Contribution ID: **18** Type: **not specified**

The effect of noncommutativity on the charged 4D-EGB black hole in AdS space–time

In this paper, we obtain a solution of a static spherically symmetric charged black hole inspired by noncommutative geometry in the context of the regularized 4D-Einstein–Gauss–Bonnet theory in AdS space. The derived metric recovers the standard solutions'limits. It tends to the commutative case solution found in [P. G. S. Fernandes, Phys. Lett. B 805, 135468 (2020)] at large distance $r+\theta \longrightarrow \infty$ and the general relativity solution with smeared mass and charge as $\alpha \longrightarrow 0$. The charged solution obtained is singular at the origin in contrast to its neutral version, which is regular. The thermodynamic quantities have been modified due to the influence of noncommutativity. The heat capacity was used to investigate the local thermal stability. The black hole has been discovered to be locally stable for small and large radii, but unstable for middle radii.

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Track Classification: Abstract reviews