Bologna Workshop on:
CFT AND INTEGRABLE MODELS
and their applications from gauge/gravity dualities to statistical mechanics and quantum information

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From exact WKB analysis to instanton counting at strong coupling

Thursday, 7 September 2023 15:20 (50 minutes)

In this talk I will discuss how the framework of exact WKB analysis underlies a definition of instanton partition functions beyond weak coupling regimes. In the context of four-dimensional theories with extended supersymmetry exact computations of partition functions are made possible by localization techniques. On the one hand localization hinges on the existence of a Lagrangian description,which is only accurate in weakly coupled regions of moduli space. On the other hand, there are also many examples of non-Lagrangian quantum field theories, which cannot be studied through localization. This raises the question of what replaces the definition of the partition function of a quantum field theory in the broader setting, and how such an object may be computed. I will discuss a geometric definition of instanton partition functions based on the study of isomonodromic deformations of quantum curves associated to certain quantum field theories. I will argue that this definition encompasses the standard one at weak coupling, but also extends to strong coupling, where it is amenable to direct computation.

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