Exact Path Integral Methods in Supersymmetric AdS2 ×S2 Backgrounds

Carmine Montella*[1], Matteo Zatti , and Alberto Castellano

[1]Max Planck Institute for Physics – Germany

Abstract

We determine the exact functional determinants of charged, massive spin-0 and spin-1/2 particles in AdS2 ×S2 backgrounds threaded by constant electric and magnetic fields. This is achieved using Schwinger proper-time formalism, which allows us to derive the full non-perturbative effective action in the 1-loop and constant background field approximations. We then specialize the computation to supersymmetric settings and we obtain the effective action for a 4d N= 2 BPS massive hypermultiplet in a supersymmetric AdS2 ×S2 space-time. This setup can be seen to be equivalent to the near-horizon geometry of a BPS black hole which solves the attractor equations of 4d N= 2 supergravity. Our results provide a necessary intermediate step for the evaluation of the quantum-corrected black hole partition function. We also comment on the relation with the celebrated Gopakumar-Vafa integral representation.

*Speaker