

BLACK HOLE THERMODYNAMICS AND MODIFIED GUP CONSISTENT WITH DOUBLY SPECIAL RELATIVITY

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Received 5 November 2012

Accepted 7 November 2012

Published 30 November 2012

We study the black hole thermodynamics and obtain the correction terms for temperature, entropy, and heat capacity of the Schwarzschild black hole, resulting from the commutation relations in the framework of *Modified Generalized Uncertainty Principle* suggested by *Doubly Special Relativity*.

Keywords: Black hole thermodynamics; modified generalized uncertainty principle; doubly special relativity.

PACS No.: 04.70.Dy

1. Introduction

The first idea that gravity may affect the quantum uncertainty principle dates back to Mead.¹ This idea was based on the fact that in the strong gravity regime, Heisenberg uncertainty relation is no longer satisfactory. Since then, modified commutation relations between position and conjugate momentum commonly known as Generalized Uncertainty Principle (GUP) were introduced in the context of string theory and black hole physics with the prediction of a minimum measurable length.^{2–23} A large amount of interest has recently been focused on resolving the quantum corrections for Schwarzschild black hole thermodynamics, by GUP.^{24–28} Corrections to the thermodynamical properties of Reissner–Nordström black hole

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