and Eqs. (32), where $v_z = h/\lambda m_{C_{60}} \approx 110$ m/s. Fig. 15 shows contour plot of the probability density distribution $p(x,z)$ projected on the plane (x,z). The quantum wave-nature of the fullerene molecular flow is drawn by color gray. The particle-nature presented by the Bohmian trajectories is shown in the upper part of the figure. Predominantly, they are drawn by color violet. Some trajectories colored in blue are drawn against this background. Due to such a color representation flows of fullerene molecules through the near-field region and further are easily visualized. Fullerene molecular flows are seen to have undulatory motions.

Obviously, there are no possibilities to observe real movements of fullerene molecules through the slit grating and further [24]. Any perturbation of the molecule destroys its movement and, consequently, it destroys the interference pattern. In best case we can observe the fullerene molecular flows at crossing some kind of detecting plates (fixed at $z_{\rm T}/2, z_{\rm T}, 3z_{\rm T}/2, \cdots$, for instance), as shown in Fig. 12(a).

VI. VARIATIONAL CALCULATIONS

What could force the particle to carry out such undulatory and zigzag behaviors, as shown in the figures above? Possible answer can be as follows: a set of ordered slits in the screen poses itself as a quantum object that provides a polarization of the vacuum in the near-field region. The polarization, in turn, induces formation of a virtual particle escort around of a flying real particle through. The escort "informs" the particle about the environment. Such an insight considering behavior of the particle with the point of view of Feynman path integrals, can be more productive, than fantastic ideas about splitting particles passing through the slit grating and their confluence as soon as the slits are left far behind.

We need in this connection to continue discussion of the problems, relating to the virtual and real trajectories. Let us consider a number of variational procedures applied to the complex-valued function $\psi(\vec{q},\vec{p};t)$, wave function. It permits to see which variational scheme ends up the classical equations of movement and what scheme leads to the quantum mechanical equations. The problem, in fact, is to retrace how the virtual trajectories relate to the real trajectories, Bohmian trajectories.

A. Classical domain

Let the complex-valued function be as follows

$$\psi = \sqrt{\rho}\cdot\exp\left\{\frac{\mathbf{i}}{\hbar}\int\limits_{t_0}^{t_1} L(\vec{q},\dot{\vec{q}};\tau)d\tau\right\} \qquad (34)$$

Let us demand that this function would retain a constant value along a path from the initial time $t = t_0$ to final $t = t_1$. In other words, variation of this function along this time interval has to vanish, i.e., $\delta\psi = 0$. Applying this variation to the expression (34), we disclose, that the complex-valued function ends by two equations, separately for real and imaginary parts. Each equation should vanish.

Real part of the above equation leads immediately to the continuity equation (4) for the probability density ρ. Imaginary part reduces to variation of the action S, see equation (1), along paths from the initial time t_0 to the final time t_1. After a series of mathematical transformations [1] we disclose, that the particle moves along an optimal path that is described by the Hamilton-Jacobi equation (2).

We observe in the classical case, that the particles move along the classical trajectories submitting to the principle of least action. By moving along the optimal paths, ensemble of the particles resembles a "cloud" having a density distribution ρ. Evolution of the cloud obeys the continuity equation for the density distribution.

B. Quantum domain

In contrast to the previous searching of a single trajectory connecting the initial and final points, here all trajectories connecting these points are to be considered. They pass through all intermediate points belonging to a conditional set