Contribution ID: **93** Type: **not specified**

Black Holes in Holography Thermodynamics

Tuesday, 14 November 2023 10:15 (15 minutes)

we study thermodynamics of charged and uncharged 4-Dimension Einstein–Gauss–Bonnet (4D-EGB) black holes. The context of this study is the Visser's holographic thermodynamics with a fixed anti-de Sitter radius and a variable Newton constant known as restricted phase space thermodynamics (RPST). Our setup is constructed by using the AdS/CFT correspondence and by introducing a conjugate quantity of the Gauss–Bonnet parameter. By this ansatz, we conclude that the Gauss–Bonnet action multiplied by a temperature, behaves as a free energy. We derive the conjugate quantities corresponding to the first law in the RPST formalism. The study of the T – S processes and the effect of the Gauss–Bonnet constant, α, show that thermodynamic properties of charged black holes depend on the Gauss–Bonnet term and the charge of black holes. For an uncharged black holes, the effect of Gauss–Bonnet becomes crucial, as it behaves as a charged black hole with an effective charge. Finally, we find that the Hawking-Page phase transition occurs between a large black hole and a thermal AdS space.

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Session Classification: Partner

Track Classification: Partner