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The calculation of the thermodynamic quantities of the Bardeen black hole

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We compute the series of thermodynamic quantities such as local temperature, heat capacity and free energy of Bardeen black hole to explore its thermodynamic properties that subject to the horizon and charge of this kind of black hole. For the sufficiently high temperature, the black hole with large horizon radius survives. Only tiny black holes and huge ones have positive heat capacity, which lead to stable black holes. We also discuss the thermodynamic characteristics associated with the charge to check the existence and stability of the Bardeen black hole. The black holes involving the large charge can remain stable; although their sizes are not extremely small or extremely large. The influence from the charge of Bardeen black hole on its critical temperature, heat capacity and free energy is obvious and distinct. There may be more black holes with magnetic charge than in the case of vanishing charge within a region of local temperature. If the local temperature becomes high enough, only large black holes will emerge, no matter whether they have magnetic charge or not. The black holes without magnetic charge cannot exist stably unless they are huge.

Biography

Hongbo Cheng has completed his PhD from East China University of Science and Technology. He is a Professor in the Department of Physics in East China University of Science and Technology. He has published more than 35 papers in reputed journals.

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