# Heat Kernels and Quantum Gravity in 3-dimensional Anti de Sitter Space

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**Abstract**

Heat kernel methods are often used to regularize determinants appearing at one-loop in field theories. These type of computation are usually extremely difficult to perform in 4-dimensions and higher on curved background spacetimes of interest like black holes. Motivated by Witten's recent proposal for the partition function of the CFT, dual to "pure gravity" in AdS3, we will report on a work in progress on the gravitino heat kernel on a quotient of $AdS_3$. These results combined with the recently computed heat kernel in the graviton sector, enables one to write down the full one-loop partition function for the quantum supergravity on a quotient of the hyperbolic space $H^3$ through a direct bulk computation. The result should be compared with the partition function for the Brown-Henneaux boundary excitations.