

So called MEs (MEs or topological light rays) are non-vacuum extremals of both Kähler action and the EYM action serving as effective action of the theory. These extremals have cylindrical geometry and are carriers of purely classical vacuum currents and Einstein tensor, which are both light like. These vacuum currents generate coherent states of photons and gravitons with frequencies coming as multiples of the basic frequency determined by the length of the microtubule. They can also carry Bose-Einstein condensates of massless particles. It is proposed that microtubules and other linear structures could act as quantum antennae so that coherent light would be for brain same as radiowaves for us. MEs associated with axonal microtubules or axons themselves could serve as waveguides for the photons of coherent light and realize the notion of neural window abstracted from the paradigm of holographic brain. Vacuum currents could be also behind the ability of the biosystems to form representations of the external world.

There is indeed evidence for the quantum antenna hypothesis: some monocellulars are known to possess primitive microtubular vision, biophotons of Popp could be generated by MEs and the observations of Callahan support the view that odour perception of insects relies on maser-like emissions by the odour molecules. The coherent light emitted in sonoluminescence could be generated by light-like vacuum currents associated with regions with size given roughly by the diameter of microtubule when vapour-to-liquid phase transition occurs at the final stage of the bubble collapse. Also the observed direct transformation of kinetic energy of fluid motion to chemical energy could involve generation of MEs.

The light-like boundaries of MEs might not be allowed by boundary conditions: MEs could appear as pairs glued together along boundaries or as a similar pair of ME and magnetic flux tube. If the boundaries are however

possible, they have the same miraculous conformal properties as the boundary of future lightcone and MEs also allow holography in the sense of quantum gravity and string models and there are good hopes to generalize the construction of the WCW geometry and quantum TGD to take into account the classical non-determinism of Kähler action. MEs provide a justification for the intuition that the supersymplectic and superconformal symmetries of the lightcone boundary  $\delta M^4_+ \times CP_2$ , which are cosmological symmetries, generalize to approximate macroscopic symmetries acting on the light-like boundaries of the spacetime sheets inside future lightcone and broken only by quantum gravity. Supersymplectic symmetries almost-commute with Poincare symmetries and the gigantic almost-degenerate supersymplectic multiplets defined by genuinely quantum gravitational state functionals in the `{world of worlds}` correspond in a well-defined sense to higher abstraction level expected to be crucial for understanding consciousness. MEs are also tailor-made for quantum holography and teleportation. Quantum holography conceptualization inspires much more detailed views about how biosystems process information and how this information becomes conscious.

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