

## **Critical Analysis of the Origins of Heisenberg's Uncertainty Principle**

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**Abstract:** Analysis of the initial stages of the logical process followed by Louis de Broglie in establishing the electron phase wave equation in his 1924 thesis, which triggered the development of Wave Mechanics when Erwin Schrödinger formalized this concept with his vectorial wave equation. This development was soon followed by Quantum Mechanics, when Schrödinger proved that the Matrix Mechanics independently developed by Werner Heisenberg was equivalent to Wave Mechanics; with both theories leaving room for some degree of uncertainty as to the physical localization of the moving electron. This is what led Heisenberg to also formalize the Uncertainty Principle to take this situation into account. This principle was soon regarded as a fundamental axiomatic principle that seemed to make further exploration of the subatomic level of magnitude appear impossible to most researchers. We will analyze in this article the reason why the phase-wave velocity established by de Broglie generated this uncertainty in the localization of the moving electron in light of the current state of knowledge on the behavior of the electron in motion, in view of establishing the relevance of maintaining the Uncertainty Principle in the study of the subatomic level of magnitude.

Analysis of the historical use of the wrong frequency that gave rise to the concept of a wave group to represent the electron's momentum energy as developed by Louis de Broglie, and to the Uncertainty principle developed by Werner Heisenberg.

**Keywords:** Phase wave velocity; Wave Mechanics; Matrix Mechanics; Quantum Mechanics; Uncertainty Principle.

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