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On The Special Strongly Interacting Baryons*

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Abstract

Physics of strongly interacting particles are well known in terms of simplified mathematical models. This note mathematically shows the evidence of particles called baryons of special type, means with special quark combinations. The certainty of this paper must be an experimental approach in high energy accelerators.

Keywords: Isospin, Flavors, Baryon Number.

The supremacy of mathematical models describing particularly the strongly interacting particles is precise. The eightfold way [1] classification was proposed in 1961, which describes the patterns, mathematically established to classify the particles discovered in cosmic ray analysis. In 1968 the discovery of quarks gave the experimental vindication to firmly establish the existence of quarks. The work of Gell-Mann [2] predicted the possible existence of quarks of three flavors up, down and strange. However experiments showed that six flavors of quarks exist which bears an electric charge of +2e/3 and –e/3 with spin ½ all clearly a fermions. The charge formula [3] derived by Gell-Mann and K.Nishijima is to calculate the charge of quarks of three flavors according to Gell- Mann's theory. The Gell-Mann–Nishijima formula relates the baryon number *B*, the strangeness *S*, the isospin *I3* of quarks to the electric charge *Q*

$$Q = I_3 + \frac{1}{2}(B + S)$$

Theoretical calculations shows a striking mathematical connection to show that a special strong interacting hadrons essentially baryons must exist. The equation based on quarks of three flavors (up, down and strange) of Gell-Mann's work can simply be given as

$$Q_B = 3I_3 + \frac{1}{2}(B + S) + B - S$$

Q_B is the charge of the special baryon.The merits of the above equation shows that a particle (Baryon) of combination "u u u", "d d d" and "$s'\ s'\ s'$" must exist. "$s'\ s'\ s'$" is the antiparticle of particle of possible composition "s s s" all mentioned baryons posses a spin 3/2 fermions of weird type.

From the calculation the charge of "u u u", "d d d" and "$s'\ s'\ s'$" is +2, -1 and +1 respectively, so clearly merits of our mathematical equation also predicts the antiparticle of at least one special baryon "s s s". In addition one chance must be stated that baryons of states "c c c", "b b b" and "t t t" seems does not exist in nature**.

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References

[1] M. Gell-Mann, Phys. Rev. 125, 1067 (1961).

[2] M. Gell-Mann, Phys. Letters 8, 214 (1964).

[3] Nishijima, paper "Charge Independence for V-particles" Nov 16, 1953, pg 581. Journal prog. Theor. Phys.

*After the completion of this work, author was being reported that the predicted particles were already confirmed experimentally much earlier.

** Particles not yet discovered (obeying the prediction of the author)