

# RÉNYI AND ENTANGLEMENT ENTROPIES: SOME HOLOGRAPHICALLY CALCULABLE CONTRIBUTIONS

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Entanglement is one of the most peculiar features of quantum systems. In general, it is difficult to extract unambiguous, cut-off independent contributions to its associated entropy. However, in the very special case of conformally invariant fields and spherical entangling surfaces, a logarithmic (in the cutoff) term can be identified whose universal coefficient is dictated by type-A trace anomaly. In this contribution we present two alternative derivations of this remarkably entropy-anomaly connection. Both start with a conformal mapping to thermal entropy in a certain hyperbolic geometry. One derivation considers this geometry as the near-horizon region of an extremal black hole and the log-correction is computed, following Wald, as Noether charge at the horizon. The second approach, in turn, contemplates the hyperbolic geometry as the conformal boundary of a bulk hyperbolic background; the AdS/CFT dictionary trades the boundary thermal entropy for the functional determinant (one-loop effective action) of a dual bulk field. The log-term shows up now as consequence of the holographic (or volume) anomaly in the bulk. Finally, we show that the associated Rényi entropy can be accounted for by a suitable  $q$ -deformation of the previous calculations.