What gravitons are in the TGD framework? This question has teased me for decades. It is easy to understand gravitation at the classical level in the TGD framework but the identification of gravitons has been far from obvious. Second question is whether the new physics provided by TGD could make the detection of gravitons possible?

The stimulus, which led to the ideas related to the TGD based identification of gravitons, to be discussed in the sequel, came from condensed matter physics. There was a highly interesting popular article telling about the work of Liang et al with the title "Evidence for chiral graviton modes in fractional quantum Hall liquids" published in Nature.

The generalized Kähler structure for $M^4 \subset M^4 \times CP_2$ leads to together with holography=generalized holomorphy hypothesis to the question whether the spinor connection of M^4 could have interpretation as gauge potentials with spin taking the role of the gauge charge. The objection is that the induced M^4 spinor connection has a vanishing spinor curvature. If only holomorphies preserving the generalized complex structure are allowed one cannot transform this gauge potential to zero everywhere. This argument can be strengthened by assigning the fundamental vertices with the splitting of closed string-like flux tubes representing elementary particles. The vertices would correspond to the defects of ordinary 4-D smooth structure making possible a theory allowing a creation of fermion pairs. The vielbein part of the induced M^4 spinor connection could not be eliminated by a global general coordinate transformation at the defects.

For the induced vielbein conection of M^4 one would have an analog of topological field theory and the Equivalence Principle at quantum level would state that locally the vielbein part of M^4 spinor connection can be transformed to zero but not globally. The Kähler part of the M^4 spinor connection cannot be transformed away and could give rise to gravitons as monopole flux tubes containing fermion pairs with rotational angular momentum $L = 1$.

This description of gravitons corresponds to gauge-gravitation duality. Gravitons and gauge bosons would be in a completely similar role as far as vertices of generalized Feynman diagrams are considered. The vertex contains besides gauge potential terms also a term proportional to the trace of the second fundamental form at the singularity and vanishing elsewhere. It is identifiable as a generalized acceleration and generalization of the Higgs field. The condition for the vertex generalizes Newton's "F=ma"!

The second question is whether gravitons could be detected in the TGD Universe. It turns out that the FQHE type systems do not allow this but dark protons at the monopole flux tube condensates give rise to a mild optimism.