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Foundations of Quantum Mechanics

In-class problems for the exercise class

Problem 8: Bohmian trajectories for plane waves

Let ψ_t be a plane wave solution of the Schrödinger equation with wave vector $\boldsymbol{k}$. Show that for every constant vector $\boldsymbol{a} \in \mathbb{R}^3$,

$$\boldsymbol{Q}(t) = \boldsymbol{a} + \frac{\hbar \boldsymbol{k}}{m} t \tag{1}$$

is a Bohmian trajectory with initial position $\boldsymbol{Q}(0) = \boldsymbol{a}$.

Problem 9: Bohmian trajectories for the double-slit

(a) Why do the Bohmian trajectories in Figure 1 not intersect? Give a mathematical reason.
(b) Why do they not cross the middle axis?

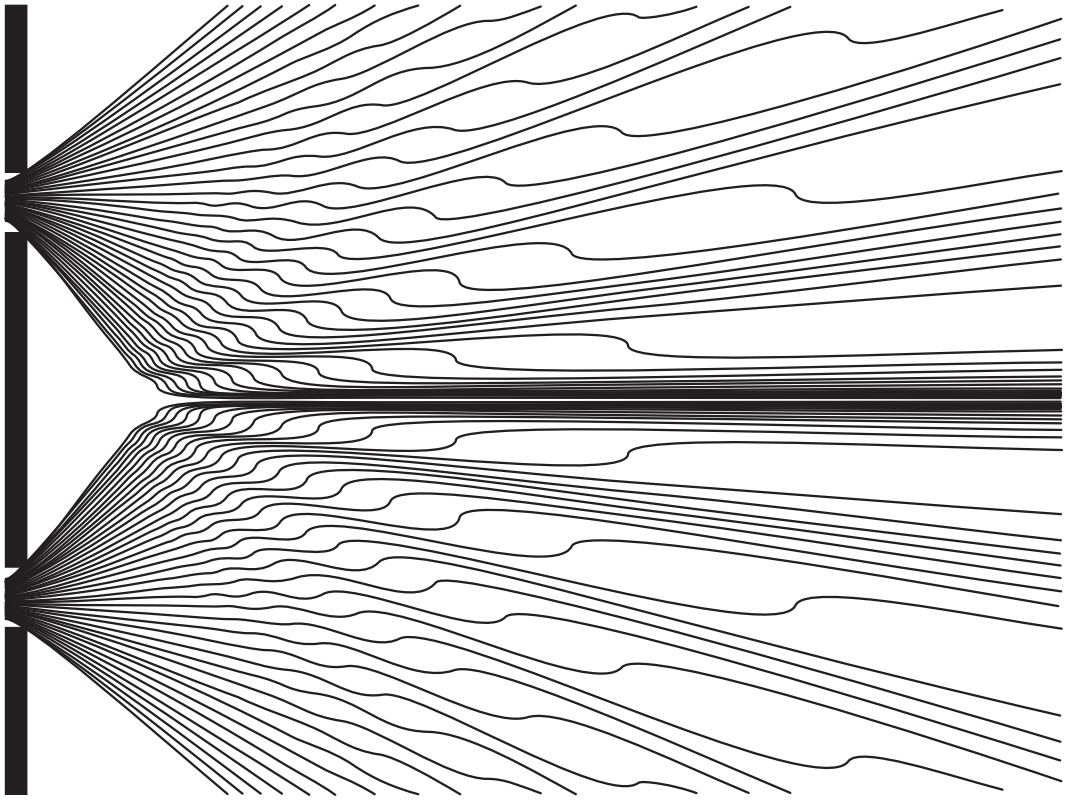

Abbildung 1: Bohmian trajectories for the double-slit experiment