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# A study of matter-wave diffraction for particle in the near field regime under the influence of a uniform electric field

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For various experiments to investigate quantum effects, matter-wave diffraction is an apparent example. Particle diffractions have been measured even at the large molecular level, such as the $C_{60}$ molecules. In order to describe the matter-wave diffraction of $C_{60}$ beam, we assume the initial wave functions behind a grating in form of the Fourier series with a Gaussian distribution function. By applying the Feymann path integral, the exact wave functions of the molecule diffraction in the near-field regime can be derived analytically. The obtained probability density distributions are corresponding to interference fringes as found in the Fresnel diffraction. The probability of finding $C_{60}$ molecules, behind the grating at the Talbot length, consistency with the mentioned experimental data of $C_{60}$ diffractions.

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