Elementary particle vacuum functionals and family replication phenomenon

1. Motivations and background.

   (a) In the original model for elementary particles they were identified as 2-D boundary components of 3-surfaces so that the genus g of the orientable boundary component became topological elementary particle quantum number. Generation-genus corresponds states that various quark and lepton generations correspond to various genera g=0,1,2 in rather obvious order.

   (b) Conformal invariance inspired the hypothesis that only the conformal equivalence class of the boundary components in the induced metric matters physically. Vacuum functional defined in the space of conformal equivalence classes of partonic 2-surface would characterize particle.

   (c) Modular invariance which is symmetry of conformal field theories would be natural property of elementary particle vacuum functional.

2. Construction of elementary particle vacuum functionals.

   (a) This led to a proposal for the construction of elementary particle vacuum functionals and also to a model for how the boundaries topologies of different genus would mix. This topological mixing would induce Cabibbo-Kobayashi-Maskawa (CKM) mixing.

   (b) In p-Adic mass calculations one must estimate the contribution of the modular degrees of freedom to p-adic mass squared. This leads to a p-adic variant for the space parametrizing the modular degrees of freedom. The prediction is that this contribution dominates for higher genera.

   (c) The model should explain why why only 3 lowest genera are ex- perimentally present. The proposed explanation relies on the observation that 3 lowest genera are always hyper-elliptic meaning that they pos- sess Z_2 conformal symmetry. For higher genera this symmetry exists only for special metrics.

   (d) This global symmetry would make lowest three genera exceptional: they could have much lower mass scale than higher ones or the higher genera would correspond to what might be interpreted as many particle states formed by handles residing at partonic 2-surface and having continuous mass spectrum. One might even ask whether they could correspond to "ur-particles" introduced by Glashow.

3. Objections.

   (a) For the model to make sense one should have unique identification of the partonic 2-surfaces. This is not the case in ordinary positive energy ontology.In Zero Energy Ontology partonic 2-surfaces are naturally associated with the 3-surfaces at the ends of CD so that the problem disappears.

   (b) The recent view about elementary particles is more complicated than the original.

      i. Boundary component is replaced with partonic 2-surface at which the induced metric of the spacetime surface changes its signature.

      ii. Particle is replaced with a string like object consisting of two wormhole contacts.

   (c) In principle the genera of the 4 throats can be different although one expects that in excellent approximation they are identical and cor- respond to identical elementary particle vacuum functionals in the case of fermions at least.

   (d) In the case of bosons one can consider the possibility that the fermion and anti-fermion can have different genera so that one would obtain dynamical SU(3) symmetry asa combinatorial symmetry. Alternatively one could have only 3 bosonic genera. This prediction might kill the scenario.