

Geometric applications of the conformal bootstrap

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I will explain how ideas familiar from the conformal bootstrap lead to new rigorous upper bounds on the spectral gap of the Laplacian on hyperbolic orbifolds. The bounds follow from a combination of representation theory and linear programming. In two dimensions, the bounds allow us to determine the set of spectral gaps attained by all hyperbolic orbifolds. I will also discuss the question of sharpness of linear programming bounds appearing in the conformal bootstrap. In some cases, sharpness can be proven rigorously. The method of proof is essentially identical to that used by Viazovska to solve the sphere packing problem in dimension 8. Remarkably, the method was developed by physicists independently of Viazovska almost simultaneously.

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