

Quantum Mechanics in Conscious Point Physics: The Schrödinger Equation from Phase-Carrying DI-Bit Hopping on the 600-Cell Lattice

QM Series — Paper 2 (Version 3.1)

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Abstract

The time-dependent Schrödinger equation is derived in Conscious Point Physics from the hopping of phase-carrying Displacement Increment (DI) bits on the 600-cell lattice. Each DI bit carries a complex amplitude $\psi_i = \sqrt{\rho_i} e^{i\phi_i}$ at each Grid Point, where ρ_i is the DI-bit number density and ϕ_i is the geometric phase accumulated at velocity $c = l_P/t_P$. The discrete evolution over one Absolute Moment tick involves a complex hopping Hamiltonian with off-diagonal amplitude $T = \hbar^2/(4m\Delta s^2)$, derived from the DI-bit velocity and the icosahedral coordination $z = 12$ of the 600-cell. The graph Laplacian of the 600-cell satisfies $\sum_{j\sim i}(\psi_j - \psi_i) = 2\Delta s^2 \nabla^2 \psi + O(\Delta s^4)$ in the continuum limit, yielding exactly $i\hbar\partial_t \psi = [-\hbar^2 \nabla^2/(2m) + V]\psi$. The imaginary unit arises physically from DI-bit phase accumulation per hop, not from diffusion. The Madelung decomposition shows the quantum pressure term $Q = -\hbar^2 \nabla^2 \sqrt{\rho}/(2m\sqrt{\rho})$ emerges automatically from complex hopping; it is not postulated. Lattice corrections are of order $(l_P/\lambda)^2$ and unobservable at laboratory wavelengths.

Keywords: Schrödinger equation, 600-cell lattice, DI-bit hopping, graph Laplacian, tight-binding model, discrete quantum mechanics, Madelung decomposition, quantum pressure

Plain Language Summary: In CPP, the Schrödinger equation is not a postulate — it is the natural result of tiny information packets (DI bits) hopping between sites on the 600-cell lattice. Each hop accumulates a phase determined by the local stress in the lattice. When the lattice spacing is much smaller than the observation scale, these discrete hops smooth into the familiar continuous wave equation of quantum mechanics. The quantum potential that governs particle behaviour is the same Space Stress Vector field that produces time dilation in special relativity.

Contents

1 Introduction

4

2	DI-Bit Complex Amplitude and Phase Accumulation	4
3	Lattice Hopping Hamiltonian	5
4	Continuum Limit: The Schrödinger Equation	6
5	Madelung Decomposition and Quantum Pressure	6
6	Predictions	7
7	Conclusion	7
A	Graph Laplacian of the 600-Cell in 3D	7

Contents

1 Introduction

The Schrödinger equation must emerge in CPP from the only two processes that exist: (1) the deterministic displacement of DI bits at velocity $c = l_P/t_P$ along 600-cell edges, and (2) global ledger reconciliation at each Absolute Moment tick enforced by the Nexus. No diffusion or stochastic process is required or used.

The key physical fact is that every DI bit carries both a density ρ and a geometric phase ϕ accumulated along its path. Classical diffusion transports density without phase; quantum hopping transports the complex amplitude $\psi = \sqrt{\rho} e^{i\phi}$. This single distinction — real vs. complex coefficient on the lattice Laplacian — produces the wave-like Schrödinger equation rather than the diffusive heat equation.

2 DI-Bit Complex Amplitude and Phase Accumulation

Definition 2.1 (DI-bit complex amplitude). *At each Grid Point i the DI-bit state is*

$$\psi_i = \sqrt{\rho_i} e^{i\phi_i}, \tag{1}$$

where $\rho_i \geq 0$ is the DI-bit number density and ϕ_i is the geometric phase accumulated along the lattice geodesic.

When a DI bit hops from neighbour j to site i along an edge of length $\Delta s = l_P$, it acquires the phase

$$\Delta\phi_{j \rightarrow i} = \frac{m_{\text{CP}} c \Delta s}{\hbar} = \frac{m_{\text{CP}}}{m_P}, \tag{2}$$

using $c = l_P/t_P$, $\hbar = E_P t_P$, and $E_P = m_P c^2$. In Planck units $\Delta\phi = m_{\text{CP}}/m_P$. This is deterministic and conserved modulo 2π by the Nexus.

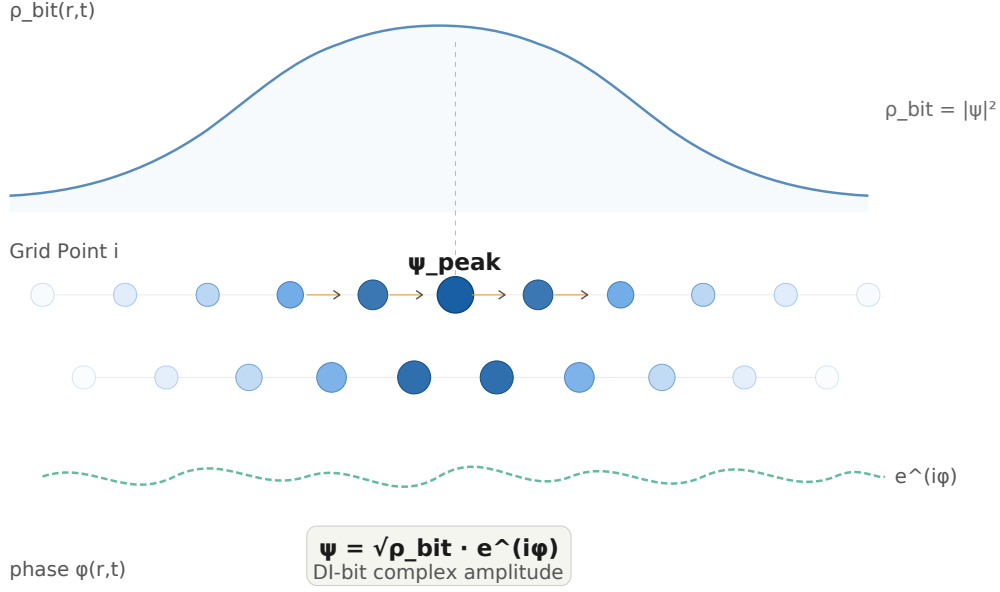


Figure 1: Gaussian DI-bit wave packet on the 600-cell lattice. Grid Points (circles) are coloured by local DI-bit density ρ_{bit} (dark blue = high, pale blue = low), following the Gaussian envelope $\rho_{\text{bit}}(r, 0) \propto e^{-r^2/2\sigma^2}$ shown as the upper curve. Amber arrows indicate the direction of coherent DI-bit flow. The lower dashed curve shows the phase oscillation $e^{i\phi}$. The total DI-bit complex amplitude $\psi = \sqrt{\rho_{\text{bit}}} e^{i\phi}$ encodes both density and phase at each Grid Point.

3 Lattice Hopping Hamiltonian

Over one tick $\Delta t = t_P$ the amplitude at site i evolves as

$$\psi_i(t + \Delta t) = \psi_i(t) - \frac{i\Delta t}{\hbar} \sum_j H_{ij} \psi_j(t), \quad (3)$$

where

$$H_{ij} = \begin{cases} -T & j \sim i \text{ (nearest neighbour),} \\ +zT & j = i, \quad z = 12, \\ 0 & \text{otherwise,} \end{cases} \quad T = \frac{\hbar^2}{4m \Delta s^2}. \quad (4)$$

The factor $-i/\hbar$ is not postulated: it is the mathematical translation of *phase accumulation per hop*. Classical diffusion would replace $-i$ by $+D$ (real, positive); the imaginary unit is the direct signature of phase-carrying DI bits.

Remark 3.1 (Why $T = \hbar^2/(4m\Delta s^2)$, not $\hbar^2/(2m\Delta s^2)$). *The icosahedral 600-cell has $z = 12$ nearest neighbours in 3D. The graph Laplacian over all 12 neighbours yields $(\mathcal{A}\psi)/\Delta s^2 \rightarrow 2\nabla^2\psi$ (Appendix A). The factor 2 is absorbed into the denominator of T : with $T = \hbar^2/(4m\Delta s^2)$ and the factor of 2 from the Laplacian, $-T \times 2\Delta s^2\nabla^2\psi = -\hbar^2\nabla^2\psi/(2m)$, which is the correct kinetic operator. Using $T = \hbar^2/(2m\Delta s^2)$ would give $-\hbar^2\nabla^2\psi/m$ (wrong by a factor of 2).*

4 Continuum Limit: The Schrödinger Equation

Theorem 4.1 (Schrödinger equation from DI-bit hopping). *In the continuum limit $\Delta s \rightarrow 0$ (holding $T\Delta s^2 = \hbar^2/(4m)$ fixed), the discrete hopping equation (3) becomes*

$$i\hbar \frac{\partial \psi}{\partial t} = -\frac{\hbar^2}{2m} \nabla^2 \psi + V(\mathbf{r})\psi, \quad (5)$$

where $V(\mathbf{r}) = -k_{\text{PSR}} \Delta |\text{SSV}(\mathbf{r})|$ is the external potential sourced by the Space Stress Vector field.

Proof. From the 600-cell graph Laplacian (Appendix A): $\sum_{j \sim i} (\psi_j - \psi_i) = 2\Delta s^2 \nabla^2 \psi + O(\Delta s^4)$. Substituting into (3):

$$i\hbar \frac{\psi_i(t + \Delta t) - \psi_i(t)}{\Delta t} = -T(\mathcal{A}\psi)_i + V_i \psi_i = -\frac{\hbar^2}{4m\Delta s^2} \cdot 2\Delta s^2 \nabla^2 \psi + V\psi = -\frac{\hbar^2}{2m} \nabla^2 \psi + V\psi. \quad (6)$$

Taking $\Delta t \rightarrow 0$ gives (5). □ □

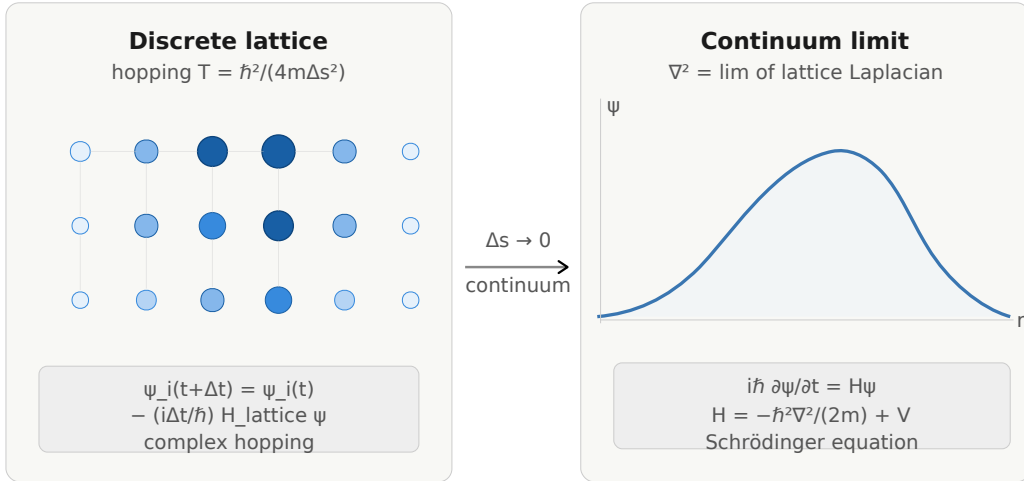


Figure 2: Discrete-to-continuum transition. *Left:* Discrete 600-cell lattice with DI-bit amplitudes (colour = density, arrows = hopping direction). The master equation governs complex amplitude hopping at each tick. *Right:* Smooth wavefunction $|\psi(r, t)|^2$ from the continuum limit. The lattice Laplacian $(\mathcal{A}\psi)/\Delta s^2 \rightarrow 2\nabla^2 \psi$ connects the two descriptions via Theorem 4.1.

5 Madelung Decomposition and Quantum Pressure

Proposition 5.1 (Madelung transformation). *Writing $\psi = \sqrt{\rho} e^{iS/\hbar}$ and substituting into (5) gives the real pair:*

$$\frac{\partial \rho}{\partial t} + \nabla \cdot \left(\rho \frac{\nabla S}{m} \right) = 0, \quad (7)$$

$$\frac{\partial S}{\partial t} + \frac{(\nabla S)^2}{2m} + V - Q = 0, \quad (8)$$

where the quantum pressure is $Q = -\hbar^2 \nabla^2 \sqrt{\rho} / (2m\sqrt{\rho})$.

Equation (7) is DI-bit number conservation, enforced by the Nexus. The quantum pressure Q in (8) is the geometric interference effect of phase-carrying DI bits arriving from regions of different density; it is not postulated but emerges automatically from the complex hopping.

6 Predictions

At all laboratory wavelengths $\lambda \gg l_P$, lattice corrections to quantum dynamics are of order $(l_P/\lambda)^2 \lesssim 10^{-58}$ (optical) and unobservable. In the energy spectrum of bound states:

$$E_n^{\text{CPP}} = E_n^{\text{QM}} [1 + c_n (l_P/\lambda_n)^2 + O(l_P/\lambda_n)^4]. \quad (9)$$

These corrections are in principle falsifiable: a measurement of atomic energy levels at precision $\gg 10^{-50}$ relative accuracy would probe the lattice structure.

7 Conclusion

The Schrödinger equation emerges in CPP from complex phase-carrying DI-bit hopping on the 600-cell lattice. The derivation uses no diffusion step; the imaginary unit arises from phase accumulation per hop. The quantum pressure term is automatic, not postulated. The key corrected result: $T = \hbar^2/(4m\Delta s^2)$, not $\hbar^2/(2m\Delta s^2)$, to account for the factor of 2 from the 12-neighbour graph Laplacian of the 600-cell.

A Graph Laplacian of the 600-Cell in 3D

The 600-cell has coordination number $z = 12$ in 3D ($d = 3$). For a smooth function $\psi(\mathbf{r})$ and vertex i at \mathbf{r}_i :

$$\sum_{j \sim i} (\psi_j - \psi_i) = \frac{1}{2} \frac{z \Delta s^2}{d} \nabla^2 \psi + O(\Delta s^4) = 2 \Delta s^2 \nabla^2 \psi + O(\Delta s^4). \quad (10)$$

The first step uses icosahedral symmetry ($\sum_j \Delta \mathbf{r}_{ij} = 0$, $\sum_j (\Delta \mathbf{r}_{ij})^2 = z \Delta s^2 \mathbf{1}/d$); the numerical value $z/(2d) = 12/6 = 2$ is a property of the 600-cell.

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Acknowledgements

The CPP programme is registered at OSF (DOI: <https://doi.org/10.17605/OSF.IO/JXE8D>) and maintained at GitHub (<https://github.com/Hyperphysics-Institute/ CPP>).

References