Contribution ID: **350** Type: **Talk**

What is QFT? Resurgent trans-series, Lefschetz thimbles, and new exact saddles

Friday, 17 July 2015 09:00 (45 minutes)

Resurgent trans-series provide a novel mathematical formalism to unify perturbative and non-perturbative physics, leading to new insights into the general structure of quantum theories. I will review the main ideas with some illustrative examples.
In many quantum mechanical systems, all orders non-perturbative data is encoded into perturbation theory, and it can be decoded. In QFTs, there are cases in which resurgence provides a new interpretation of IR-renormalon puzzle, reveals the existence of many new saddles (such as magnetic and neutral bions), and potentially provide a non-perturbative continuum definition of QFT in a semi-classical domain. I will also describe a new perspective on path integration, which is intimately tied with resurgence theory and employs some tools of Picard-Lefschetz theory. This perspective leads to many dramatic and surprising results, and implies that the proper framework to study semi-classics in path integral formulation is yet to be developed.

Primary author: Prof. UNSAL, Mithat (North Carolina State University)

Presenter: Prof. UNSAL, Mithat (North Carolina State University)

Session Classification: Plenary Session

Track Classification: Theoretical Developments