Topological Geometrodynamics is able to make rather precise and
often
testable predictions. In this and two other articles I want to
describe
the recent over all view about the aspects of quantum TGD relevant
for
particle physics.

In the first chapter I concentrate the heuristic picture about TGD
with
emphasis on particle physics.

\begin{itemize}

\item First I represent briefly the basic ontology: the motivations
for
TGD and the notion of many-sheeted space-time, the concept of zero
energy
ontology, the identification of dark matter in terms of hierarchy of
Planck
constant which now seems to follow as a prediction of quantum TGD,
the
motivations for p-adic physics and its basic implications, and the
identification of space-time surfaces as generalized Feynman
diagrams and
the basic implications of this identification.

\item Symmetries of quantum TGD are discussed. Besides the basic
symmetries of the imbedding space geometry allowing to geometrize
standard
model quantum numbers and classical fields there are many other
symmetries.
General Coordinate Invariance is especially powerful in TGD
framework
allowing to realize quantum classical correspondence and implies
effective
2-dimensionality realizing strong form of holography. Super-
conformal
symmetries of super string models generalize to conformal symmetries
of 3-D
light-like 3-surfaces.

What GRT limit of TGD and Equivalence Principle mean in TGD
framework have
are problems which found a solution only quite recently (2014). GRT
space-time is obtained by lumping together the sheets of many-
sheeted
space-time to single piece of M^4 provided by an effective metric
defined
by the sum of Minkowski metric and the deviations of the induced
metrics of
space-time sheets from Minkowski metric. Same description applies to
gauge

potentials of gauge theory limit. Equivalence Principle as expressed by
Einstein's equations reflects Poincare invariance of TGD.

Super-conformal symmetries imply generalization of the space-time supersymmetry in TGD framework consistent with the supersymmetries of
minimal supersymmetric variant of the standard model. Twistorial approach
to gauge theories has gradually become part of quantum TGD and the natural
generalization of the Yangian symmetry identified originally as symmetry
of ${\cal N}=4$ SYMs is postulated as basic symmetry of quantum TGD.

\item The so called weak form of electric-magnetic duality has turned out
to have extremely far reaching consequences and is responsible for the
recent progress in the understanding of the physics predicted by TGD. The
duality leads to a detailed identification of elementary particles as
composite objects of massless particles and predicts new electro-weak
physics at LHC. Together with a simple postulate about the properties of
preferred extremals of K\"ahler action the duality allows also to realized
quantum TGD as almost topological quantum field theory giving excellent
hopes about integrability of quantum TGD.

\item There are two basic visions about the construction of quantum TGD.
Physics as infinite-dimensional K\"ahler geometry of world of classical
worlds (WCW) endowed with spinor structure and physics as generalized
number theory. These visions are briefly summarized as also the practical
constructing involving the concept of Dirac operator. As a matter fact, the
construction of TGD involves four Dirac operators.

\begin{enumerate}

\item The K\"ahler Dirac equation holds true in the interior of space-time
surface: the well-definedness of em charge as quantum number of zero modes
implies localization of the modes of the induced spinor field to 2-surfaces. It is quite possible that this localization

is consistent with K\"ahler-Dirac equation only in the Minkowskian regions
where the effective metric defined by K\"ahler-Dirac gamma matrices can be
effectively 2-dimensional and parallel to string world sheet.

\item Assuming measurement interaction term for four-momentum, the boundary
condition for K\"ahler-Dirac operator gives essentially massless M^4
Dirac equation in algebraic form coupled to what looks like Higgs term
but gives a space-time correlate for the stringy mass formula at stringy
curves at the space-like ends of space-time surface.

\item The ground states of the Super-Virasoro representations are
constructed in terms of the modes of imbedding space spinor fields which
are massless in 8-D sense.

\item The fourth Dirac operator is associated with super Virasoro
generators and super Virasoro conditions defining Dirac equation in WCW.
These conditions characterize zero energy states as modes of WCW spinor
fields and code for the generalization of S-matrix to a collection of
what I call M-matrices defining the rows of unitary U-matrix defining
unitary process.

\end{enumerate}

\item Twistor approach has inspired several ideas in quantum TGD during
the last years. The basic finding is that M^4 resp. CP_2 is in a
well-defined sense the only 4-D manifold with Minkowskian resp.
Euclidian signature of metric allowing twistor space with K\"ahler
structure. It seems that the Yangian symmetry and the construction of
scattering amplitudes in terms of Grassmannian integrals generalizes to
TGD framework. This is due to ZEO allowing to assume that all particles
have massless fermions as basic building blocks. ZEO inspires the
hypothesis that incoming and outgoing particles are bound states of
fundamental fermions associated with wormhole throats. Virtual
particles would also consist of on mass shell massless particles but
without bound state constraint. This implies very powerful constraints
on loop diagrams and there are excellent hopes about their finiteness:

contrary to original expectations the stringy character of the amplitudes
seems necessary to guarantee finiteness.

\end{itemize}