Department of Theoretical Physics

Tata-Infosys Lecture Series

Causality Constraints in Quantum Field Theory

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Date: April 19th,21st & 26th 2017
Time: 11.30 am
Venue: A-304, TIFR
(Time for lecture on 26th might change)

Causality places nontrivial constraints on QFT in Lorentzian signature, for example fixing the signs of certain terms in the low energy Lagrangian. In conformal field theory, I will show how causality is encoded in crossing symmetry and reflection positivity of Euclidean correlators, and derive constraints on the interactions of low-lying operators directly from the conformal bootstrap. I will explain the connection between the causality constraints in the lightcone limit and the averaged null energy condition. In particular, causality implies that the averaged null energy must be positive in interacting quantum field theory in flat spacetime. I will also show that in four-dimensions, conformal field theories with large-N and a sparse spectrum exhibit universal, gravity-like behavior and consequently, the anomaly coefficients satisfy a=c