

General Relativity and Quantum Cosmology

Charged anti-de Sitter scalar-tensor black holes and their thermodynamic phase structure

Daniela D. Doneva, Stoytcho S. Yazadjiev, Kostas D. Kokkotas, Ivan Zh. Stefanov, Michail D. Todorov

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In the present paper we numerically construct new charged anti-de Sitter black holes coupled to nonlinear Born-Infeld electrodynamics within a certain class of scalar-tensor theories. The properties of the solutions are investigated both numerically and analytically. We also study the thermodynamics of the black holes in the canonical ensemble. For large values of the Born-Infeld parameter and for a certain interval of the charge values we find the existence of a first-order phase transition between small and very large black holes. An unexpected result is that for a certain small charge subinterval two phase transitions have been observed, one of zeroth and one of first order. It is important to note that such phase transitions are also observed for pure Einstein-Born-Infeld-AdS black holes.

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