Department of Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

Discreteness and Integrality in Conformal Field Theory

(Zoom Seminar)

Eric Perlmutter

(Caltech, USA)

Date: October 5, 2020

Time: 10:00 am IST

Zoom link shall be shared separately

Various observables in compact CFTs are required to obey positivity, discreteness, and integrality. Positivity forms the crux of the conformal bootstrap, but understanding of the abstract implications of discreteness and integrality for the space of CFTs is lacking. We systematically study these constraints in 2D CFTs, and demonstrate their power to produce rigorous bootstrap-type bounds *without* the need for positivity. For curious reasons which we explain, CFTs with marginal operators admit special bounds. We also gain surprising insights into questions of spectral determinacy that go against conventional folklore about non-holomorphic CFTs: in particular, 1) we prove that in rational CFT, the spectrum of operator twists above c/12 is uniquely determined by its complement, and 2) we argue that in generic CFTs without fine-tuning, the spectrum of operator dimensions above (c-1)/12 is uniquely determined by its complement. Our conclusions follow from two new mathematical results: one on holomorphic vector-valued modular forms, and the other on non-holomorphic cusp forms. The obligation to discuss 3D gravity is fulfilled. Based on 2008.02190.

Infosys