On the Mechanics of Quasi-Quanta Realization

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Abstract

We model an absolute reference frame using a pullback on a certain locally trivial line bundle. We demonstrate that this pullback is unrealizable in $\mathbb{R}^4$. We devote section 3 to process-based thinking.

1 Preliminaries

Let $\Phi : \mathbb{R}^4_0 \longrightarrow \mathbb{R}^4_n$ be a piecewise linear discrete path. Suppose all spaces throughout are Hausdorff. Let $\eta_i : \partial_i \star (-1)^i$ be a normal operator on the space of eigenfunctors of $\tan(\Phi)$. By eigenfunctor, we mean

Definition 1 *a trace-preserving map, $\partial_i \xrightarrow{\star} \mathscr{E}$, shall be called an eigenfunctor, if the associated pullback to a Hausdorff topological space is stable and Hausdorff.*

The orbits of eigenfunctors are representable as matrices $m_{ij} = \mathcal{S}_\bullet \subset \mathbb{R}^4$, where $\mathcal{S}_\bullet$ is a co-normal frame suspended in a well of kinetic energy. We will explore here some of the implications of providing a tame topological stack, $\mathscr{A}$, to pull back to. We will assume the space $\mathbb{R}^4_\bullet$ to be Hermitian. Our trick is to represent every slice encompassing a coordinate patch as a restriction of a substack to a realizable space. In order to do so, we contemplate simplicial spaces as a discrete realization of the super-smooth path space over the bundle gerbe of $\mathbb{R}^4_\bullet$. The following is then immediate:

Definition 2 *a spacetime cuboid is a restriction*

$$\mathfrak{A} \in \mathscr{A}\Big|_\bullet = \mathfrak{s}_\bullet \overset{\models}{\sim} \mathbb{R}^4_\bullet$$

which is finitely presentable.

We also have:

Definition 3 *A spacetime slice of a space $\mathbb{M}^n$ is a presentable space $\mathbb{M}^{<n}$.*

We will similarly use the term "spacetime chunk" where it is more appropriate, specifically in the $n >> 2$ case.

Axiom 1 *Every spacetime chunk is non-empty.*

Remark 1 *The elements of a chunk $\mathfrak{C}$ may be only $\{*\}$, the fixed point, but we do not allow for $\{\emptyset\}$.*

We will refer to the span

$$\mathfrak{S} = \langle \mathfrak{s}_{\mathfrak{o}}, ..., \mathfrak{s}_n \rangle$$

collectively, as the "multiverse," and denote it by $\mathfrak{M}$.

By "span," we mean a nerve of vectors encompassing all of the nth order directional derivatives of points along the appropriate vector spaces.

If $\mathcal{P} : x \longrightarrow y$ is a path along a horizontal section of a path groupoid, then it shall be called a "horizontal lift" (written P_h or $\tilde{h}$), and we will likewise define "vertical lifts," and write P_v or $\tilde{v}$. We define the path groupoid as follows:

Definition 4 *The space of paths, $\mathcal{P}_{\mathcal{M}}$ over a manifold $\mathcal{M}$, shall be called the path groupoid of $\mathcal{M}$.*

2 Holonomy

One of the most important reasons for developing the theory of connections is to establish the concept of *holonomy* over a manifold.

Definition 5 *Let $\Gamma : x \leftrightarrow y$ be a connection on $\mathcal{M}$. Let σ be the orientation of $\mathcal{M}$. Then, the map*

$$\sigma(m \in t_{<0}(\mathbb{M})) \longrightarrow \sigma(m \in t_0(\mathbb{M}))$$

is called a holonomy map.

Parallel transport is defined by holonomy maps along tangent vectors about any given point. We define a tangent vector by

$$\tan_{vec} = P_v \otimes P_y$$

and, recursively, define a *connection* (also: connexion) as a a path

$$tan_{vec_1} \longrightarrow tan_{vec_2}$$

which need not preserve orientation. That is to say, we allow for some transformation, such that there exists the formula:

$$tan_{vec_1} \star k \xrightarrow{d\theta} tan_{vec_2}$$

In this case,

$$tan_{vec_1} \star k = d(\theta(tan_{vec_1}), tan_{vec_1})$$

2.1 Holonomy for Complex Spaces

There is a canonically defined map

$$\mathcal{T}_{\mathcal{M}} \xrightarrow{can_\theta} \mathcal{T}_{\mathcal{M}}$$

which preserves all admissible fibers. That is to say,

$$\underset{\leftarrow}{colim}(im(\mathcal{T}_{\mathcal{M}})) = \underset{\rightarrow}{lim}(ker(\mathcal{T}_{\mathcal{M}})$$

gives us a *supersite*, $\tilde{\sigma}$, which is the centralizer for the effective action of an object traveling at a constant speed on $\mathcal{M}$.

Here, $\mathcal{T}_{\mathcal{M}}$ is the Teichmuller space.

Let μ_0 be a miniscule cocharacter of a Lie algebroid. Then, there is the display block,

$$\mathcal{B}_{\Box} \simeq (\Box \sim \tilde{\sigma})$$

where $\Box$ is the category-enriched category of necessary moments, meaning that all its objects are discrete categories. We denote this enrichment by

$$\Box : DiscCats$$

As we have previously discussed, we allow $\Box$ to occur at the moment $t = 0$. This gives us the following:

Axiom 2 *$t = 0$, the present moment, is strictly necessary.*

Proof: Immediate.

3 Processes

Definition 6 *A process is an ontological premise which transacts potential for energy. Respectively, a potential process exchanges potential energy for potential energy, and a kinetic process exchanges potential or kinetic energy for kinetic or thermal energy.*

Definition 7 *An ontological premise is a point-like fact located along the tautological line of an open string.*

For each ontological premise, p, there is a pure potential

$$p_i \in Pur$$

and an evaluation

$$ev(p_i) : \mathbb{T} \sim \mathscr{A} \longrightarrow \mathfrak{f} \in \mathfrak{F}$$

where $\mathfrak{f}$ is some fact and $\mathfrak{F}$ is a faction.

Definition 8 *A faction is a collection of facts,*

$$\sum_{i=0}^{n} \mathfrak{f}_i$$

equipped with a stratified manifold $Strat_{\mathcal{M}}$ *which ascribes, to each fact, a local truth value,* $\tau(\mathfrak{f}_i)$*. The truth value is assigned a time t=0, to an agent* $\dot{\alpha}$*, and is a measure of the anisotropy of the projection of "absolute truth" to a local module.*

Since each morphism $ev(p_i)$ is surjective onto its target, we have a strictly decreasing chain of choices from the absolute manifold to the restricted manifold. Thus, we obtain the flag manifold:

$$\mathscr{A}\big|_X \supset \mathscr{A}\big|_{X' \subset X} \supset ... \supset \mathscr{A}\big|_{* \subset \mathcal{U}(*)}$$

consisting in successive restriction to coarser and coarser coordinate patches in the convex portion of a manifold discretely isomorphic to $\mathbb{R}^4$.

Definition 9 *A discrete isomorphism is a quasi-bijective mapping from the points swept out by the foliation of a smooth manifold, and the points of the smooth manifold.*

For this, we shall write

$$\mathcal{C}^\infty(\mathcal{M})_\Delta \xrightarrow{\Gamma_{\delta_i}} DiscTop$$

The motivation for writing this article followed a brief Discord discussion, in which the lead author attempted to justify the existence of a semi-Newtonian aether. This author contends that all actionable energy, i.e., all that which is transacted during the ordinary motion of objects in the physical world, represent kinectic activations of some a priori background potential. Crucially, *shape*, and thus, *static shape*, in the "real world," represent no mere objects, but processes. These processes exist by virtue of the proposed anisotropy of factions.

Just as mathematical structures such as groups and rings come to have meaning in relation to so-called "real-world" physical phenomena, so too does the construction of a "faction" come to bear significance. The primary units for transactions between the potential and the actual world are what we may call "activation keys." Broadly speaking, an activation key is an exit path from the transitive inner model of a locale to a mechanical-acoustic environment.

Activation keys can be used to model a wide variety of naturally-occurring processes, such as state transitions, refraction, and gravitational flux. We will not delve into the technicalities here.

3.1 Quasi-quanta

Let $q \in \mathbb{R}^4_\bullet$ be a quantum. We define a generalization, $\hat{q}$, the quasi-quanta.

Let *Str* be an open string, whose span is $\mathfrak{S}$, such that there is a co-ordinate patch in every copy of $\mathbb{R}^4$ which is timelike identical but spacelike distinct. Thus, we have:

$$\forall c \in \mathbb{R}^4_\bullet \ \ \exists^{\hat{q}} c' \in \mathbb{R}_{\bullet \pm 1} \tag{1}$$

such that c,c' are in superposition. Write $c^\heartsuit$ for the set of all such c' for any $\mathbb{R}^4_\bullet$. Thus, for any particular c, we have:

$$c^\heartsuit\big|_{c_i} \tag{2}$$

where the *observation* of c_i corresponds to a particular instantiation of a fact, $\dot{\alpha}(\mathfrak{f}_i)$, which is essentially unique.

The thesis here is that if there is a stationary absolute reference frame $\mathscr{A}$, then the realization of physical quanta at differing spatial locations can be described as a superposition of quasi-quanta in conormal kinetic frames. Specifically, the differing spatial locations can be accounted for as *anisotropic* refraction of some underlying "absolute" truth, $\mathbb{T}$, which is yet to be evaluated. The localization of this absolute frame (which might suitably be called an *Aether frame*) to a specific degenerate simplicial copy of $\mathbb{R}^4$ represents the assignment of the truth value from a maximally compact frame of reference.

The ideal compactification of $\mathbb{R}^4$, the pointlike compactification

$$\mathbb{R}^4 \longrightarrow *$$

yields a sheaf of tangent vectors about said point. We also obtain a neighborhood within which the truth values remain coherent:

$$\underset{\leftarrow}{lim} \tan_{vec}(*) = \mathcal{U}(*)\big|_{LocSys} \tag{3}$$

Proposition 1 *If such a limit exists in a small subcategory of* $\Box$ *(call it* $\Box|_c$*), then* $\Box|_c$ *is full.*

Proof Since we have

$$Max(\tau)\mathfrak{f}_i\big|_{\dot{\alpha}} = *$$

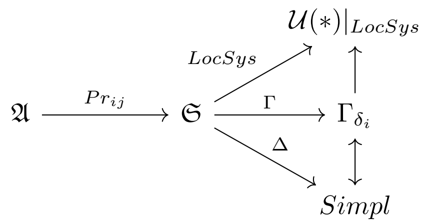
we then define $*$ to be the limit in (3). Since $\Box|_c$ contains $*$, it is shown that inverse limits are preserved under the restriction. Assuming the topology of $\Box_c$ to be Urysohn, then for every such restriction to $*$, there is a neighborhood $\mathcal{U}(*)$ which covers all $* + \varepsilon$.

That this neighborhood defines a local system is evident from the nonemptiness axiom of spacetime chunks. Thus, this subcategory is full, since the universal property of $\Box$ is satisfied; namely,

$$x \cap \mathfrak{S} \text{ is non trivial } \forall x \in \mathcal{U}(*)\big|_{LocSys}$$

3.1.1 Realization of Quasi-quanta

The mathematical interpretation of this realization will differ from the physical interpretation, if one exists. Symplectically, the realization of the underlying substack $\mathfrak{A}$ is given by the diagram:



where *Simpl* is the category of simplicial sets, and where Γ_{δ_i} is a $\delta_i - small$ localization of the projective morphjism pr_{ij}.

Physical interpretation

$Pr_{ij} \longrightarrow c^{\heartsuit}$ gives us the desired morphism to the wave function $\Psi(\heartsuit)$. The radical claim of this ontology is that *stationary* objects in the physical universe have multiverse counterparts whose superposition at relatively different spatial locations causes anisotropic propogation of truth, which causes *motion* at the macroscopic level.

This gives us a reasonable notion of *quantum gravity* as a distortion of an underlying absolute background frame, which is projected to a relativistic (kinetic) frame. The sequence

$$\mathscr{A} \to \mathfrak{A} \longrightarrow \mathfrak{S}$$

gives us the appropriate *localization* of the aether background to a given instantiation of $\mathbb{R}^4$ at a unitary moment of time. The tangent vectors about this moment of time yield a window of correspondence between the relativistic (time-dependent) truth of the fact, and its persistent (absolute) truth value. In much the same way, the tangent vectors about any given point in the physical world yield an arbitrarily small neighborhood of physical objects (particles, molecules) which are either “true” (existing) at a given arbitrarily small unit of space at a given time, or “false” (non-existing).

The ceasing of energy to exist in one neighborhood gives rise to a corresponding energy existing in another neighborhood. In this way, we get quantum effects out of a more-or-less classical truth-value system, with very slight fuzzy modifications.

The “path groupoid” over a manifold $\mathcal{M}$ is its set of possible next future moves, and the realization of $\hat{q}$ yields a physical object q at an arbitrarily close future moment of time. We have

$$d(\hat{q} \in \mathcal{P}_{\mathcal{M}}, q \in \mathbb{R}_{\mathcal{M}}) = \theta$$

giving us the path $\mathcal{P}_{\mathcal{M}} \longrightarrow \mathbb{R}_{\mathcal{M}}$ which describes the first-order differential between a potential location of a realized parton, and a necessary location. This is effectively the surprisal of the particle's location.

3.2 Main Theorem

Our main theorem is this:

Theorem 1 *The pullback of* $\mathfrak{A}$ *is unrealizable by* $\mathfrak{S}$.

The reason for this is simple, yet it explains the apparently contradictory nature of general relativity and quantum mechanics. Suppose we he have a collection of spacetime cuboids spanned by $\mathfrak{S}$. We have

$$\mathscr{A} \supset \mathfrak{A} \supset \mathfrak{A}|_{\mathfrak{S}}$$

Therefore, given strict monotonicity of the chain, there must be some elements of $\mathscr{A}$ which are not contained in the restriction to $\mathfrak{S}$. In other words, *relativistic frames* are only relative to what is absolute. By the axiom of extension, the existence of differing relative frames implies a larger universe (the multiverse) in which all such frames are contained.

4 References

[1] U. Schreiber, K. Waldorf *Parallel Transport and Functors*, (2014)
[2] T.E. Goldberg *What Is a Connection, and What is it Good For?*, (2008)
[3] R.J. Buchanan *The Anisotropy of Factions*, (2023)
[4] R. Brown, K.A. Hardie, K.H. Kamps, T. Porter *A Homotopy Double Groupoid of a Hausdorff Space*, (2002)
[5] I. Moerdijk *Introduction to the Language of Stacks and Gerbes*, (2002)
[6] D. Treumann *Exit Paths and Constructible Stacks*, (2007)
[7] P. Emmerson *Quasi-quanta Logic 2*, (2023)