

1125-60-1955

**Riddhipratim Basu** and **Shirshendu Ganguly\*** (sganguly@berkeley.edu), 307 Evans Hall,  
UC Berkeley, Berkeley, CA 94720. *SO(N) Lattice Gauge Theory, under strong coupling.*

Lattice Gauge theories have been studied in the physics literature as discrete approximations to quantum Yang-Mills theory for a long time. Primary statistics of interest in these models are expectations of the so called “Wilson loop variables”. In his recent seminal work Chatterjee (2015) rigorously established a gauge-string duality, by solving, what is known as the “Makeenko-Migdal” equations in the physics literature. This allows one to write the Wilson loop expectations in Lattice Gauge theories in a certain limit, as a sum of certain weights over string trajectories.

In this talk we will discuss some recent results towards a better geometric understanding of the string trajectories using correspondence to combinatorial objects such as decorated trees and non-crossing partitions. Using connections with Free Probability theory, the planar case can be explicitly described. We will also mention some structural results in higher dimensional lattice gauge theory which falls outside the exactly solvable regime. All the necessary background will be reviewed. Several open questions will be presented as well.

The talk will be based on joint work with Riddhipratim Basu (Stanford). (Received September 19, 2016)