Contribution ID: **191** Type: **not specified**

Corrections to AdS_5 black hole thermodynamics from higher-derivative supergravity

Wednesday 11 January 2023 11:20 (30 minutes)

I will discuss the results that have recently appeared in 2208.01007 [hep-th], where we study four-derivative corrections to five-dimensional minimal gauged supergravity and evaluate the on-shell action of the AdS_5 black hole solution with two independent angular momenta and one electric charge at linear order in the corrections. After imposing supersymmetry, we are able to recast the action in terms of the supersymmetric chemical potentials and match the result obtained from the dual superconformal index on the second sheet. We then use the on-shell action to determine the corrections to the black hole thermodynamics, including those to the entropy and the charges. We then specialize to the supersymmetric and extremal case and find a simple expression for the microcanonical entropy. In particular, for the case with one independent angular momentum the corrections are entirely encoded in the dual superconformal anomaly coefficients. We corroborate our results for the black hole entropy constructing the corrected near-horizon solution and applying Wald's formula and also evaluating the Legendre transform of the supersymmetric on-shell action.

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Session Classification: 30' Contribution