A Novel View of Quark Electric Charges and Baryon Composition

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Abstract

I propose that the quarks (d, s, b) carry the electric charge (-1) and the quarks (u, c, t) are electrically neutral. I further propose that baryons are composed of one quark and two anti-quarks. I believe that these assumptions help to solve some problems in the Standard Theory of elementary particles.

Exposition of Problems:

Baryons are said to be composed of three quarks each. Quarks are the charge carriers of the strong interaction which possesses three charges called colours: red (R), green (G), and blue (B). The combination of (RGB) then results in a colour-less output, just as baryons appear. The strong interaction is supposed to confine the quarks within the hadrons (baryons and mesons).

But why do quarks, according to the Standard Theory, possess fractional electric charges while the leptons (electron and neutrino) carry integer charges?

			R	G	B
Electron	-1	d-quark	-1/3	-1/3	-1/3
Neutrino	0	u-quark	+2/3	+2/3	+2/3

The same applies to the heavier quarks (s, c, b, t) and their associated leptons.

In Standard Theory the concept of isospin was introduced to distinguish between baryons with identical quark composition. In the case of baryons with three different quarks, e. g. [dus], there are iso-triplets. For quarks with two different quarks, e. g. [ddu], there are iso-doublets. Only baryons with three identical quarks, e. g. [ddd], are uniquely determined. The proton (nucleon +) with the quark composition [duu], for example, has a partner with the same composition, the Delta +.
In the Standard Theory, nucleons and deltas are distinguished [because of] their isospin of 1/2 and 3/2, respectively.

Can the problem which to clarify the isospin was introduced not also be

solved in a different way?

Baryons are unstable on their own and ultimately decay into the proton, the only stable baryon. Accordingly, the proton should be composed of three of the lightest quarks.

Why, then, does the proton have the quark configuration [duu], and not [ddd] or [uuu]?

Proposal for a Solution:

The colour charges need to be redefined: red (R), magenta (M), yellow (Y). The former green (G) turns into the anti-colour anti-magenta ($\underline{M}$). The former blue (B) turns into anti-yellow ($\underline{Y}$). Only red (R) remains unchanged.
The former colourless (RGB) turns into white (W)=(R$\underline{MY}$). (W) will be newly introduced to turn the colour hexagon into a colour cube.

	W		R	M	Y
Electron	-1	d-quark	-1	-1	-1
Neutrino	0	u-quark	0	0	0

The same applies to the heavier quarks (s, c, b, t) and their associated leptons.

Leptons and quarks now have analogous and integer electric charges.
All particles are now electrically negative (or neutral), while the anti-particles are positive (or neutral).

Baryons still consist of three quarks, but now, more precisely, of one quark and two anti-quarks.

The proton now has the configuration [d$\underline{dd}$]. The d-quark is here supposed to be the lightest quark, and it seems only logical that all instable baryons decay into the proton.

For the possible triplet variation the following used to apply:

$N=(n-1+k)!/(n-1)!k!$ for {d, u} n=2, k=3, N=4
{d, u, s, c} n=4. k=3, N=20
{d, u, s, c, t} n=6, k=3, N=56

Now the following variation applies:

$N=f(n-1+k)!/(n-1)!k!$ for {d, u} f=n=2, k=2, N=6

{d, u, s, c}	f=n=4, k=2, N=40
{d, u, s, c, b, t}	f=n=6, k=2, N=126

Ther seems no need any longer for the concept of isospin since the quark triplets are now uniquely defined for each baryon.

A preon model with ($\pm$ ½) electrical charge and no neutral charges becomes tangible. There remain, however, problems with particle rest masses.