$M^8 - H$ duality is a proposal to integrate geometric and number theoretic visions of TGD. $M^8 - H$ duality has several questionable features. For various reasons it seems that M^8 must be replaced with its complexification M^8_c interpreted as complexified octonions O_c. This however leads to several problems. The modified variant of $M^8 - H$ duality identifying M^8 as a quaternionic sub-space of octonions O with a number theoretic norm defined by $Re(o^2)$, rather than $o\bar{o}$, solves these problems.

The proposal has been that octonionic polynomials $P(o)$ define the number theoretic holography. Their roots would define 3-D mass shells for which mass squared values are in general complex and the initial data for the holography would correspond to 3-surfaces at these mass shells. Also this assumption has problems. There is however no need for this assumption: the holography on the H side is induced by the $M^8 - H$ duality!

The hierarchy of polynomials defines a hierarchy of algebraic extensions defining an evolutionary hierarchy central for all applications of TGD and one must have it. Luckily, the recent realization that a generalized holomorphy realizes the holography at the H side as roots for pairs of holomorphic functions of complex (in generalized sense) coordinates of H comes to rescue. It can be strengthened by assuming that the functions form a hierarchy of pairs of polynomials.

Twistor lift strongly suggests that M^4 and space-time surfaces allow a Kähler structure and what I call Hamilton-Jacobi structure. These structures force a breaking of Poincare and even Lorentz invariance unless they are dynamically generated. It indeed turns out that $M^8 - H$ duality generates them dynamically.