ICTS String Seminar

Title : String Field Theory, Graph Homology and the Transition from Φ^3 to Gauge Theory Amplitudes

Speaker : Roji Pius (The Institute of Mathematical Sciences, Chennai)

Date : Monday, 22 September 2025

Time : 3:30 PM (IST)

Abstract : Feynman integrals are one of the most important tool in the perturbative study of quantum field theory. For scalar quantum field theories the Schiwnger representations have unveiled deep connections to various branches of mathematics namely algebraic geometry and number theory. Unfortunately, the tensor structures that apperar in the Feynman integrals makes such analysis unfeasable for gauge theories. Surprisingly, the remarkable work of Kreimer, Sars and van Suijlekom unravelled a curious relation between Φ^3 theory and quantum gauge theory. They obtained the renormalized integrand of a generic non-abelian gauge theory amplitude by transmuting the amplitude of a scalar field theory with only cubic interactions. They achieved this by the comparison of graph homology with BRST homology. This demonstrated that a covariant quantization of gauge fields is possible without the need of introducing ghost fields. However, thus far we lack a physics explanation of this miraculous phenomena.

In this talk, I will show that this connection naturally emerges from Witten's open string field theory in the field theory limit. Thus unveils the astounding interplay between the graph homology and string field theory.

Venue : Chern Lecture Hall
Zoom Link: https://icts-res-in.zoom.us/j/88092766911?pwd=R3ZrVk9yeW96ZmQ4ZG9KRzVhenRKZz09
Meeting ID: 880 9276 6911
Passcode: 232322