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ICTS Seminar

Title : Monomer-Dimer-Tensor-Network (MDTN) basis for lattice gauge theories

Speaker : Shailesh Chandrasekharan (Duke university, United States)

Date : Tuesday, 29 April 2025

Time : 3:30 PM (IST)

Abstract : Lattice gauge theories have traditionally been formulated in the position basis of the lattice link Hilbert space. In this talk, we argue that when reformulated in the dual basis of representations, the gauge constraints can be fully resolved, allowing one to work directly in the physical Hilbert space of gauge-invariant states. These states can be represented as a tensor network of monomers and dimers, which we refer to as the monomer-dimer-tensor-network (MDTN) basis.

While traditional Kogut-Susskind Hamiltonians suffer from sign problems in the MDTN basis, it is possible to construct alternative, non-traditional Hamiltonians that are free from such issues. We will present recent results demonstrating that these non-traditional Hamiltonians can reproduce several well-known results of traditional lattice gauge theories. In particular, we show that the universal behavior of finite-temperature confinement-deconfinement phase transitions can be fully captured. Additionally, we observe that quantum fluctuations contribute to a reduction in string tension.

These findings suggest that the MDTN approach may offer a viable alternative for studying the strong coupling dynamics of gauge theories.

Based on the preprint: arXiv:2502.14175

Venue : Emmy Noether Seminar Room

Zoom Link: <https://icts-res-in.zoom.us/j/88092766911?pwd=R3ZrVk9yeW96ZmQ4ZG9KRzVhenRKZz09>

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