

Testing Decoherence in Interference Experiments with Macromolecules: the Theoretical Background

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The interference pattern which can be obtained by macromolecules impinging on a diffraction grating is examined in detail [1], referring in particular to the recently realized experiments with fullerene molecules [2, 3]. The loss of coherence is analyzed with reference to the two main sources of reduction of fringe visibility: beam preparation, including setup geometry and features of the thermal beam, and environmental disturbances, due to interaction with the surrounding medium [4, 5]. In the first case the analogy with optics is highlighted, in the second case the quantum master equation describing the interaction through collisions of a massive particle with the surrounding environment is considered. It is shown how it essentially depends on the dynamic structure factor of the surrounding environment, keeping the correct description of both energy and momentum transfer into account [6].

References

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