Projected Ontology Theory (POT)

Formal Definition Draft v0.1

Premise

Projected Ontology Theory (POT) posits that the ontologically real substrate of the universe is a **Hilbert space** $\mathcal{H}$, and that our observed 4D spacetime $\mathbb{R}^4$ is a **projection** from this underlying structure. Observable physical phenomena (mass, charge, time, etc.) arise as *stable eigenmodes* or *projections* from $\mathcal{H}$, governed by dynamics intrinsic to the Hilbert structure.

Core Postulates

1. **Ontological Substrate**
   Reality exists in a separable complex Hilbert space $\mathcal{H}$ with an inner product structure and a complete basis of eigenstates.

2. **Projection to Observable Space**
   The 4-dimensional physical spacetime $\mathbb{R}^4$ and all observables therein are derived via a projection operator $\Pi : \mathcal{H} \to \mathbb{R}^4$, possibly parameterized by eigenvalues of time and space operators.

3. **Modal Flow**
   Dynamics in $\mathbb{R}^4$ are a consequence of cyclic or quasi-cyclic modal flows in $\mathcal{H}$, possibly involving resonance phenomena and governed by functional equations or Green's functions in $\mathcal{H}$.

4. **Emergence of Mass and Charge**
   Physical quantities like mass and charge correspond to residues or spectral densities derived from modal analysis in $\mathcal{H}$, not intrinsic attributes of particles in $\mathbb{R}^4$.

5. **Collapse and Measurement**
   Measurement is interpreted as a transfer of energy from **propagating wave modes** (traveling solutions) to **eigenmodes** (stationary, projectable modes) rather than a stochastic collapse.

6. **Time and Causality**
   Time emerges from the structure of projection itself. Modal causality in $\mathcal{H}$ can appear time-symmetric, but the projection imposes an arrow of time due to mode selectivity.

Mathematical Sketch

Let:

- $\psi \in \mathcal{H}$
- $\hat{O}$ be an observable (self-adjoint operator)
- Π be a projection operator from $\mathcal{H} \to \mathbb{R}^4$

Then:

- The observed value in $\mathbb{R}^4$ is $\Pi(\hat{O}\psi)$

- The evolution is governed by modal interaction:

$$i\hbar \frac{d\psi}{dt} = \hat{H}\psi$$

but $\hat{H}$ includes not just Hamiltonians on $\mathbb{R}^4$, but structural potentials of $\mathcal{H}$ (e.g., resonance constraints, mode entanglements)

Forbidden but Fundamental Questions

These are questions rarely asked in public lectures, papers, or classrooms—yet they strike at the core of our assumptions:

- How can the scalar-valued Schrödinger equation describe the structure and interaction of trillions of entities?
- Why do we allow ourselves to define "particles" as objects in higher-order codomains—are these inventions or discoveries?
- Can a single wavefunction meaningfully encode locality, identity, entanglement, and emergence?
- Are so-called fundamental constants like ε_0, μ_0, and even c truly fundamental—or projection redundancies?
- Why are there three neutrino flavors? Why not one, or twenty-seven?
- Does the Higgs mechanism really explain mass, or is it a formal trick to preserve gauge symmetry in a broken theory?
- What is a neutrino ontologically? Is it an object, or a phase-preserving whisper of modal interference?

These questions may sound naive, but they expose critical blind spots in the architecture of modern physics—and provide the philosophical and formal foundation upon which POT is constructed.

To be refined in version v0.2: treatment of locality, entanglement, observer dependence, and categorical formulation.