Eric Weinstein has proposed "Geometric Unity", which is a proposal for a unification of the standard model and gravitation based on the notion of 14-D manifold $U(14)$, which according to my understanding is the bundle of metrics of X reducing locally to a product space-time and 10-D internal space which could consist of 4×4 symmetric matrices. Weinstein wants to endow $U(14)$ with some additional structure and explain gauge symmetries in terms of the fiber of $U(14)$ consisting of symmetric 4×4 matrices. Group SO(10) acts as the 10-bein group of this space in the Euclidean case and the proposal is that it acts as a gauge group.

The first problem is that if the 10-bein group defines the gauge group, the gauge group for a Minkowskian signature of X is non-compact variant of $SO(10)$, which is the group of isometries for the space of M_{10} with Euclidean signature. In gauge theories non-compactness of the gauge group implies the loss of unitarity. Weinstein admits that his proposal works only in the Euclidean case.

Second problem is posed by the general coordinate invariance. General coordinate transformations do not induce a mere gauge transformation of the matrix of M_{10} as they should. This could mean severe difficulties in the realization of the general coordinate invariance.

In the TGD framework, one of the challenges is the more precise definition of the QFT limit of TGD. In this article I will consider a variant of Weinstein's theory obtained by replacing $H = M^4 \times CP_2$ with $M^4 \times S^n$ as a possible manner to approach the problem. For $n = 9$ and $n = 10$ one obtains $SO(n+1)$ as maximal isometry group and holonomy group. It turns out that one can obtain standard model symmetries but the predicted number of fermion families turns out to be wrong. In TGD fermion families have a topological explanation. M can be replaced by a sphere S^n, and $n = 10$ gives 4 generations and $n = 8$ and $n = 9$ 2 generations. For larger values of n the number generations increases exponentially. Whether the QFT model could serve as a phenomenological description of the family replication phenomenon remains open.

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