

## 5.2 Impact of the Dimension of Chance

The dimension of chance ( $\xi$ ) introduces a new degree of freedom into the  $7dU$  framework, adding a layer of geometric complexity to quantum mechanics. In this extended spacetime, the chance dimension modifies the commutation relations between conjugate operators. We propose the following generalized relation:[5]

$$[\hat{x}, \hat{p}] = i\hbar + g(\xi),$$

where:

- $g(\xi)$  is a function representing the contribution of the chance dimension ( $\xi$ ) to the uncertainty in quantum measurements.

This additional term introduces a dynamic uncertainty component influenced by the geometry of spacetime in the  $7dU$  model. The function  $g(\xi)$  could depend on physical factors such as the curvature of spacetime, energy scales, or interactions with the  $\xi$ -dimension.