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Black Hole Entropy Sourced by String Winding Condensate

We calculate the entropy of an asymptotically Schwarzschild black hole (BH), using an effective field theory of winding modes in type II string theory. In Euclidean signature, the geometry of the BH contains a thermal cycle which shrinks towards the horizon. The light excitations thus include, in addition to the metric and the dilaton, also the winding modes around this cycle. The winding modes condense in the near-horizon region and source the geometry of the thermal cycle. Using the effective field theory action and standard thermodynamic relations, we show that the entropy, which is also sourced by the winding modes condensate, is exactly equal to the Bekenstein-Hawking entropy of the black hole. We then discuss some properties of the winding mode condensate and end with an application of our method to an asymptotically linear-dilaton black hole.

Type of contribution

Contributed Talk or Poster

Authors: Prof. BRUSTEIN, Ram (Ben-Gurion University of the Negev); M. ZIGDON, Yoav (Ben-Gurion University of the Negev)

Orateur: M. ZIGDON, Yoav (Ben-Gurion University of the Negev)

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