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ICTS Geometry and Physical Mathematics Seminar

Title : New constraints on renormalization group flows

Speaker : Ken Kikuchi (ICTS-TIFR, Bengaluru)

Date : Thursday, 27 November 2025

Time : 4:00 PM (IST)

Abstract : Typical problems in quantum field theory are given in terms of renormalization group (RG) flows. Namely, problems are theories defined at short distances (or ultraviolet, UV), and answers are their behaviors at long distances (or infrared, IR). An example is the quantum chromodynamics. It is defined in UV as an $SU(3)$ gauge theory with matters. We have been trying to show its IR behaviors such as confinement or chiral symmetry breaking for decades. Traditionally, we used symmetries and ('t Hooft) anomalies to constrain IR behaviors. Recently, it was realized that the definition of symmetries can be generalized. The generalized symmetries are described by categories. In this viewpoint, 't Hooft anomalies are part of the data of symmetry categories. Often, generalized symmetries have additional structures such as braiding. Then, a natural question is this: Do the additional structures impose further constraints on RG flows? The answer is yes.

In this talk, I explain some new constraints imposed by braiding structures. They give mathematical explanation when and why which symmetries emerge in IR. They also constrain possible ground state degeneracies in gapped phases. Depending on time, I take examples from Ising models, non-unitary rational conformal field theories, or Wess-Zumino-Witten models.

Venue : Chern Lecture Hall

Zoom Link: <https://icts-res-in.zoom.us/j/96960474069?pwd=bP6jN4fkCDkVh6mkk28b3oMsaND7MC.1>

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