



## **Thematic Research Programme**

## Current Trends in Geometric Methods in Natural Sciences

2 September - 20 December 2019 ICMAT, Madrid www.icmat.es/RT/2019/CTIGMINS/

## Seminar CAUSALITY IN COUPLED DYNAMICS: ENTROPY AND GEOMETRY

SPEAKER: José María Amigó (CIO, Universidad de Elche, Spain)

DATE: Thursday, 21 November 2019 - 14:30

VENUE: Aula Gris 1, ICMAT

**ABSTRACT:** Cause-effect relationships are important when it comes to understand or control processes in nature and in the human society. Such an insight can in principle be inferred from an accurate mathematical description, if any. In reality, though, our knowledge of complex processes is imperfect, so causal relationships usually have to be gained via data analysis. Within this general framework, this talk will focus on the identification of directional couplings (or drive-response relationships) in the analysis of time series output by interacting nonlinear systems. Specifically, we will review methods based on state space reconstruction, as well as methods based on transfer entropy, permutation entropy and the algebraic structure of permutations via the so-called transcripts. We will speculate briefly on the relation of some results obtained with transcripts and the concept of information projection in Information Geometry.

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