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Thermodynamics of black holes featuring primary scalar hair

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In this work, we embark on the thermodynamic investigation concerning a family of primary charged black holes within the context of shift and parity symmetric Beyond Horndeski gravity. Employing the Euclidean approach, we derive the functional expression for the free energy and derive the first thermodynamic law, offering a methodology to address the challenge of extracting the thermal quantities in shift-symmetric scalar tensor theories characterized by linear time dependence in the scalar field. Following the formal analysis, we provide some illustrative examples focusing on the thermal evaporation of these fascinating objects.

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