

# Supplementary: Schrödinger Equation

December 7, 2025

## 0.1 Schrödinger Equation from Embedding Evolution

The time evolution of the wave function follows from the evolution of the embedding in the normal direction. The extrinsic curvature in the first normal direction satisfies:

$$\frac{\partial K^{(1)}}{\partial t} = (\text{evolution determined by embedding equations}).$$

For the normal direction amplitude  $\psi = \langle X, n^{(1)} \rangle$ , this evolution equation becomes:

$$i\hbar \frac{\partial \psi}{\partial t} = \hat{H} \psi,$$

where  $\hat{H}$  is the Hamiltonian operator emerging from the extrinsic curvature. The Schrödinger equation is derived from geometric evolution rather than postulated.

The appearance of  $i$  (imaginary unit) reflects rotation in normal space under time evolution. The Hamiltonian  $\hat{H}$  relates to energy through extrinsic curvature energy density, connecting quantum dynamics to geometric structure.