

Mathematical Bootstrap: From Conformal Fields to L-Functions

mercredi 15 octobre 2025 10:00 (2 heures)

In this course, I will revisit the conformal bootstrap from a mathematical perspective and describe its recent applications in number theory and spectral geometry.

The conformal bootstrap is an algebraic formulation of conformal field theory, valid in general dimension. While its axioms define a precise mathematical structure, realizing the corresponding objects has posed a significant challenge.

The main idea presented in this course is that an almost identical structure has a natural realization in number theory, specifically in spectral theory of automorphic forms. The Hilbert space of conformal field theory becomes a direct sum of automorphic representations, and the structure constants of the operator algebra are related to L-functions.

This link allows us to import the bootstrap mindset and methods into mathematics, which has led to new progress on important open problems. I will describe two recent applications: bounds on spectral gaps of hyperbolic manifolds, and subconvex bounds on L-functions.

(Course given in English.)

References:

<https://arxiv.org/abs/2111.12716>

<https://arxiv.org/abs/2308.11174>

<https://arxiv.org/abs/2508.20576>

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