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Soft hairy warped black hole entropy. (English) Zbl 1387.83047

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Summary: We reconsider warped black hole solutions in topologically massive gravity and find novel boundary conditions that allow for soft hairy excitations on the horizon. To compute the associated symmetry algebra we develop a general framework to compute asymptotic symmetries in any Chern-Simons-like theory of gravity. We use this to show that the near horizon symmetry algebra consists of two $u(1)$ current algebras and recover the surprisingly simple entropy formula $S = 2\pi(J_0^+ + J_0^-)$, where J_0^\pm are zero mode charges of the current algebras. This provides the first example of a locally non-maximally symmetric configuration exhibiting this entropy law and thus non-trivial evidence for its universality.

MSC:

[83C57](#) Black holes

[83D05](#) Relativistic gravitational theories other than Einstein's, including asymmetric field theories

[83C05](#) Einstein's equations (general structure, canonical formalism, Cauchy problems)

[94A17](#) Measures of information, entropy

[58J28](#) Eta-invariants, Chern-Simons invariants

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black holes; conformal and W symmetry; classical theories of gravity; Chern-Simons-like theory of gravity

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