The holography = holomorphy principle (H-H) has become a key principle of TGD. For the volume action H-H yields minimal surfaces as extremals and this encouraged the conjecture that H-H holds also for Kähler action.

Even stronger conjecture would be that even curvature scalar allows minimal surfaces as extremals. The strongest conjecture would be that the H-H principle holds for any general coordinate invariant action constructible in terms of the induced geometry and spinor structure.

Marko Manninen tested the conjectured universality by using NeuroPaja, a research setup combining AI systems with computer algebra, and found that it fails in two tested cases, namely for Kähler action and for the curvature scalar.

The curvature scalar does not appear in the basic action so that this is not a problem. The failure for Kähler action is however a problem. This is due to the failure of the Kähler current to be light-like. There is a very simple remedy to the problem. The condition that the Kähler function of CP_2 restricted to the space-time surface satisfies 2-D Laplace equation in transversal degrees of freedom implies that the Kähler current vanishes outside lower-dimensional singular surfaces, which could correspond to wormhole throats.

Hamilton-Jacobi (H-J) structure defines a generalization of Kähler structure and complex structure as a fusion of complex and hypercomplex structures. H-J structure can be identified as a slicing defined by 2-D Minkowskian string world sheets and Euclidean surfaces orthogonal to each other. The assumption that these surfaces are minimal surfaces is very attractive.