

# From correlation to causality - machine-learning in physics and astronomy (keynote)

*Tuesday, 21 May 2019 13:10 (40 minutes)*

Machine-learning methods such as deep learning are frequently used in data-intensive particle physics and astronomy to extract scientific information from data. A number of illustrative examples will be shown, including the classification of event topologies in particle physics experiments, the morphological and spectral classification of astronomical objects, time-series analysis, or the automated detection of radio interference patterns in radio antenna arrays. Causal inferences require the knowledge of the uncertainties of the measurement which can be obtained by means of calibration or simulation, within the limitations provided by the stability and reproducibility of the output from neural networks. The next generation of experiments and observatories will rely on intelligent data pipelines using fast implementations of machine-learning methods to reduce the data volume to levels that can be stored in long-term archives, and yet to ease the exploration of the full discovery space of the data.

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