



Electron diffraction in Stochastic electrodynamics

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We measured diffraction of electrons from a grating of light [1] and realized Feynman's thought experiment by recording a movie of the build-up of the electron diffraction pattern one particle at a time for the double slit [2]. The idea that the electromagnetic vacuum field under the boundary conditions presented by a double slit could be responsible for electron diffraction is decades old. Recently [3], this idea has been studied in stochastic electrodynamics (SED) and may lead to a possible explanation for double slit diffraction in a deterministic way. Inspired by SED, we studied the harmonic oscillator [4] under pulsed excitation as a test of the theory [5]. Recently, we also studied the potential presence of interference of a double slit-like state in the harmonic oscillator and hope to extend this work to the double slit with the purpose of understanding whether or not a cornerstone of Quantum Mechanics; superposition-like behavior, is supported by SED.

[1] D. L. Freimund, K. Aflatooni, and H. Batelaan, *Nature* 413, 142-143 (2001)

[2] R. Bach, D. Pope, S. H. Liou, H. Batelaan, *New J. Phys.* 15 033018 (2013).

[3] Luis de la Pena, Ana, Maria Cetto, Andrea Valdes Hernandez, *The Emerging Quantum*, Springer 2015, p.323.

[4] Wayne Cheng-Wei Huang, H. Batelaan, *Journal of Computational Methods in Physics*, Volume 2013 (2013) Article ID 308538

[5] Wayne Cheng-Wei Huang, H. Batelaan, *Found. of Phys.* 45, 333 (2015)