

Workshop on Integrability



Contribution ID: 13

Type: 40 Min Talk

Integrability as a new method for exact results on quasinormal modes of black holes

Monday, 28 March 2022 17:00 (1 hour)

In this talk, I will show a new connection we found between quantum integrable models and black holes perturbation theory. After a brief introduction to quasinormal modes and their role in gravitational waves observations, I will connect their mathematically precise definition with the integrability structures derived from the differential equation associated to the black hole perturbation. More precisely, I will derive the full system of functional and non linear integral equations (Thermodynamic Bethe Ansatz) typical of quantum integrability and prove that the quasinormal modes verify different equivalent exact quantization conditions. As a consequence, it follows a new simple and effective method to numerically compute quasinormal modes, namely the Thermodynamic Bethe Ansatz, which I will compare with other methods. I will also give a mathematical explanation of the recently found connection between quasinormal modes and $N=2$ supersymmetric gauge theories, through the further connection we previously found of these to quantum integrable models. All this I will show for a generalization of extremal Reissner-Nordström (charged) black holes, but in the end I will explain how it should be possible to generalize it to many other black holes, branes, fuzzballs, etc. and thus provide a new effective tool for the study of quantum gravity and gravitational waves. (Based on: ArXiv:2112.11434)

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Track Classification: Participants Talks: Abstracts of Participants Talks