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Title: BPS black holes and number theory: exact results for statistical black hole entropy

Abstract: The pioneering work of Strominger and Vafa has shown that it is possible to write down the Bekenstein-Hawking area law as a statistical entropy for special classes of black holes, called BPS black holes, by identifying and counting black hole microstates in string theory. This enumeration program has revealed fascinating connections with number theory, and has recently led to exact expressions for the number of microstates carried by BPS black holes in certain classes of string theory models. Moreover, these number theoretic connections show that only a finite amount of microscopic data is required in order to reproduce the exact expression for the statistical microstate degeneracy of BPS black holes. This number should, in turn, also be computable in terms of a suitably defined partition function of quantum gravity in an AdS_2 background which, as predicted by the exact microscopic results, will consist of an infinite series starting with the Bekenstein-Hawking entropy.

In this talk, we give a short overview of the recent advances mentioned above.