Quantum model for sensory receptor.

1. Basic assumptions:

   (a) sensory reception is analogous to di-electric break down in which a lot of charge flows between electrodes

   (b) At least the first electrode carrying the qualia must be a macrocopic quantum system. Second electrode represents external world.

   (c) The increments of charges at first electrode represents the increment of quantum numbers representing quale. In the case of color vision the charges would correspond to color charges.

   (d) Basic prediction: qualia appear as pairs: quale and conjugate quale like color and conjugate color.

   (e) The communication of sensory input to magnetic body would be involved with the interpretation of the basic sensory input.

2. In the first model the assumption is that cell membrane is near to vacuum extremal for some neurons. This is not the only possibility.

   (a) Classical Z^0field would be present and effective membrane potential would contain Z^0contribution raising the energy of Josephson photons to visible and UV range corresponding to energies of bio-photons.

   (b) Without this assumption one cannot explain biophotons as decay products of dark photons of EEG since for far from vacuum extremals Josephson energy would correspond to ZeV$_emandwouldbejustabovethethermalenergy$.

(c) Near extremal property also implies that the effective resting potentials associated with span a range which can be wider than octave required by the realization of music metaphor in the model of EEG in the sense that even the music scale has analog as spectrum of Josephson energies.

(d) The assumption vulnerable to criticism is that for near vacuum extremals the value of Weinberg angle is by about factor 1/10 smaller than far from vacuum extremals. It is possible to get rid of this restriction. The assumption about classical Z^0fields is however questionable since it seems that classical $Z^0$and Wfields should vanish at string world sheets at least above weak scale which is however scaled up for large values of h_{eff}.

3. Second model relies on generalization of Josephson junction to allow different cyclotron energies at the two sides of the the membrane.

   (a) The energy difference for particles at different sides of membrane contains besides ordinary Josephson energy also a contribution from difference of cyclotron energies. This raises the scale to the energy scale of biophotons and allows alsoconsistent model for the metabolic energy quantum of nominal value .5 eV and considerabily higher than ordinary Josephson energy.

   (b) This model allows also to generalize the thermodynamical model of cell membrane to its quantal "square root" so with Boltzmann weights replaced with their complex square roots with phase expressed as different of total energy. Chemical potentials are replaced with differences of cyclo tron energies which are universal and in the energy range of biophotons.

   (c) Second model can be modified also to the needs of the first model.

   The first model can be applied to model color qualia

   (a) Visual colors correspond to QCD color assignable to quarks and gluons. This makes sense in TGD because TGD allows p-adically scaled copies of hadron physics and especially so in the length scale range 10 nm-2.5 μm containing four p-adic length scales assignable to Gaussian Mersennes.

   (b) There are 3 different fundamental pairs of conjugate colors: red-green, blue-yellow, and blackwhite corresponding to quantum numbers of 3 quarks (quantum numbers of quarks flowing to second layer of "capacitor").

(c) The Josephson energies assignable to various ions relevant for nerve pulse correspond to energies of photons assignable to basic colors being in eV range.

(d) Dark photons with these energies perhaps resulting from ordi nary visible photons could code for colors and transfer information to magnetic body.

(e) What is enocouraging that the spectrum of visible light varies from 380 nm to 750 nm. This corresponds to one octave as the realization of music metaphor demands!