

A Derivation of the Schrödinger Equation from the Model of Spiral-Vortical Threads of Electromagnetic Field Force Lines

Evgeny Shulzinger, PhD in Physics, Jelgava, Latvia

Abstract

This article presents a classical derivation of the Schrödinger equation based on the resonance dynamics of spiral-vortical threads, interpreted as structured force lines of the electromagnetic field. These threads represent coherent energy flows capable of forming stable spatial nodes through interaction. It is shown that the behavior of these threads in a potential landscape leads naturally to a wave equation identical in form to Schrödinger's, without invoking quantum postulates.

1. Introduction

The Schrödinger equation is traditionally viewed as a foundational postulate of quantum mechanics, describing the evolution of a particle's wave function. However, this work proposes a classical route to the equation by modeling particles as stable energetic nodes arising from the resonance of spiral electromagnetic threads. Building upon our previous paper — *Shulzinger E. "A Classical Derivation of Planck's Formula from Electromagnetic Mode Merging Statistics"* — we show that quantum-like behavior can emerge from ordered field dynamics rather than imposed quantization.

2. Structure of Electromagnetic Threads

The electromagnetic field is modeled as a network of spiral-vortical energy threads — force lines structured as helical flows. These threads oscillate with a defined rhythm and orientation. Their spatial length is inversely related to frequency, and their helical geometry promotes resonance stability. Through interaction, these threads form concentrated energy nodes capable of responding to external field variations, acting as localized carriers of wave-like behavior.

3. Resonant Behavior and the Wave Function

Each node formed by interacting threads exhibits oscillatory behavior, described by a complex amplitude dependent on position and time. In the presence of an external potential, the configuration and energy of these threads shift. The change in amplitude reflects both spatial deformation and temporal evolution, governed by gradients in energy density and rhythm phase. This leads to a differential equation that connects the node's energy, its spatial curvature, and temporal evolution — structurally matching the form of Schrödinger's wave equation.

4. Derivation of the Wave Equation

When modeling an energetic thread in a potential environment, its state is represented by a wave-like function whose evolution is determined by two key properties:

- How the amplitude bends or concentrates in space (analogous to curvature or gradient).
- How rapidly the internal phase rotates over time (reflecting frequency and energy content).

Linking these aspects produces a linear equation where the rate of change over time is proportional to the thread's spatial curvature and the potential energy at each point. The resulting form corresponds exactly to the Schrödinger equation:

Rate of temporal evolution = spatial curvature + potential energy contribution

Thus, Schrödinger's equation arises as a natural expression of the internal dynamics of structured field threads — describing the flow and deformation of energy nodes across space and time.

5. Classical Interpretation

In this model, energy quantization is not imposed — it emerges from the structured resonance of electromagnetic threads. A particle is seen not as a point, but as a stable energy node formed by synchronized field flows. The wave function is the amplitude of the thread's deformation in response to potential gradients. Schrödinger's equation then becomes a tool for describing the resonant motion of classical field structures rather than an axiom of quantum theory.

6. Conclusion

Spiral-vortical electromagnetic threads offer a classical basis for deriving the Schrödinger equation. These structured force lines encode resonance, geometry, and energy distribution, forming stable nodes that behave like quantum particles. This approach integrates field theory, thermodynamics, and resonance into a unified vision — suggesting that quantum behavior may emerge from the organized dynamics of classical field flows.
