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Black hole thermodynamics and boundary terms

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I discuss sensitivity of black hole thermodynamics to certain boundary terms in the gravitational action. In some cases, boundary terms can alter not only the black hole entropy but even its thermodynamic temperature. Remarkably, this behaviour is confirmed by both covariant phase space (Iyer-Wald) and Euclidean (Brown-York) methods. I demonstrate our results on the example of 4D scalar-tensor Einstein-Gauss-Bonnet gravity. I also discuss the implications of our findings for thermodynamics of regular black holes

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