

## Quantum Physics

# First considerations on the generalized uncertainty principle for finite-dimensional discrete phase spaces

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Generalized uncertainty principle and breakdown of the spacetime continuum certainly represent two important results derived of various approaches related to quantum gravity and black hole physics near the well-known Planck scale. The discreteness of space suggests, in particular, that all measurable lengths are quantized in units of a fundamental scale (in this case, the Planck length). Here, we propose a self-consistent theoretical framework for an important class of physical systems characterized by a finite space of states, and show that such a framework enlarges previous knowledge about generalized uncertainty principles, as topological effects in finite-dimensional discrete phase spaces come into play. Besides, we also investigate under what circumstances the generalized uncertainty principle (GUP) works out well and its inherent limitations.

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