

Absorption of scalars by black holes in string theory

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ABSTRACT

We show that the low frequency absorption cross section of minimally coupled test massless scalar fields by extremal spherically symmetric black holes in d dimensions is equal to the horizon area, even in the presence of string-theoretical α' corrections. Classically one has the relation $\sigma = 4GS$ between that absorption cross section and the black hole entropy. By comparing in each case the values of the horizon area and Wald's entropy, we discuss the validity of such relation in the presence of higher derivative corrections for extremal black holes in many different contexts: in the presence of electric and magnetic charges; for nonsupersymmetric and supersymmetric black holes; in $d = 4$ and $d = 5$ dimensions. The examples we consider seem to indicate that this relation is not verified in the presence of α' corrections in general, although being valid in some specific cases (electrically charged maximally supersymmetric black holes in $d = 5$). We argue that the relation should be valid for the absorption cross section of scalar fields which are part of the model (and not "test"), at least in string theory.

References

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