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Generalized uncertainty principle effect in nuclear matter and slowly rotating neutron stars

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Recent observations of neutron stars indicate that there must be corrections to Einstein's theory of gravity. This research aims to study gravitational modifications in neutron stars. The GUP (Generalized Uncertainty Principle) effect is incorporated into the RG (Rainbow Gravity) metric in the slowly rotating case. GUP itself will affect the nuclear properties in neutron star matter, causes the modifications on neutron stars physical properties. According to these modified physical properties, such as the mass-radius profile, moment of inertia, and crust properties, neutron stars require a negative value for the GUP parameter β . This negative β preference also appears in the cases of white dwarf stars and black holes, although this means that the minimum position measurement uncertainty $\Delta x_{\min} = \sqrt{\beta}$, which should emerge as a consequence of the existence of a minimal length, does not appear in this range.

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