

$M^8 - H$ duality and the realization of holography in M^8 strongly suggests the importance of tessellations of H^3 (analogous to lattices of E^3) in the TGD based physics. These tessellations form a scale hierarchy and can thus appear in all scales. The hierarchy of effective Planck constants labelling dark matter as phases of ordinary matter indeed predicts quantum coherence in arbitrarily long scales and gravitational quantum coherence corresponds to the largest scales of quantum coherence among basic interactions.

There are 5 Platonic tessellations known as honeycombs: the 4 regular honeycombs correspond to cubic, icosahedral, and 2 dodecahedral honeycombs and a quasiregular icosatetrahedral honeycomb having tetrahedra, octahedra and icosahedra as cells. The icosatetrahedral honeycomb might define a universal realization of the genetic code as an induced structure so that the genetic code would be much more than a biochemical accident. These 5 Platonic honeycombs could occur also in astrophysical scales as gravitational tessellations. The recent discovery of gravitational hum might have an explanation as gravitational diffraction in this kind of a honeycomb.

In this chapter the properties of hyperbolic honeycombs are considered in detail and also a detailed view about the realization of DNA double strand in terms of the icosatetrahedral honeycomb is considered. The emerging model is surprisingly quantitative. Also a connection with the notion of memetic code and the realization of memetic codons in terms of 21 DNA codons are suggested by the model.