Matter Universe: According to QM, Nonassociativity $\sim$ Unobservability

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Essential pieces

$$so(1, 3) \times u(1) \times su(2) \times su(3)$$

Fermions require Dirac spinors: space-time fields living in $\mathbb{C}^4$.

Dirac spinors require the Dirac algebra:
$D \simeq \mathbb{C}(4)$, the complexified Clifford algebra of 1,3-space-time.

Parity nonconservation requires $D$ be thought of as $P(2)$:
$P \simeq \mathbb{C}(2) = Pauli$ algebra.

$$\gamma_0 = \begin{bmatrix} 0 & \sigma_0 \\ \sigma_0 & 0 \end{bmatrix}, \quad \gamma_k = \begin{bmatrix} 0 & \sigma_k \\ -\sigma_k & 0 \end{bmatrix}, \quad \gamma_5 = i \prod \gamma_\mu = \begin{bmatrix} \sigma_0 & 0 \\ 0 & -\sigma_0 \end{bmatrix}$$
Perversion Step 1: New Pauli

\[ \mathbf{P} = \mathbb{C} \otimes \mathbb{H} \] (redefined).

So new Dirac algebra: \( \mathbf{D} = \mathbf{P}_L(2) = \mathbb{C} \otimes \mathbb{H}_L(2) \).

\[ \epsilon = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \quad \alpha = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}, \quad \beta = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, \quad \gamma = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}. \]

\[ \gamma_0 = q_{L0} \beta, \quad \gamma_k = i q_{Lk} \gamma \gamma_5 = i \prod \gamma_\mu = \alpha. \]

New spinors:

\[ \mathbf{P}^2 = \mathbb{C} \otimes \mathbb{H}^2. \]

Twice the dimensionality of ordinary Dirac spinor: \( SU(2) \) doublet. Internal \( SU(2) \) from unit elements of \( \mathbb{H}_R \). This is new.
Perversion Step 2: Octonions

\[ T = C \otimes H \otimes O \]

New Clifford algebra, a Dirac algebra for 1,9-spacetime:

\[ T_L(2) = C \otimes H_L \otimes O_L(2) \]

New spinor space: \( T^2 \).
New Clifford algebra 1-vectors (sort of canonical)

\[ \{ \beta, \gamma q_{Lk} e_{L7}, k = 1, 2, 3, \gamma i e_{Lp}, p = 1, \ldots, 6 \} \]

(Time, 3-space, 6-space).
Unobservable stuff (explanation in larger theory, of which this is a kernel)

Extra 6 dimensions:

$$\gamma i e_L p, \; p = 1, \ldots, 6$$

Quarks and anti-quarks:

Quarks: $$\rho_+ T^2 \rho_$$, and Anti-quarks: $$\rho_- T^2 \rho_+$$,

both linear in $$e_p, \; p = 1, \ldots, 6$$.

$$\rho_{\pm} := \frac{1}{2} (1 \pm i e_7).$$
Project down to Observable stuff

Need to project out anything linear in the $e_p$, $p = 1, \ldots, 6$, (or $e_{Lp}$, $p = 1, \ldots, 6$).

Spinor space:

$\rho_+ T^2 \rho_+$ Matter (Leptons), $\rho_- T^2 \rho_-$ Anti-Matter (Anti-Leptons).

Clifford Algebra (just Matter): $\rho_L + \rho_R + CL(1, 9) \rho_R + \rho_L +$.

1-vectors: $\{\beta, \gamma q_{Lk} e_{L7}, k = 1, 2, 3, \gamma i e_{Lp}, p = 1, \ldots, 6\} \rightarrow 
\{\beta, \gamma i q_{Lk}, k = 1, 2, 3,\} \rho_R + \rho_L +$.

2-vectors: $\rho_L + \rho_R + so(1, 9) \rho_L + \rho_R + = (so(1, 3) \times u(1) \times su(3)) \rho_L + \rho_R +$.
What’s left?

Total symmetry:

\[(so(1, 3) \times u(1) \times su(2) \times su(3))\rho_L + \rho_R +
\]

This, and the 1-vectors of \(\rho_L + \rho_R + cL(1, 9)\rho_R + \rho_L +\), which is

\[\{cL(1, 3) + \text{ extra bits }\}\rho_R + \rho_L +\]

act on

\(\rho_+ T^2 \rho_+\),

which is MATTER - no anti-matter.
Interpretation

Projecting everything down to just observable bits yields:
1. A Clifford algebra for 1,3-spacetime with
2. Extra bits, including $u(1) \times su(2) \times su(3)$ internal symmetry,
3. All of which (in this case) see only Matter.

The universe we observe is the same.

A version of this will exist for Anti-Matter.

The extra 6 dimensions carry $SU(3)$ charges, and link the Matter and Anti-Matter 1,3-spacetimes.
Numerous Nobel Prizes ... 

await those who come up with the overarching theory of which this is but a kernel. 

IMHO