

Black holes with Lambert W function horizons

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We consider Einstein gravity with a negative cosmological constant endowed with distinct matter sources. The different models analyzed here share the following two properties: (1) they admit static symmetric solutions with planar base manifold characterized by their mass and some additional Noetherian charges, and (2) the contribution of these latter in the metric has a slower falloff to zero than the mass term, and this slowness is of logarithmic order. Under these hypothesis, it is shown that, for suitable bounds between the mass and the additional Noetherian charges, the solutions can represent black holes with two horizons whose locations are given in term of the real branches of the Lambert W functions. We present various examples of such black hole solutions with electric, dyonic or axionic charges with AdS and Lifshitz asymptotics. As an illustrative example, we construct a purely AdS magnetic black hole in five dimensions with a matter source given by three different Maxwell invariants. © 2019, The Author(s).