Directors:

**M. SÁENZ**, Universidad de La República Uruguay, Uruguay  
**S. SEN**, Harvard University, USA  
**P. SUR**, Harvard University, USA

## Local Organiser:

**J. BARBIER**, ICTP, Italy

## Speakers:

**S. ACEVEDO**, SISSA, Italy  
**F. CAMILLI**, ICTP, Italy  
**R. DUDEJA**, Harvard University, USA  
**Z. FAN**, Yale University, USA  
**F. GERACE**, SISSA, Italy  
**S. GOLDT**, SISSA, Italy  
**A. JAGANNATH**, Waterloo University, Canada  
**Y. KABASHIMA**, Tokyo University, Japan  
**J. KO**, ENS Lyon, France  
**B. LOUREIRO**, ENS Paris, France  
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**M. MARSILI**, ICTP, Italy  
**M. MONDELLI**, IST, Austria  
**R. NICKL**, Cambridge University, UK  
**M. OPPER**, Birmingham University, UK  
**P. SUR**, Harvard University, USA  
**T. TAKAHASHI**, Tokyo University, Japan  
**S. VILLAR**, Johns Hopkins University, USA

## How to apply:

Online application:  
<http://indico.ictp.it/event/10184/>

Female scientists are encouraged to apply.

## Grants:

A limited number of grants are available to support the attendance of selected participants, with priority given to participants from developing countries. There is no registration fee.

