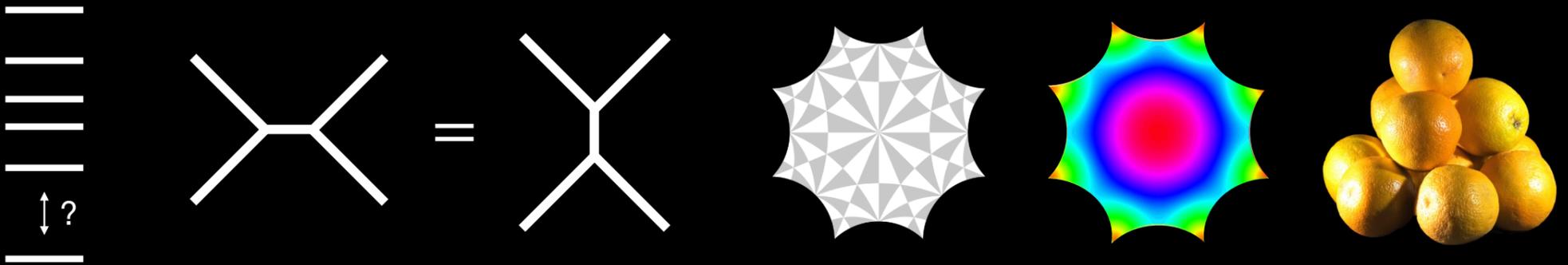# Institut de Physique Théorique
Theoretical physics courses

Bootstrap methods in mathematical physics

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On Fridays November 8, 15, 22, 29, 10:00 to 12:15, and Monday November 18, 14:15 to 16:30. In person at IPhT and live online.

In mathematics and physics, one often encounters objects characterized by an infinite set of data obeying an infinite set of identities and inequalities. This situation is paradigmatic in conformal field theory but arises also in the study of quantum and statistical lattice models, systems of ODEs, sphere packings, Laplacian spectra of manifolds and many other situations. A unifying theme is that whether or not a particular question admits an exact analytic answer, it can be successfully analyzed starting from the identities and inequalities. Inspired by the terminology from conformal field theory, one can refer to this set of ideas as bootstrap methods.

In this course, I will introduce the bootstrap methods in several contexts and use them to answer various questions of interest. The emphasis will be on exact results and on the connections between different fields. In particular, I will discuss

- Bootstrap in quantum mechanics.
- Spectral bounds on conformal field theories and hyperbolic manifolds.
- The solution of the sphere packing problem in dimensions 8 and 24 and its connection to conformal field theory.

To receive the latest news on this course and the video-conference links, please subscribe to its newsletter, as explained at the website `courses.ipht.fr`. An open, non-interactive livestream will also be available at `youtube.com/ipht-tv`.