5.6 Experimental Predictions

The modified uncertainty principle provides several testable predictions:

1. <u>Deviation in High-Precision Measurements</u>: Experiments probing atomic or molecular energy levels could detect small deviations from standard quantum mechanical predictions due to the influence of ξ .[13]

2. <u>Quantum Tunneling</u>: The modified HUP may alter the probabilities of quantum tunneling events, especially in high-energy systems.

3. <u>Gravitational Quantum Effects</u>: Near strong gravitational fields (e.g., in neutron stars or black holes), the influence of ξ could lead to detectable deviations in quantum processes.[1], [4]