

The Aharonov–Bohm Effect

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This thesis focuses on the Aharonov-Bohm effect. In 1959, Aharonov and Bohm showed that the vector potential $\vec{A}$ can affect the quantum behavior of a particle even in regions where the magnetic field $\vec{B}$ is zero. This result indicates that potentials have a fundamental significance at the quantum level.

The thesis considers the motion of a charged particle around an infinite solenoid and analyzes the phase shift of the wave function. The main goal of this work is the mathematical analysis of adiabatic evolution and demonstrating its connection to the Aharonov-Bohm effect. This phenomenon is directly based on the geometric phase (Berry's phase), which emerges precisely during adiabatic processes.