Quark and Particle Isomers

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Abstract

The process of finding the least common denominator of quarks has yielded four new unique quarks. Taking this process one step further, particles made of these new quarks can be proposed and investigated. If these new particles are just isomers of existing particles, how can we tell if a particle is composed of the well-known quarks or the new quarks?

Keywords

Tetrons, quarks, particles, beta-plus, beta-minus

Contents

Claims of Novelty

- 4 New quarks exist
- Leptons are made of quarks

Dedication

This work is dedicated to Ginger

Chapter 2 Derivation of New Quarks

The first step in deriving new quarks is to list the known first level quarks.

symbol	spin	charge
u	+1/2	+2/3
d	+1/2	-1/3
u'	-1/2	-2/3
d'	-1/2	+1/3

Performing a least common denominator technique on spin and charge to find a more elementary entity that makes up these quarks, we find sub-quarks with spin +/- 1/4 and charge +/- 1/6. Examining the result, we find a quadrant of 4 possible sub-quarks, now named tetrons[1]. Double letters are used for tetron names because all single letter symbols are used elsewhere:

symbol	spin	charge
ww	+1/4	+1/6
xx	-1/4	+1/6
yy	+1/4	-1/6
zz	-1/4	-1/6

The last step is to find the non-repeating permutations of these 4 tetrons to recreate the existing quarks.

Spin	Charge		Tetrons	ww	xx	yy	zz	Quark	Isomer
-1/2	-2/3		zz, yy, zz, zz	0	0	1	3	u'	
+1/2	-2/3		zz, yy, yy, yy	0	0	3	1	yyz	
-1/2	-1/3		yy, zz, zz, xx	0	1	1	2	wxy'	
+1/2	-1/3		yy, yy, xx, yy	0	1	3	0	d2	d
-1/2	+1/3		xx, yy, xx, xx	0	3	1	0	d2'	d'
-1/2	-1/3		zz, zz, zz, ww	1	0	0	3	zww'	wxy'
+1/2	-1/3		yy, ww, yy, zz	1	0	2	1	d	
-1/2	+1/3		xx, xx, zz, ww	1	2	0	1	d'	
-1/2	+2/3		xx, xx, ww, xx	1	3	0	0	yyz'	
+1/2	+1/3		ww, yy, xx, ww	2	1	1	0	wxy	
+1/2	+1/3		ww, ww, zz, ww	3	0	0	1	zww	wxy
+1/2	+2/3		xx, ww, ww, ww	3	1	0	0	u	

The existing first level quarks u, u', d, d' have been recreated from the 4 tetrons. New unique quarks have been created from the tetrons: wxy, wxy', yyz and yyz'. Isomers have also been created: zww, zww', d2, d2'. The quark definition of an isomer is, "two quarks with the identical charge, spin but with different tetrons". By this definition:

- zww is an isomer of wxy (ww, ww, zz, ww) vs. (ww, yy, xx, ww)
- zww' is an isomer of wxy' (zz, zz, zz, ww) vs. (yy, zz, zz, xx)
- d2 is an isomer of d (yy, yy, xx, yy) vs. (yy, ww, yy, zz)
- d2' is an isomer of d' (xx, yy, xx, xx) vs. (xx, xx, zz, ww)

That leaves four new quarks as possible components of existing particles. It is convenient to use a database to list the particles that can be composed because an outer join can perform a combination or permutation.

[1] Tetrons, viXra.org e-Print archive, viXra:2307.0050

Proton

Quarks	Spin	Charge
d, u, u	+3/2	+1
u, d, u	+3/2	+1
u, u, d	+3/2	+1
wxy, wxy, wxy	+3/2	+1

The u, u, d is expected, but the wxy, wxy, wxy is not expected. However, wxy spin is +1/2 and charge is +1/3, which meets the criteria for the proton being made of 3 wxy.

Neutron

Quarks	Spin	Charge
d, d, u	+3/2	0
d, u, d	+3/2	0
u, d, d	+3/2	0
wxy, wxy, yyz	+3/2	0
wxy, yyz, wxy	+3/2	0
yyz, wxy, wxy	+3/2	0

This again meets the criteria because wxy and yyz are each +1/2 spin and the yyz's -2/3 charge matches the wxy's +1/3.

Chapter 3 Derivation of Lepton Quarks

In my weak reaction paper[2], the leptons are described as being composed of the new quarks. The same outer join technique yields the possible quarks that make the electron, positron, electron neutrino and positron neutrino.

Electron

Quarks	Spin	Charge
d, d, wxy'	+1/2	-1
d, wxy', d	+1/2	-1
d', yyz, yyz	+1/2	-1
u', wxy, yyz	+1/2	-1
u', yyz, wxy	+1/2	-1
wxy', d, d	+1/2	-1
wxy, u', yyz	+1/2	-1
wxy, yyz, u'	+1/2	-1
yyz, d', yyz	+1/2	-1
yyz, u', wxy	+1/2	-1
yyz, wxy, u'	+1/2	-1
yyz, yyz, d'	+1/2	-1

[2] The Weak Reaction, viXra.org e-Print archive, viXra:2307.0076

Positron

Quarks	Spin	Charge
d, u, yyz'	+1/2	+1
d', wxy, wxy	+1/2	+1
d, yyz', u	+1/2	+1
u, d, yyz'	+1/2	+1
u, u, wxy'	+1/2	+1
u, wxy', u	+1/2	+1
u, yyz', d	+1/2	+1
wxy, d', wxy	+1/2	+1
wxy', u, u	+1/2	+1
wxy, wxy, d'	+1/2	+1
yyz', d, u	+1/2	+1
yyz', u, d	+1/2	+1

Electron Neutrino

Quarks	Spin	Charge
d, d, yyz'	+1/2	0
d, u, wxy'	+1/2	0
d, wxy', u	+1/2	0
d', wxy, yyz	+1/2	0
d, yyz', d	+1/2	0
d', yyz, wxy	+1/2	0
u, d, wxy'	+1/2	0
u, wxy', d	+1/2	0
u', wxy, wxy	+1/2	0
wxy', d, u	+1/2	0
wxy, d', yyz	+1/2	0
wxy', u, d	+1/2	0
wxy, u', wxy	+1/2	0
wxy, wxy, u'	+1/2	0
wxy, yyz, d'	+1/2	0
yyz', d, d	+1/2	0
yyz, d', wxy	+1/2	0
yyz, wxy, d'	+1/2	0

Positron Neutrino

Quarks	Spin	Charge
d', d', yyz	-1/2	0
d', u', wxy	-1/2	0

d', wxy, u'	-1/2	0
d, wxy', yyz'	-1/2	0
d', yyz, d'	-1/2	0
d, yyz', wxy'	-1/2	0
u', d', wxy	-1/2	0
u', wxy, d'	-1/2	0
u, wxy', wxy'	-1/2	0
wxy, d', u'	-1/2	0
wxy', d, yyz'	-1/2	0
wxy, u', d'	-1/2	0
wxy', u, wxy'	-1/2	0
wxy', wxy', u	-1/2	0
wxy', yyz', d	-1/2	0
yyz, d', d'	-1/2	0
yyz', d, wxy'	-1/2	0
yyz', wxy', d	-1/2	0

Chapter 4 Derivation of Beta Reaction Components

In addition to listings of particle isomers, the database approach is also convenient for finding nuclear reaction components. For example, my weak reaction paper[3] postulates a reaction among the nucleons and the leptons instead of a weak force driven decay.

Beta Plus Reaction

electron_neutrinos	positrons
d, d, yyz'	d, u, yyz'
d, d, yyz'	u, d, yyz'
d, u, wxy'	d, u, yyz'
d, u, wxy'	u, u, wxy'
d, wxy', u	d, yyz', u
d, wxy', u	u, wxy', u
d', wxy, yyz	d', wxy, wxy
d, yyz', d	d, yyz', u
d, yyz', d	u, yyz', d
d', yyz, wxy	d', wxy, wxy
u, d, wxy'	u, d, yyz'
u, d, wxy'	u, u, wxy'
u, wxy', d	u, wxy', u
u, wxy', d	u, yyz', d
u', wxy, wxy	d', wxy, wxy
wxy', d, u	wxy', u, u
wxy', d, u	yyz', d, u

[3] The Weak Reaction, viXra.org e-Print archive, viXra:2307.0076

wxy, d', yyz	wxy, d', wxy
wxy', u, d	wxy', u, u
wxy', u, d	yyz', u, d
wxy, u', wxy	wxy, d', wxy
wxy, wxy, u'	wxy, wxy, d'
wxy, yyz, d'	wxy, wxy, d'
yyz', d, d	yyz', d, u
yyz', d, d	yyz', u, d
yyz, d', wxy	wxy, d', wxy
yyz, wxy, d'	wxy, wxy, d'

Beta Minus Reaction

positron_neutrinos	electrons
d', d', yyz	d', yyz, yyz
d', d', yyz	yyz, d', yyz
d', u', wxy	yyz, u', wxy
d', wxy, u'	yyz, wxy, u'
d, wxy', yyz'	d, wxy', d
d', yyz, d'	d', yyz, yyz
d', yyz, d'	yyz, yyz, d'
d, yyz', wxy'	d, d, wxy'
u', d', wxy	u', yyz, wxy
u', wxy, d'	u', wxy, yyz
wxy, d', u'	wxy, yyz, u'
wxy', d, yyz'	wxy', d, d
wxy, u', d'	wxy, u', yyz
wxy', yyz', d	wxy', d, d
yyz, d', d'	yyz, d', yyz
yyz, d', d'	yyz, yyz, d'
yyz', d, wxy'	d, d, wxy'
yyz', wxy', d	d, wxy', d

It is difficult to find fault with the database results. It is necessary to find fault with the premise that the new quarks don't exist and/or they don't form the leptons. In answer to the question posed in the abstract, "How can we tell if a particle is composed of the well-known quarks or the new quarks?" The answer must be unknown until an analytic technique is devised that can tell us the contents of a quark.