General Physics Notes (10272026):

We have to cover the Wentzel-Kramers-Brillouin (WKB) approximation in quantum mechanics. The ideas we are so familiar with are the tunneling of a particle through a barrier. There are also classically forbidden zones, allowed regions, and connection areas. Usually, we use continuity conditions with integration and derivatives to find continuity - which is an interesting application of dimension.

$$\frac{1}{\Gamma_p}\left(\frac{1}{\hbar}\int_a^x \partial x' p - \frac{\phi}{2}\right) \tag{1}$$

This is the wavefunction with its momentum Γ_p and its position, momentum, and phase information. Of course we have to start thinking of new Hilbert space filling curves.

$$\Phi_{r.f.} = \left(e^{\pm\frac{1}{\hbar}\int \partial x' p}\right)\frac{1}{2|p|^{\frac{1}{2}}} \tag{2}$$

This is the reflection phase of the wave off the barrier. Impenetrable barriers have a π phase and smooth barriers have a $\frac{\pi}{2}$ phase. We'll have to start utilizing the four vector in place of the traditional x and the four momentum as well.

$$s_{i,j,k,t} = x^2 + y^2 + z^2 - c^2t^2 \tag{3}$$

$$P_{i,j,k,t} = p_x^2 + p_y^2 + p_z^2 + m^2c^2 \tag{4}$$

We'll still have our zeta relations.

$$f(x) = \int \frac{\partial f(x)}{\partial x}\partial x \cdot \zeta(s,t) \tag{5}$$

This can be rewritten:

$$f(\lambda) = \int \frac{\partial f(\lambda)}{\partial x}\partial x \cdot \zeta(x^2 + y^2 + z^2 - c^2t^2) \tag{6}$$

We can alternatively write:

$$f(s) = \int \frac{\partial f(s)}{\partial s}\partial x \cdot \zeta(s) \tag{7}$$

The self similarity is in the zeta's Γ function:

$$\zeta(s) = 2^s\pi^{s-1}\sin\frac{\pi s}{2}\Gamma(1-s)\zeta(1-s) \tag{8}$$

The trick is in the turbulent dynamics and mathematics related to the primes and the dimensions of Γ:

$$\Gamma(s)\Gamma(1-s) = \frac{\pi}{\sin(\pi s)} \tag{9}$$

We have to recover the primes as they indicate chaotic basis states:

$$\zeta(s) = \prod_{p=prime} \frac{1}{1-p^{-s}} \tag{10}$$

Now we can recover complete expressions in WKB.

$$\frac{1}{\sqrt{p}} \cos\left(\frac{1}{\hbar}\int_b^x \partial x' p - \phi_b\right) = \Phi_+ \tag{11}$$

This is the expression of the decrease in the region. It matches the traveling wave outside the barrier. Basically, all barrier waves have this form. It neglects the zeta terms and the Hilbert space filling wave approximation.

$$\frac{1}{\sqrt{P_4}} \cos\left(\frac{1}{\hbar}\int_b^x \partial s \cdot (\zeta(s,t))' P_4 - \phi_b\right) = \Phi_+ \tag{12}$$

This is a better correction with the four vector and the expression from zeta calculus we found earlier.