Quantum Fluctuations Contribution to the Random Walk of a Single Molecule and New Estimate of the Planck Constant

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It is shown, by considering the case of the harmonic oscillator, that quantum fluctuations may be the most significant contribution to the random walk of a single molecule. From this point, the controversy on the existence of a standard quantum limit (SQL) is addressed and settled on the experimental ground. Comparisons to the experimental data yet avalaible in the literature provide a new estimate of the reduced Planck constant yielding \hbar = (1.1 \pm 0.2) ~ 10^{-34} J.s.

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