%\begin{abstract}

Nuclear string hypothesis is one of the most dramatic almost-predictions
of TGD. The hypothesis in its original form assumes that nucleons inside
nucleus form closed nuclear strings with neighboring nuclei of the string
connected by exotic meson bonds consisting of color magnetic flux tube with
quark and anti-quark at its ends. It is also possible that neutrons and
protons form their own strings. The lengths of flux tubes correspond to
the p-adic length scale of electron and therefore the mass scale of the
exotic mesons is around 1 MeV in accordance with the general scale of
nuclear binding energies. The long lengths of em flux tubes increase the
distance between nucleons and reduce Coulomb repulsion. A fractally scaled
up variant of ordinary QCD with respect to p-adic length scale would be in
question and the usual wisdom about ordinary pions and other mesons as the
origin of nuclear force would be simply wrong in TGD framework as the large
mass scale of ordinary pion indeed suggests.

\vm {\it 1. $A>4$ nuclei as nuclear strings consisting of $A\leq 4$ nuclei}\vm

In this article a more refined version of nuclear string hypothesis is
developed.

\begin{enumerate}

\item It is assumed ^4He nuclei and $A<4$ nuclei and possibly also
nucleons appear as basic building blocks of nuclear strings. $A\leq 4$
nuclei in turn can be regarded as strings of nucleons. Large number of
stable lightest isotopes of form $A=4n$ supports the hypothesis that the
number of ^4He nuclei is maximal. Even the weak decay characteristics
might be reduced to those for $A<4$ nuclei using this hypothesis.

\item One can understand the behavior of nuclear binding energies
surprisingly well from the assumptions that total {\it strong} binding

energy associated with $A\leq 4$ building blocks is {\it additive} for
nuclear strings.

\item In TGD framework tetra-neutron is interpreted as a variant of alpha
particle obtained by replacing two meson-like stringy bonds connecting
neighboring nucleons of the nuclear string with their negatively charged
variants. For heavier nuclei tetra-neutron is needed as an additional
building brick. \end{enumerate}

\vm{\it 2. Bose-Einstein condensation of color bonds as a mechanism of
nuclear binding}\vm

The attempt to understand the variation of the nuclear binding energy and
its maximum for Fe leads to a quantitative model of nuclei lighter than
Fe as color bound Bose-Einstein condensates of pion like colored states
associated with color flux tubes connecting ^4He nuclei. The color
contribution to the total binding energy is proportional to n^2, where
n is the number of color bonds. Fermi statistics explains the reduction
of E_B for the nuclei heavier than Fe. Detailed estimate favors
harmonic oscillator model over free nucleon model with oscillator strength
having interpretation in terms of string tension.

Fractal scaling argument allows to understand ^4He and lighter nuclei as
strings of nucleons with nucleons bound together by color bonds. Three
fractally scaled variants of QCD corresponding $A>4$, $A=4$, and $A<4$
nuclei are involved. The binding energies of also $A\leq 4$ are predicted
surprisingly accurately by applying simple p-adic scaling to the model of
binding energies of heavier nuclei.

\vm{\it 3. Giant dipole resonance as de-coherence of Bose-Einstein
condensate of color bonds}\vm

Giant resonances and so called pygmy resonances are interpreted in terms

of de-coherence of the Bose-Einstein condensates associated with $A\leq 4$
nuclei and with the nuclear string formed from $A\leq 4$ nuclei. The
splitting of the Bose-Einstein condensate to pieces costs a precisely
defined energy. For ^4He de-coherence the model predicts singlet line at
12.74 MeV and triplet at ~ 27 MeV spanning 4 MeV wide range.

The de-coherence at the level of nuclear string predicts 1 MeV wide bands
1.4 MeV above the basic lines. Bands decompose to lines with precisely
predicted energies. Also these contribute to the width. The predictions are
in rather good agreement with experimental values. The so called pygmy
resonance appearing in neutron rich nuclei can be understood as a
de-coherence for $A=3$ nuclei. A doublet at ~ 8 MeV and MeV spacing
is predicted. The prediction for the position is correct.

\vm{\it 4. Dark nuclear strings as analogs of as analogs of DNA-, RNA- and
amino-acid sequences and baryonic realization of genetic code}\vm

A speculative picture proposing a connection between homeopathy, water
memory, and phantom DNA effect is discussed and on basis of this
connection a vision about how the hardware for topological quantum
computation (TQC) represented by the genome is actively developed by
subjecting it to evolutionary pressures represented by a virtual world
representation of the physical environment. The speculation inspired by
this vision is that genetic code as well as DNA-, RNA- and amino-acid
sequences should have representation in terms of nuclear strings. The model
for dark baryons indeed leads to an identification of these analogs and the
basic numbers of genetic code including also the numbers of amino-acids
coded by a given number of codons are predicted correctly. Hence
genetic code would be universal rather than being an accidental outcome
of the biological evolution.

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