Derivation of the Uncertainty Principle from the Fine Structure Constant: The Principle Holds at the Macroscopic Level, and Uncertainties Can be Taken as Finite Differences of Given Quantities

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Abstract. We present a straightforward derivation of Heisenberg's Uncertainty Principle starting from the established expression for the fine structure constant. Newfound link between these two universal expressions can enrich our physical interpretation of reality as subject to a quantum mechanical regime at all levels. Macroscopic manifestation of the Uncertainty Principle is therefore shown to arise in the form of a discrete character for any electrical current, for instance, driven by a flux of elementary charges. A new inequality governing the Uncertainty Principle for electricity at the macro-scale is hence proposed, and the results obtained are discussed. We furthermore demonstrate, in support of our undertaking, that, "given finite difference quantities" are identical to, and thus interchangeable with, "well-defined uncertainty quantities". Accordingly, possessed values acquired by finite difference quantities shall under no circumstances abolish related uncertainty characteristics. Our derivation of Heisenberg's Uncertainty Principle from Sommerfeld's original definition of the fine structure constant also evokes that, the former too can well be stated as a definition, or *vice versa*. From such a perspective, Uncertainty Principle can be considered as simply a capstone definition of the Planck constant – just like Pressure x Volume / Temperature happens to be the definition of the gas constant when written for gases. It is vital to recall that, Yarman et al, have well shown that the macroscopic behavior of a complex system such as a gas enclosed in a container, is still rooted to the Planck Constant. In this sense the present approach makes strictly no distinction between macro and micro worlds; indeed, nature does not seem to draw at all, any perceivable limits between the two worlds of concern.