GEOMETROTHERMODYNAMICS OF BLACK HOLES

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I present the fundamentals of geometrothermodynamics (GTD), a formalism that represents in an invariant way the thermodynamic laws and properties in terms of geometric concepts. The GTD of black holes is considered as a particular example and it is shown that a Legendre invariant metric, in which the mass, angular momentum and electric charge are considered as coordinates, can be used to describe the equilibrium space of black holes. As a consequence, black hole phase transitions can be described as curvature singularities of the equilibrium space. Moreover, GTD implies that black holes should be considered as quasi-homogeneous systems and, therefore, additional physical quantities like the cosmological constant should be considered as thermodynamic variables.