The Theory of Isomorphic Physics
Part 2: Primitive Wavefunctions

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Primitive Wavefunctions

This theory argues that the wavefunctions are the most fundamenatal constituents of the universe. However, it does not use any standard definition of the wavefunction. Instead it uses primitive wavefunctions (indicated with a prime), and eigen-primitives (indicated wtih an underline and a prime). These are meant to be even more fundamental building blocks than particles as we can multiply and divide these together to form "natural wavefunctions", a subset of which, in theory, map to all particles.

The Inputs as a Set

In this theory, functions are defined over the set $|P_\mu^\flat|$, which governs the position of a particle or system in flat spacetime. The set is expressed as:

$$|X_\mu^\flat| = \left\{ |P_\mu^\flat| \left(|x_\mu^\flat| - \tau \right) \mid x_\mu^\flat \in [x_{\mu,min}^\flat, x_{\mu,max}^\flat] \right\}$$

In this formulation:

- τ is a **discrete-valued** parameter that is subtracted from each element of $x_\mu^\flat$. When τ is positive, it shifts the particle's location by increasing the magnitude of the negative elements and decreasing the magnitude of the positive elements in the set. This effectively repositions the **zero-point** of the position eigenfunction, representing the particle's location in flat spacetime.

- The particle's position is represented as the zero-point of the position eigenfunction, which permeates the universe as a field. The shift introduced by τ adjusts the location of this zero-point, shifting both the positive and negative elements of $x_\mu^\flat$, thus moving the particle's location in the universe.

- The probability of collapsing to a particular value τ is determined by the wavefunction evaluated at a given $x_\mu^\flat$, with the probability distribution derived from the modulus squared of the wavefunction.

Mapping to Physical Quantities

Each $x^\flat_\mu$ (five space) and $|P^\flat_\mu|$ (five-momentum) maps to specific physical quantities, all defined in flat spacetime. These terms will later contrast with the general curved spacetime formulation.

In the Flat Spacetime Context:

- $x^\flat_0$ corresponds to $|t^\flat|$, the magnitude of time in flat spacetime, when no external forces or interactions are present.
- $x^\flat_1$, $x^\flat_2$, and $x^\flat_3$ represent the magnitudes of the spatial components $|x^\flat|$, $|y^\flat|$, and $|z^\flat|$, respectively, in flat spacetime.
- $x^\flat_4$ corresponds to $|S^\flat|$, a scalar related to the flat spacetime, when no forces are acting on the system. This is not a dimension.

In the Flat Energy-Momentum Context:

- $|P^\flat_0|$ corresponds to the magnitude of energy, $|E^\flat|$, in the absence of forces, defined in flat spacetime.
- $|P^\flat_1|$, $|P^\flat_2|$, and $|P^\flat_3|$ correspond to the magnitudes of the momentum components $|p^\flat_x|$, $|p^\flat_y|$, and $|p^\flat_z|$, respectively, in flat spacetime.
- $P^\flat_4$ corresponds to mass, $|m^\flat|$, in flat spacetime.

In both contexts, τ acts as the localized zero-point of collapse, allowing the position eigenfunction or energy/momentum eigenfunction to spread from this specific point.

Universe Magnitude for Particles α and β

For two particles, α and β, the universe is characterized by the following relation for the magnitude of $x^\flat_\mu$:

$$|P^\flat_{\mu,\alpha}|(x^\flat_{\mu,\alpha,u} - x^\flat_{\mu,\alpha,l}) \approx |P^\flat_{\mu,\beta}|(x^\flat_{\mu,\beta,u} - x^\flat_{\mu,\beta,l})$$

This equation implies that for particles α and β, the magnitudes of their respective regions (defined by the upper and lower limits of $x^\flat_\mu$) are approximately equal, suggesting a form of equilibrium or symmetry between their positions within the same flat spacetime framework.

Primitives

We define the **primitive wavefunction** ψ', which serves as the fundamental building block for constructing the more general wavefunction ψ (without a prime). The primitive wavefunction is expressed as:

$$\psi'(|X^\flat_\mu|) = \prod_{\mu=0}^{4} \left(\zeta + \frac{\eta}{\lambda + |X^\flat_\mu|} \right)^{\theta(\lambda + |X^\flat_\mu|)}$$

In this expression:

- ζ, η, and θ are parameters that can take specific values as outlined in Table 1.
- Each unique combination of these parameters corresponds to distinct physical properties, also listed in Table 1.

The parameter λ, which controls the wavefunction's curvature, is defined as:

$$\lambda = \sigma \xi^{\nu}$$

Where:

- σ is the *curvature magnitude* parameter. Higher values of σ lead to lower curvature, while smaller values increase the curvature.
- ν dictates how the curvature scales with ξ, controlling the behavior of the wavefunction as a function of position.

The **primitive** wavefunctions form the basic building blocks of what we refer to as the "natural wavefunction." These primitive wavefunctions are mathematically analogous to the elementary particles in the Standard Model, though the precise correspondence to known particles is still an open question.

The structure of these primitives is fundamentally rooted in the definition of e, which is given by the limit:

$$e = \lim_{n \to \infty} \left(1 + \frac{1}{n}\right)^{n}$$

There are 40 unique primitive wavefunctions, as shown in Table 1, which arise from the different possible combinations of ζ, η, and θ. Each combination yields a distinct set of physical properties and corresponding behaviors.

The Properties of Primitives

Rate of Rotation

The rate of rotation, denoted by κ, is defined as:

$$\kappa = \frac{\text{Cycles}}{\Delta |X_{\mu}^{\flat}||}$$

Currently, $\Delta|X_{\mu}^{\flat}| = 2$, which leads to values of κ such as 0, $\pm\frac{1}{2}$, and ±1, creating a clearer connection to quantized spin. This formulation makes it easier to relate the rotational behavior of wavefunctions to quantum mechanical properties like spin. However, it might also be simpler to define κ more generally as the number of cycles per unit $|X_{\mu}^{\flat}||$, leaving $\Delta|X_{\mu}^{\flat}||$ as an implicit factor depending on the specific wavefunction context. Thoughts on which approach to use?

Notation	ζ	η	θ	Rate of Rotation	Curvature Type	Magnitude Scale	Zero-Point Orientation	Peak Offset
$\overset{\leftharpoondown}{\psi}'_{(-A)\odot}$	i	i	1	-4	$-A$	e	1	0
$\overset{\rightharpoondown}{\psi}'_{(A)\odot}$	i	$-i$	-1	4	A	e	1	0
$\overset{\leftharpoondown}{\psi}'_{(A)\odot}$	$-i$	i	-1	-4	A	e	1	0
$\overset{\rightharpoondown}{\psi}'_{(-A)\odot}$	$-i$	$-i$	1	4	$-A$	e	1	0
$\overset{\rightarrow}{\psi}'_{(A)\odot}$	-1	1	-1	2	A	e	1	0
$\overset{\leftarrow}{\psi}'_{(-A)\odot}$	-1	-1	1	-2	$-A$	e	1	0
$\overset{\leftharpoondown}{\psi}'_{(B)\vee}$	i	1	1	-4	B	1	1	$-1/e$
$\overset{\rightharpoondown}{\psi}'_{(-B)\wedge}$	i	1	-1	4	$-B$	1	1	$1/e$
$\overset{\leftharpoondown}{\psi}'_{(B)\wedge}$	i	-1	1	-4	B	1	1	$1/e$
$\overset{\rightharpoondown}{\psi}'_{(C)\vee}$	i	-1	-1	4	C	1	1	$-1/e$
$\overset{\leftharpoondown}{\psi}'_{(C)\vee}$	$-i$	1	-1	-4	C	1	1	$-1/e$
$\overset{\rightharpoondown}{\psi}'_{(C)\wedge}$	$-i$	1	1	4	C	1	1	$1/e$
$\overset{\rightharpoondown}{\psi}'_{(B)\vee}$	$-i$	-1	1	4	B	1	1	$-1/e$
$\overset{\leftharpoondown}{\psi}'_{(-B)\wedge}$	$-i$	-1	-1	-4	$-B$	1	1	$1/e$
$\overset{\leftarrow}{\psi}'_{(B)\vee}$	-1	i	1	-2	B	1	1	$-1/e$
$\overset{\rightarrow}{\psi}'_{(-B)\wedge}$	-1	i	-1	2	$-B$	1	1	$1/e$
$\overset{\rightarrow}{\psi}'_{(B)\wedge}$	-1	$-i$	1	2	B	1	1	$1/e$
$\overset{\leftarrow}{\psi}'_{(-B)\vee}$	-1	$-i$	-1	-2	$-B$	1	1	$-1/e$
$\overset{\rightharpoondown}{\psi}'_{(C)\oslash}$	i	i	-1	4	C	$1/e$	1	0
$\overset{\leftharpoondown}{\psi}'_{(-C)\oslash}$	i	$-i$	1	-4	$-C$	$1/e$	1	0
$\overset{\rightharpoondown}{\psi}'_{(-C)\oslash}$	$-i$	i	1	4	$-C$	$1/e$	1	0
$\overset{\leftharpoondown}{\psi}'_{(-A)\oslash}$	$-i$	$-i$	-1	-4	$-A$	$1/e$	1	0
$\overset{\leftarrow}{\psi}'_{(-C)\oslash}$	-1	1	1	-1	$-C$	$1/e$	1	0
$\overset{\rightarrow}{\psi}'_{(C)\oslash}$	-1	-1	-1	1	C	$1/e$	1	0
$\overline{\psi}'_{(-A)\odot}$	1	1	1	0	$-A$	e	1	0
$\overline{\psi}'_{(-D)\odot}$	1	i	$-i$	0	$-D$	e	1	0
$\overline{\psi}'_{(A)\odot}$	1	-1	-1	0	A	e	1	0
$\overline{\psi}'_{(-D)\odot}$	1	$-i$	i	0	$-D$	e	1	0
$\overline{\psi}'_{(F)\wedge}$	1	1	i	0	F	1	1	$1/e$
$\overline{\psi}'_{(F)\vee}$	1	1	$-i$	0	F	1	1	$-1/e$
$\overline{\psi}'_{(B)\wedge}$	1	i	1	0	B	1	1	$1/e$
$\overline{\psi}'_{(-B)\vee}$	1	i	-1	0	$-B$	1	1	$-1/e$
$\overline{\psi}'_{(B)\vee}$	1	$-i$	1	0	B	1	1	$-1/e$
$\overline{\psi}'_{(-B)\wedge}$	1	$-i$	-1	0	$-B$	1	1	$1/e$
$\overline{\psi}'_{(F)\vee}$	1	-1	i	0	F	1	1	$-1/e$
$\overline{\psi}'_{(F)\wedge}$	1	-1	$-i$	0	F	1	1	$1/e$
$\overline{\psi}'_{(C)\oslash}$	1	1	-1	0	C	$1/e$	1	0
$\overline{\psi}'_{\oslash}$	1	i	i	0	0	$1/e$	1	0
$\overline{\psi}'_{(-C)\oslash}$	1	-1	1	0	$-C$	$1/e$	1	0
$\overline{\psi}'_{\oslash}$	1	$-i$	$-i$	0	0	$1/e$	1	0

Table 1: This table gives the resulting properties of a given set of Z, H, and Θ.

The standard wavefunction, e^{ikx}, also exhibits this property. For instance, e^{ikx} completes one cycle as kx increases by 2π. Therefore, the rate of rotation for the standard wavefunction is 2π, and this rotation is right-handed by default. To reverse the handedness, the sign of k must be flipped.

In contrast, this version of the wavefunction allows for multiple rates of rotation, defined by $\kappa = 0, \pm 2, \pm 4$. These correspond to: - $\kappa = 0$ for scalar-valued wavefunctions that do not rotate. - $\kappa = 2$ for a right-handed wavefunction completing one cycle as $|X_\mu^\flat||$ grows by 2. - $\kappa = -2$ for the left-handed version of the same rotation. - $\kappa = \pm 4$ for a right- or left-handed wavefunction completing one cycle per increase of 4 in $|X_\mu^\flat||$.

With the standard wavefunction, to reverse the handedness (and thus the direction of momentum), one must flip the sign of k, resulting in a left-handed wave. This effectively reverses the direction of the wave's travel. However, this modified wavefunction behaves differently. It is naturally "two-handed," meaning that you can flip the sign of the momentum (or the direction the wave will travel) without needing to flip the sign of ξ. In essence, this two-handedness allows for a richer representation of physical phenomena where momentum and handedness can be decoupled.

The exact combination of ζ, η, and θ that results in these varying rotation rates is not fully understood, but certain patterns are evident. For instance: - $\kappa = 0$ typically corresponds to scalar-valued wavefunctions, such as when $\zeta = \eta = \theta = 1$. In this case, the function behaves like the mathematical definition of e in the limit $(1 + 1/n)^n$, where the function approaches e without any rotation. - A rate of $\kappa = 2$ corresponds to a wavefunction that completes one full cycle in two steps, similar to $(-1) \cdot (-1) = 1$, indicating that $\zeta = -1$ leads to these faster rotation rates. - When $\zeta = i$ or $-i$, the rotation rate becomes $\kappa = \pm 4$, as $i \cdot i \cdot i \cdot i = 1$. This four-step cycle corresponds to the slower, more quantized rotations associated with these values.

However, as shown in the table, there is no immediately apparent pattern linking a specific combination of ζ, η, or θ to the handedness (right or left) of the wavefunction. Further exploration of the underlying mathematics is required to better understand these rotational properties.

Notably, many elements in the table differ from others only in the sign of κ. This suggests that these wavefunctions naturally describe conjugated versions of ψ, as the negative-κ version can be interpreted as the conjugate of the positive-κ counterpart.

Curvature

Wavefunction curvature is defined as:

$$\Phi = \psi'^\flat - \psi'$$

Here, the flat symbol ($^\flat$) represents taking the limit as λ approaches infinity for the relevant wavefunction. Essentially, $\psi^\flat$ is the wavefunction with nearly no curvature, while ψ is the wavefunction with curvature defined by the parameters

λ, ζ, η, and θ. The larger the value of λ, the closer ψ is to $\psi^\flat$, and the smaller the curvature. This difference between $\psi^\flat$ and ψ represents the wavefunction's deviation from its flat, zero-curvature state.

The higher the value of σ, the lower the curvature, and as σ approaches infinity, the curvature approaches zero. This is structurally analogous to the definition of e:

$$e = \lim_{n\to\infty} \left(1 + \frac{1}{n}\right)^n$$

If we remove the limit on n, allowing it to take much lower values, the function develops "curvature," which is essentially a deviation from the constant value of e. In our model, $\lambda - \Xi$ is an analog to n in the equation for e, while ζ, η, and θ play analogous roles to the values in the base function, but allow for more variation in the properties as a function of Ξ.

The parameter ξ^ν allows us to adjust the value of λ as a function of ξ. This controls how the curvature scales with ξ, as shown in Table 3.

For instance, when $\zeta = \eta = \theta = 1$, we essentially recreate the definition of e as $(1 + 1/n)^n$, but with $n = \lambda$ and $\lambda + \xi$. As ξ approaches infinity, the function value increases, but the increments become smaller. By including ξ in the definition of λ, we allow the growth rate of λ (similar to the rate of n) to fluctuate, controlling how the curvature behaves.

For $\psi^\flat$, the function becomes constant (at e) and Φ describes the difference between this idealized "flat" value and the actual, curved value of ψ.

In more complex cases, where ψ is a wavefunction, the same logic applies. Both $\psi^\flat$ and ψ rotate, but $\psi^\flat$ maintains a constant magnitude (similar to e), while ψ has a magnitude that deviates from this constant. The resulting value of Φ is typically very small, and since we are dealing with quantum forces within the context of the universe, we expect these deviations to be extremely small on large scales.

While my computer can only handle calculations of λ with relatively low values (e.g., a few zeros), it can provide approximate results for how the magnitude of Φ scales with varying values of ν, where:

$$\lambda = \sigma \xi^\nu$$

In Table 2, we provide different curvature types and how the magnitude of Φ scales with each value of ν. Note this also includes capitol curvature types which will be explained later.

Wavefunction curvature is defined

Magnitude Scale

The magnitude scale refers to the amplitude of the wavefunction. The subscript $\odot$ indicates that the wavefunction has a scale of e, while the subscript $\oslash$ indicates a scale of e^{-1}. A wavefunction without any subscript has a scale of 1. The corresponding mathematical expressions are as follows:

$$\left|\psi'^{\flat}_{\odot}(|X^{\flat}_{\mu}||)\right| = e$$

$$\left|\psi'^{\flat}(|X^{\flat}_{\mu}||)\right| = 1$$

$$\left|\psi'^{\flat}_{\oslash}(|X^{\flat}_{\mu}||)\right| = e^{-1}$$

When ζ, η, and θ are all set to 1, the resulting wavefunction will have a magnitude of e. This magnitude can appear in both static, scalar forms and rotating, wavefunction-like forms. Additionally, wavefunctions may exhibit a magnitude of 1, corresponding to the standard quantum mechanical wavefunction, or a magnitude of e^{-1}.

Zero-Point Orientation

The zero-point orientation refers to the value of the wavefunction at its first peak closest to zero. For these non-eigenvalue primitives, this value is always 1. However, for other types of primitives, the zero-point orientation may vary, leading to different initial values for the wavefunction.

Peak Offset

For primitives with a non-zero rate of rotation, the peak offset refers to the location at which the first peak occurs. In some cases, this peak occurs at $\xi = 0$, while in others, it may occur at $\xi = \frac{1}{e}$ or $\xi = -\frac{1}{e}$.

In primitives with a rate of rotation equal to zero, the concept of peak offset becomes more abstract. Here, the wavefunction is not scalar-valued, but instead, it is complex-valued, but nonetheless does not rotate through the complex plane.

Eigen-Primitives

We define an eigen-primitive wavefunction $\underline{\psi}'(|X^{\flat}_{\mu}||)$ as follows:

$$\underline{\psi}'(|X^{\flat}_{\mu}||) = \prod_{\mu=0}^{4} \Lambda^2 \left(\left(Z + \frac{H}{\Lambda + |X^{\flat}_{\mu}||} \right)^{\Theta(\Lambda + |X^{\flat}_{\mu}||)} - \left(-Z - \frac{H}{\Lambda - |X^{\flat}_{\mu}||} \right)^{\Theta(\Lambda - |X^{\flat}_{\mu}||)} \right)$$

Additionally, for eigen-primitives with a rotation rate of zero, we define:

$$\overline{\underline{\psi}}'(|X^{\flat}_{\mu}||) = \prod_{\mu=0}^{4} \Lambda^2 \left(\left(Z' + \frac{H'}{\Lambda + |X^{\flat}_{\mu}||} \right)^{\Theta(\Lambda + |X^{\flat}_{\mu}||)} - \left(Z' + \frac{H'}{\Lambda - |X^{\flat}_{\mu}||} \right)^{\Theta(\Lambda - |X^{\flat}_{\mu}||)} \right)$$

These wavefunctions essentially combine two non-underlined ψ wavefunctions: one with $|X^{\flat}_{\mu}||$ added and one with $|X^{\flat}_{\mu}||$ subtracted. The combination takes the form:

$$\left(\left(Z + \frac{H}{\Lambda + |X^\flat_\mu||}\right)^{\Theta(\Lambda + |X^\flat_\mu||)}\right) - \left(\left(-Z - \frac{H}{\Lambda - |X^\flat_\mu||}\right)^{\Theta(\Lambda - |X^\flat_\mu||)}\right)$$

In this construction, we ensure that the two components rotate in a synchronized manner by negating both Z and H. The result of subtracting these two components is very small, so we multiply the entire expression by Λ^2 to bring the scale back to e, 1, or e^{-1}.

Because these two components grow apart over time, the magnitude of their difference grows as well. This results in an object isomorphic to a position eigenfunction, though unlike traditional position eigenfunctions, we do not need to multiply this by x, y, z, etc., for it to exhibit eigenvalue-like behavior. This is evident from the following limit:

$$\lim_{\Lambda\to\infty}\left(\left(1 + \frac{1}{\Lambda + |X^\flat_\mu||}\right)^{(\Lambda + |X^\flat_\mu||)} - \left(1 + \frac{1}{\Lambda - |X^\flat_\mu||}\right)^{(\Lambda - |X^\flat_\mu||)}\right) = \frac{e|X^\flat_\mu||}{\Lambda^2}$$

In general, the magnitude of the difference between the two terms is proportional to the scale of the primitive multiplied by $|X^\flat_\mu||$, divided by Λ^2. As Λ increases, this difference becomes exceedingly small. Multiplying by Λ^2 brings the wavefunction back to a scale of e, 1, or e^{-1}, resulting in a wavefunction that grows at a rate approximately equal to its magnitude scale multiplied by the input $|X^\flat_\mu||$.

In the case of zero curvature and scale 1, the input directly equates to the magnitude of the output. For example,

$$\left|\overline{\psi}'^\flat_\vee\right| = \Xi$$

However, for eigen-primitives with a non-zero rate of rotation, these wavefunctions behave similarly to position eigenfunctions, growing outward in a manner analogous to $x\psi$. Thus, the eigen-primitives naturally describe wavefunctions with dynamic behavior, akin to position eigenfunctions, without the need for additional eigenvalue multipliers.

Complications with Lambda

For the function to behave coherently, Λ in eigen-primitives with non-zero rate of rotation must not only be integer-valued but also be an integer multiple of 2. If Λ takes continuous values while $|X^\flat_\mu||$ is also continuous, the wavefunction can become misaligned. Several potential solutions exist: Lambda must be integer-valued or the wavefunction does not function coherently. If Λ includes continuous $|X^\flat_\mu||$ values, it poses a problem when $|X^\flat_\mu||$ is continuous. There are several possible solutions:

1. **Use integer values for σ and $|X^{\flat}_{\mu}||$**: This approach requires using extremely small rho-values such that a particle with high energy has a higher rho than a particle with lower energy, but even a particle with extrely high rho, still has an low value of rho on the scale of 1. In this way, we quantize xi, but still ensure that rho*xi is very small such that the steps in the wavefunction will be very small ensuring the wavefunction still rotates through the complex plane almost as if it were a continuous function.

2. **Use a ceiling function**: Rounding Λ to the nearest integer maintains coherence but introduces minor discontinuities.

3. **Use only the non-underlined version of the eigen-primitives**: only underlined eigen-primitives require lambda to have integer multiples of 2, so we can not use their curvature and instead use a "flat" version of these eigen-primitives.

4. **Apply a ceiling function to Λ**: This rounds Λ to the nearest integer and ensures proper behavior.

5. **Define a rotation function to ensure ψ always peaks at the correct values**: This is explained in more detail below.

Rotation Function to Correct Lambda

When Λ is not an integer multiple of 2, the wavefunction may not align properly with its peak values. To synchronize the parts of the wavefunction associated with $\pm|X^{\flat}_{\mu}||$, we define a rotation function. This function adjusts the phase of ψ to ensure that $\psi(|X^{\flat}_{\mu}||)$ always peaks at the correct values.

When Λ is not an integer multiple of 2, the following wavefunction can become desynchronized:

$$\left(\left(Z + \frac{H}{\Lambda + |X^{\flat}_{\mu}||}\right)^{\Theta(\Lambda + |X^{\flat}_{\mu}||)}\right) - \left(\left(-Z - \frac{H}{\Lambda - |X^{\flat}_{\mu}||}\right)^{\Theta(\Lambda - |X^{\flat}_{\mu}||)}\right)$$

In order to synchronize the two terms, we define a phase rotation that shifts the zero-point of the wavefunction to coincide with a peak. The phase shift is given by:

$$e^{i\pi(\Lambda - \lfloor \Lambda/2 \rfloor \times 2)}$$

This rotates the wavefunction by an amount proportional to how far Λ deviates from an integer multiple of 2.

For instance, if $\Lambda = 101$, the phase shift becomes:

$$e^{i\pi(101-100)} = e^{i\pi}$$

which corresponds to a half-cycle shift. The general wavefunction is thus adjusted as:

$$\psi'(|X^{\flat}_{\mu}||) \to e^{i\pi(\Lambda - \lfloor \Lambda/2 \rfloor \times 2)}\psi'(|X^{\flat}_{\mu}||)$$

This ensures that the zero-point aligns with a peak, even when Λ is not an integer multiple of 2.

By applying this phase correction, the wavefunction remains synchronized, and coherent oscillatory behavior is maintained.

The Properties of Eigen-primitives

The Measurement Property

Although not explicitly listed in the table, every eigen-primitive possesses a "measurement property" by definition. This property implies that an underlined ψ is isomorphic to a position eigenfunction, meaning that it naturally yields position eigenvalues without the need for multiplying by x, etc. This intrinsic eigenvalue behavior is a key feature of the eigen-primitive.

Space-Time Curvature

Since the underlined version of ψ possesses position eigenvalues, we are led to define space-time curvature in terms of the eigen-primitive:

$$\underline{\Phi} = \underline{\psi}^{\flat} - \underline{\psi}$$

This definition suggests that space-time curvature could map to the curvature described in general relativity, offering a potential pathway toward unifying quantum mechanics with general relativity.

Magnitude Scale

The magnitude scale for eigen-primitives is defined similarly to that of primitives, except that for eigen-primitives, it effectively applies to position, energy, and momentum eigenvalues, influencing the scaling behavior of these quantities.

Zero-Point Orientation

Unlike primitives, eigen-primitives do not always have a zero-point orientation of 1. As shown in Table 3, some eigen-primitives have peaks that start at -1. While this could have potential implications, such as explaining the anti-symmetry of fermions or other phenomena, it is more likely that this is a trivial property in many cases.

Peak Offset

Peak offset for eigen-primitives is defined in the same way as it is for primitives. It refers to the location of the first peak in the wavefunction, which may vary depending on the eigen-primitive's specific parameters.

Defining ϕ

When κ is set to 1, ϕ can only take on quantized values of momentum, determined by the rate of rotation. This value is positive for right-handed rotation

Curvature Type	$\nu = 0$	$\nu = 1$	$\nu = 2$	$\nu = 3$	$\nu = 4$
a	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-a$	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
b	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-b$	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
c	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-c$	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
f	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^4$	$1/\xi^6$
g	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-g$	$1/\xi^0$	$1/\xi^0$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
A	$1/\xi^0$	$1/\xi^2$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-A$	$1/\xi^0$	$1/\xi^2$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
B	$1/\xi^0$	$1/\xi^2$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-B$	$1/\xi^0$	$1/\xi^2$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
C	$1/\xi^0$	$1/\xi^2$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-C$	$1/\xi^0$	$1/\xi^2$	$1/\xi^2$	$1/\xi^3$	$1/\xi^4$
$-D$	$1/\xi^0$	$1/\xi^2$	$1/\xi^4$	$1/\xi^6$	$1/\xi^8$
G	$1/\xi^0$	$1/\xi^2$	$1/\xi^4$	$1/\xi^6$	$1/\xi^8$

Table 2: This table gives the resulting properties of a given set of ζ, η, and θ.

Notation	Z	H	Θ	Rate of Rotation (κ)	Curvature Type	Magnitude Scale	Zero-Point Orientation	Peak Offset
$\overleftarrow{\underline{\psi}}'(-a)\odot$	i	i	1	-4	$-a$	e	1	0
$\overrightarrow{\underline{\psi}}'(a)-1\odot$	i	$-i$	-1	4	a	e	-1	0
$\overleftarrow{\underline{\psi}}'(a)-1\odot$	$-i$	i	-1	-4	a	e	-1	0
$\overrightarrow{\underline{\psi}}'(-a)\odot$	$-i$	$-i$	1	4	$-a$	e	1	0
$\overleftarrow{\underline{\psi}}'(b)-1\vee$	i	1	1	-4	b	1	-1	$-1/e$
$\overrightarrow{\underline{\psi}}'(-b)\wedge$	i	1	-1	4	$-b$	1	1	$1/e$
$\overleftarrow{\underline{\psi}}'(b)-1\wedge$	i	-1	1	-4	b	1	-1	$1/e$
$\overrightarrow{\underline{\psi}}'(-b)\vee$	i	-1	-1	4	$-b$	1	1	$-1/e$
$\overrightarrow{\underline{\psi}}'(b)-1\wedge$	$-i$	1	1	4	b	1	-1	$1/e$
$\overrightarrow{\underline{\psi}}'(-b)\vee$	$-i$	1	-1	4	$-b$	1	1	$-1/e$
$\overrightarrow{\underline{\psi}}'(b)-1\vee$	$-i$	-1	1	4	b	1	-1	$-1/e$
$\overleftarrow{\underline{\psi}}'(-b)\wedge$	$-i$	-1	-1	-4	$-b$	1	1	$1/e$
$\overrightarrow{\underline{\psi}}'(-c)-1\oslash$	i	i	-1	4	$-c$	$1/e$	-1	0
$\overrightarrow{\underline{\psi}}'(c)\oslash$	i	$-i$	1	4	c	$1/e$	1	0
$\overrightarrow{\psi}'(c)\oslash$	$-i$	i	1	4	c	$1/e$	1	0
$\overleftarrow{\underline{\psi}}'(-c)-1\oslash$	$-i$	$-i$	-1	-4	$-c$	$1/e$	-1	0
$\overline{\underline{\psi}}'(-a)1\odot$	1	1	1	0	$-a$	e	1	0
$\overline{\underline{\psi}}'(-d)-i\odot$	1	i	$-i$	0	$-d$	e	$-i$	0
$\overline{\underline{\psi}}'(a)-1\odot$	1	-1	-1	0	a	e	-1	0
$\overline{\underline{\psi}}'(-d)i\odot$	1	$-i$	i	0	$-d$	e	i	0
$\overline{\underline{\psi}}'(-g)-i\wedge$	1	1	i	0	$-g$	1	$-i$	$1/e$
$\overline{\underline{\psi}}'(-g)i\vee$	1	1	$-i$	0	$-g$	1	i	$-1/e$
$\overline{\underline{\psi}}'(b)\wedge$	1	i	1	0	b	1	-1	$1/e$
$\overline{\underline{\psi}}'(-b)-1\vee$	1	i	-1	0	$-b$	1	1	$-1/e$
$\overline{\underline{\psi}}'(g)-1\vee$	1	-1	i	0	g	1	$-i$	$-1/e$
$\overline{\underline{\psi}}'(g)\wedge$	1	-1	$-i$	0	g	1	i	$1/e$
$\overline{\underline{\psi}}'(b)-1\vee$	1	$-i$	1	0	b	1	-1	$-1/e$
$\overline{\underline{\psi}}'(-b)\wedge$	1	$-i$	-1	0	$-b$	1	1	$1/e$
$\overline{\underline{\psi}}'(-c)-1\oslash$	1	1	-1	0	$-c$	$1/e$	-1	0
$\overline{\underline{\psi}}'(f)i\oslash$	1	i	i	0	f	$1/e$	i	0
$\overline{\underline{\psi}}'(c)\oslash$	1	-1	1	0	c	$1/e$	1	0
$\overline{\underline{\psi}}'(f)-i\oslash$	1	$-i$	$-i$	0	f	$1/e$	$-i$	0

Table 3: This table gives the resulting properties of a given set of ζ, η, and θ.

and negative for left-handed rotation.

$$\phi \in \{\psi \mid |P^{\flat}_{\mu\mu} = 1 \text{ for all } \mu\} \tag{1}$$

Eigen-functionals

If we divide ψ by an overlined and underlined ϕ, the resulting function will have an eigenvalue proportional to κ if there is no curvature. More generally, it will yield energy eigenvalues when $\mu = 0$, momentum eigenvalues when $\mu = 1, 2, 3$, and mass eigenvalues when $\mu = 4$.

$$\underline{\underline{\psi}} \in \{\psi \mid \underline{\psi}/\underline{\overline{\phi}}\} \tag{2}$$

Force Curvature

Since the double-underlined version of ψ yields energy, momentum, and mass eigenvalues, we are motivated to define force as a type of curvature:

$$\underline{\underline{\Phi}} = \underline{\underline{\psi}}^{\flat} - \underline{\underline{\psi}}$$

The following table outlines the approximate scaling behavior of different curvature types with respect to ξ.

Table 2 presents the scaling behavior for three types of curvature: wave-function curvature, space-time curvature, and force curvature. This includes both positive and negative curvatures scaling as $1/\xi^0$, with varying magnitudes controlled by σ, making it suitable for describing the strong force. Additionally, forces that scale as $1/\xi^2$, such as those suitable for describing electromagnetic and gravitational forces, are included. Interestingly, if we wish to explain gravity using space-time curvature scaling as $1/\xi^3$, Table 2 suggests this as a viable option.

Explaining all forces in terms of curvature is a non-trivial task, requiring computational power beyond what is currently available. It is likely that even today's supercomputers would struggle with the calculations due to the single, universal scale used in this theory. In particular, determining the values of σ and the corresponding magnitudes of forces poses a significant computational challenge.