



Department of
Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

Polytopes and Scattering Amplitudes in Scalar Field Theory

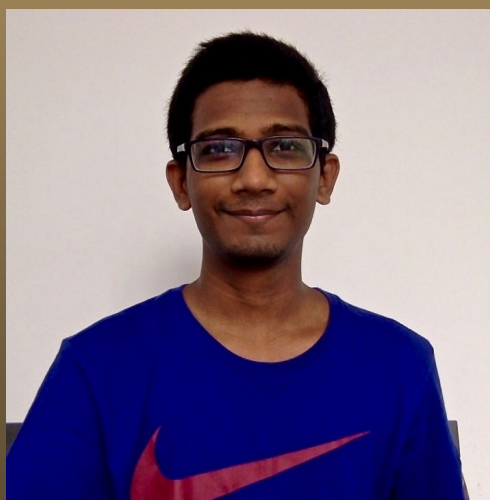
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(CMI)

Date: August 26, 2019

Time: 11.30 am

Venue: A-304, TIFR



Starting with the seminal work of Arkani-Hamed et al., there has been growing evidence of an intriguing relationship between the geometry of certain class of Polytopes and scattering amplitudes of massless scalar particles. This new perspective on scattering amplitude aims to reconfigure the fundamental postulates of S-matrix theory. A principle called Projectivity becomes primary and leads to unitarity and locality of the S matrix.

In this talk, I will review the key ideas of Arkani-Hamed et al. in the context of the tree-level S matrix of massless ϕ^3 theory. The polytope whose geometry contains information about the S matrix is known as Associahedron. Associahedron polytope is a member of an entire family of polytopes which are known as Accordiahedra and are objects of many recent studies in combinatorial mathematics. I will show how the geometry of each Accordiahedra is tied to tree-level S matrix of massless scalar field theory with polynomial interactions. This analysis relies on some recent developments in Mathematics of such polytopes that I will highlight.

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