Leptoquarks as first piece of evidence for TGD based view about SUSY?

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Abstract

Indications supporting the notion of leptoquarks have been accumulating at LHC from the decays of B mesons, which seem to break lepton universality. There is also the old deviation of muon's magnetic moment from the predicted one. It has been claimed that leptoquarks could explain all these potential anomalies. The needed leptoquarks have same quantum numbers as D type squarks in TGD inspired view about SUSY in which addition of right-handed neutrino or antineutrino to particle state creates the sparticle state.

The basic problem of TGD inspired SUSY has been the lack of experimental information allowing to guess what might be the p-adic length scale associated with sparticles. The massivation as such is not a problem in TGD: the same mass formula would be obeyed by particles and sparticles and SUSY breaking would mean only different p-adic mass scales for stable particle states. One can even consider the possibility that particles and sparticles have identical masses but sparticles have non-standard value of h_{eff} behaving therefore like dark matter.

The solution of the problem could emerge from experiments in totally unexpected manner. Indications for the existence of leptoquarks have been accumulating gradually from LHC. Leptoquarks should have same quantum numbers as pairs of quark and right-handed neutrino and would thus correspond to squarks in $\mathcal{N}=2$ SUSY of TGD.

I have written about leptoquarks as an explanation for the breaking of leptonic universality for which indications have emerged from B meson decays [**?**] [L1].

Leptoquarks have received considerable attention in blogs. Both Jester (see http://resonaances.blogspot.fi/2015/11/leptoquarks-strike-back.html) and Lubos (see http://motls.blogspot.fi/2015/11/leptoquarks-may-arrive-lhc-to-prove-e6.html) have written about the topic. Jester lists 3 B-meson potential anomalies, which leptoquarks could resolve:

- A few sigma deviation in differential distribution of $B \rightarrow K^*\mu^+\mu^-$ decays.
- 2.6 sigma violation of lepton flavor universality in $B \rightarrow D\mu^+\mu^-$ *vs.* $K \rightarrow De^+e^-$ decays.
- 3.5 sigma violation of lepton flavor universality, but this time in $B \rightarrow D\tau\nu$ *vs.* $B \rightarrow D\mu\nu$ decays.

There is also a 3 sigma discrepancy of the experimentally measured muon magnetic moment, one of the victories of QED. And old explanation has been in terms of radiative corrections brought in by SUSY. In TGD framework one can consider an explanation in terms of $\mathcal{N}=2$ SUSY generated by right-handed neutrino. It has been claimed (see http://arxiv.org/abs/1511.01900) that leptoquark with quantum numbers of $D\nu_R$, where D denotes D type quark actually s quark, which in TGD framework corresponds to genus $g=1$ for the corresponding partonic 2-surface, could explain all these anomalies.

An alternative model would explain the breaking of lepton universality in terms of bosonic analogs of higher fermion generations. The charge matrix of ordinary gauge boson is unit matrix in the 3-D state space assignable with the three generations representing various fermion families. Gauge bosons correspond to charge 3×3 matrices, which must be orthogonal with respect to the inner product defined by trace. Hence fermion universality is broken for the 2 higher gauge boson generations. The first guess is that the mass scale of the second boson generation corresponds to Gaussian Mersenne $M_{G,79}$ [?] [L2].

The model for the breaking of universality in lepton pair production is in terms of $M_{G,79}$ bosons. In standard model the production of charged lepton pairs would be due to the decay of virtual W bosons appearing in self-energy loop of penguin diagram. W emits Z^0 or γ decaying to a charged lepton pair. If a virtual higher generation W_{79} boson appears in self energy loop, it can transform to W by emitting Z^0_{79} or γ_{79} decaying to lepton pair and inducing a breaking of lepton universality. Direct decays of W_{79} to $l\overline{\nu}_L$ pairs imply a breaking of lepton universality in lepton-neutrino pair production.

With a lot of good luck both mechanisms are involved and leptoquarks are squarks in TGD sense. If also M_{89} and M_{79} hadron make themselves visible at LCH (there are several pieces of evidence for this), a breakthrough of TGD would be unavoidable. Or is it too optimistic to hope that the power of truth could overcome academic stupidity, which is after all the strongest force of Nature?

REFERENCES

Books related to TGD

Articles about TGD

[L1] Pitkänen M. Have lepto-quarks been observed in the decays of B mesons? Available at: http://tgdtheory.fi/public_html/articles/leptoquark.pdf, 2015.

[L2] Pitkänen M. What is the role of Gaussian Mersennes in TGD Universe? Available at: http://tgdtheory.fi/public_html/articles/MG79.pdf, 2015.