Séminaire commun

An introduction to resurgence in quantum theory

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Résumé

In quantum theory, we often calculate observables approximately by using perturbative series in a small parameter. These series are typically factorially divergent, so we need to make sense of them. The theory of resurgence gives a general framework to do this, and upgrades perturbative series to so- called trans-series, which include exponentially small corrections and make it possible to incorporate non-perturbative physics in a systematic way. Many non-perturbative techniques in quantum theory (like instanton calculus and renormalon physics) are in fact particular examples of this general framework. In these lectures I will give an introduction to resurgence with a focus on applications to quantum theory. After introducing some elementary resurgent technology, I will discuss resurgence in one-dimensional quantum mechanics, and then proceed to discuss what is known about the resurgent structure of quantum field theory.