

# Higher-order interactions in statistical physics and machine learning

*Tuesday 28 September 2021 15:00 (50 minutes)*

The problem of inferring pairwise and higher-order interactions in complex systems involving large numbers of interacting variables, from observational data, is fundamental to many fields. Known to the statistical physics community as the inverse problem, it has become accessible in recent years due to real and simulated big data being generated. In the first part of this talk, we discuss extracting interactions from data using a neural network approach, namely the Restricted Boltzmann Machine. In the second part, we discuss a model-independent and unbiased estimator of symmetric interactions for any system of binary and categorical variables, be it magnetic spins, nodes in a neural network, or gene networks in biology. The generality of this technique is demonstrated analytically and numerically in various examples.

**Presenter:** KHAMSEH, Ava (School of Informatics & Higgs Centre for Theoretical Physics, The University of Edinburgh)

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