Many-sheeted space-time

1. How the notion of manysheeted space-time has evolved?

   (a) Observation: the global imbeddings of field configurations possible in M^4 are not possible as space-time surfacs due to the compact topology of CP_2: CP_2 effectively replaces the noncompact field space of Minkowskian case.

   (b) What happens that the ansatz for imbedding becomes ill-defined because real CP_2 coordinates become complex and one is led outside of imbedding space.

   (c) The belief was that imbedding is possible only for regions with boundary but here boundary conditions become problematic. It would be nice to have M^4 vacuum extremal at boundary but this would mean that there is no need for boundary.

   (d) The solution comes from the observation that one can glue to extremals developing singularity (in the sense that real CP_2 coordinates would become complex) together along the boundaries. One obtains two-sheeted covering. All space-time sheets have this character so that "sheet" is not quite appropriate term but is used for "historical" reasons.

2. p-Adic length scale hypothesis and many-sheeted space-time.

   (a) p-Adic length scale hypothesis allows quantitative formulation of the notion. p-Adic mass calculations plus Uncertainty principle allow to assign to space-time sheet of elemenmentary particle p-adic length scale as $L_p = \sqrt{p}\hbar_{eff}/R$, R is CP_2 radius. p-Adic length scales would come as half-octaves if $p \simeq 2^k$ holds true.

   (b) The building bricks of elementary particles correspond to wormhole throats. What is scale of M^4 projection of wormhole throat. For cosmic strings projection is point but one expects that it widens when cosmic strings widen to topologically condensed magnetic flux tubes. Naive guess would be CP_2 scale but this would suggest mass of order CP_2 mass. The size of the projection might even correspond to Compton length.

   (c) The length of the flux tube connecting wormhole contacts appearing as building bricks of particle would be naturally of the order of Compton length length. The other end would contain pair of right-handed and left handed neutrino to neutralize the weak isospin in long length scales.

3. Hierarchy of Planck constants and multisheetedness.

   (a) The hierarchy of Planck constants $h_{eff} = n \times h$ brings additional delicacy. The proposal is that $h_{eff} = n \times h$ results from n-furcation of space-time sheet such that different sheets have same Khler action. This n-furcation is reflects the non-determinism of Khler action is closely related to the fractal hierarchy of sub-algebras of conformal algebras isomorphic to the algebra itself.

   (b) This many-sheetedness differs from that for 3-surfaces since the different branches of the multifurcation coincide at 3-surfaces at the ends of space-time sheet at boundaries of CD.

   (c) In hope of avoiding confusion I have called the many-sheetedness of pre ferred extremals as oppoto that of 3-surfaces multisheetedness.

4. Many-sheetedness and CP_2 geometry allow to over-come the basic objections against induced gauge field concept.

   (a) Induced gauge fields are expressible in terms of four CP_2 coordinates and their gradients. Hence linear superposition is lost except for massless extremals for Fourier components in the direction of massless wavevector.

   (b) The problem is solved by the replacement of the superposoition of classical fields with the superposition of their effects. A particle topologically condensing simultaneously to several space-time sheets experiences superposition of forces caused by the classical fields at the space-time sheets.

(c) Second problem is that different classical gauge fields are expressible in terms of CP_2 coordinates and are therefore not independent. How the multiply topologically condensed particle knows that particular space-time sheet carries particular gauge field? Or are the classical fields always em fields?

(d) The condition that em charge of spinor modes is well-defined implies that the spinor modes are in the generic case localized to string world sheets, which carry no W fields so that only classical em and Z^0 fields remain.

One can pose also additional condition stating that classical Z^0 field vanishes so that only classical em field remains.