ICTS String Seminar

Title : Scattering Amplitudes, Polytopes and CHY

Speaker : Mrunmay Jagadale, Chennai Mathematical Institute

Date : Thursday, January 23, 2020

Time : 4:00 PM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : 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. Unitarity and Locality emerge from geometric properties of the polytope, and the scattering amplitude is thought of as projective differential form on kinematic space.

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 Accordiahedra is tied to tree-level S matrix of massless scalar field theory with polynomial interactions. Using this geometric construction, I will describe our proposal for the world sheet forms for ϕ^{4} theory, which are forms of lower rank on the CHY moduli space.