Stony Brook University
The Graduate School

Doctoral Defense Announcement

Abstract

Exact Results in Supersymmetric and Superconformal Quantum Field Theories

By

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In this dissertation we perform exact, non-perturbative computations in supersymmetric and superconformal quantum field theories.

In the first part, we show that the conformal bootstrap equations, which implement the requirement that in a conformal quantum field theory any four-point function should be crossing symmetric, have an exactly solvable truncation in theories with extended supersymmetry. As a result, we introduce a new 4d/2d correspondence that assigns to any four-dimensional $\mathcal{N}=2$ superconformal quantum field theory, Lagrangian or non-Lagrangian, a two-dimensional chiral algebra, and subsequently explore its structure in the context of theories of class $\mathcal{S}$.

In the second part, we extend the application of the so-called Higgs branch localization technique to evaluate exactly the path integral of Lagrangian supersymmetric quantum field theories, placed on compact three- and four-dimensional Euclidean manifolds.

Date: June 12, 2015
Time: 11:00 am
Place: MT 6-125

Program: Physics
Dissertation Advisor: Leonardo Rastelli