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New Reaction of Neutron-Proton Conversion

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Abstract

Using our models of composite particles as consisting just of two types of elementary basic charges, +e/3 and -e/3, we suggest that in any nuclear reaction the total numbers of basic charges of each of the two types are conserved. That means that in any nuclear reaction, the basic elementary charges present in the reactants can join in different combinations to form the products of the reaction. This is like a balanced chemical equation where the number of atoms of each element is conserved. We apply this suggested principle of conservation of basic elementary charges in any nuclear reaction to suggest an explanation of the mechanism of the neutron-proton transmutation in the beta-minus and beta-plus decays. We suggest that another type of transmutation reaction, that does not lead to emission of an electron or positron, is feasible. The suggested new reaction of neutron-proton conversion is reversible and can go preferably in that or the other direction, depending on the relative availability of the reactant (neutrons and protons) in a nucleus.

In [1], we suggested that the "elementary" particles, such as quarks and an electron, are not elementary but are composed each of several basic elementary particles with fractional charges +e/3 and -e/3. These basic elementary particles have charge and mass properties but do not have any other intrinsic properties such as a spin or magnetic moment. The mass of the basic elementary particle of charge -e/3 was predicted to be 1/6 of the electron mass.

Each structure made of the basic elementary charges contains a definite number of +e/3 and -e/3 charges. In our models of quarks and other structures, d-quark consists of one positive and two negative basic charges, u-quark consists of one negative and three positive basic charges, and an electron consists of one positive and four negative basic charges.

Neutral particles might be structures made of an equal number of positive and negative basic elementary charges, as individual basic charges or as parts of other structures. For example, a π-0 pion consists of d-quark and d-antiquark, each consisting of definite number of elementary basic charges: $d(1+,2-)\ and\ \bar{d}(2+,1-)$. Therefore, π-0 pion consists of three +e/3 and three -e/3 elementary basic charges.

We suggest that the positive and negative basic elementary particles are the basic elements of matter, they are not created anew and are not destroyed, they are present in any composite particle and can join in different structural arrangements to form other composite particles. For example, the beta-decay reaction is described as conversion of a neutron into a proton, with emission of an electron. The fact that an electron is not present as a component of a nucleus but is created in the beta-minus-decay nuclear reaction is consistent with our models of electron. Basing on the assumption that the elementary basic charges are present in reagents of the nuclear process and re-arrange to form other structures (the products of the nuclear reaction), we consider that the total numbers of positive and negative basic elementary charges should be conserved in any nuclear reaction.

Applying the principle of conservation of numbers of positive and negative basic elementary charges to the case of beta-decay, we concluded [2] that the neutron-proton transformation couldn't be considered as just a conversion of one of the d-quark of a neutron to a u-quark where an electron would appear from nowhere. There would simply be not enough of the basic elementary charges in such a presentation of the beta-decay. We suggested the mechanism of the transformation of a neutron to a proton in beta-decays as follows: the d-quark of a neutron and, in addition to that, a $\bar{u}$ – quark would participates in the reaction as two reagents, so the resulting products (u-quark, electron, and electron anti-neutrino) would contain in total the same number of +e/3 basic elementary charges and the same number of basic -e/3 charges as in the reagents.

It is known that the direction of the nuclear reaction of conversion of a neutron into a proton or a proton into a neutron depends on the ratio of the numbers of neutrons and protons in the nucleus. Thinking of a mechanism of n->p and p->n conversion in terms of our models and counting positive and negative basic charges in the reactants and products, we can suggest that another mechanism of a neutron-proton conversion can exist, the non-radiative conversion. A neutron (ddu) consists of two d-quarks (in our model, each of them consisting of one +e/3 and two -

e/3 charges) and one u-quark (consisting of one -e/3 and three +e/3 charges). Hence, there are five -e/3 and five +e/3 basic elementary charges in a neutron. The same way, we can count the basic elementary charges in a proton (uud), resulting in four -e/3 and seven +e/3 basic charges per a proton. We can see that adding a u-quark (3+, 1-) to a neutron (5+, 5-) can produce a proton (7+, 4-) and d-quark out of +e/2 and -e/3 basic charges available in the reactants: n+ u -> p + d.

$$\left\{\left[5\left(+\frac{e}{3}\right)+5\left(-\frac{e}{3}\right)\right]+\left[3\left(+\frac{e}{3}\right)+1\left(-\frac{e}{3}\right)\right]\right\}\rightarrow\left\{\left[7\left(+\frac{e}{3}\right)+4\left(-\frac{e}{3}\right)\right]+\left[1\left(+\frac{e}{3}\right)+2\left(-\frac{e}{3}\right)\right]\right\}$$

$$n \ + \ u \ \rightarrow \ p \ + \ d \qquad (1)$$

Similarly, adding a d-quark (1+, 2-) to a proton (7+, 4-) can results in two composite particles - a neutron (5+, 5-) and a u-quark (3+, 1-).

$$\left\{\left[7\left(+\frac{e}{3}\right)+4\left(-\frac{e}{3}\right)\right]+\left[1\left(+\frac{e}{3}\right)+2\left(-\frac{e}{3}\right)\right]\right\}\rightarrow\left\{\left[5\left(+\frac{e}{3}\right)+5\left(-\frac{e}{3}\right)\right]+\left[3\left(+\frac{e}{3}\right)+1\left(-\frac{e}{3}\right)\right]\right\}$$

$$p \ + \ d \ \rightarrow \ n \ + \ u \qquad (2)$$

Hence, the suggested new reaction of converting neutron to a proton and back is reversible, with the direction of the reaction dependent on the availability of the reactants (neutrons and protons in a nucleus). The elementary charges are just re-arranging:

$$n \ + \ u \ \leftrightarrow \ p \ + \ d \qquad (3)$$

The suggested new reaction will go preferrable as (1) in case of superabundance of neutrons in a nucleus, while it will go mostly as (2) in the case of superabundance of protons, in accordance with the experimental observations.
There is no electron or positron emission in this reaction. While this transmutation reaction seems feasible in terms of our models of particles, its occurrence is to be proved (or rejected) by the experimental data analysis.

Conclusion

Using our models of composite particles as consisting of just two types of elementary basic charges, +e/3 and -e/3, we suggest that in any nuclear reaction the total numbers of basic charges of each of the two types are conserved. That means that in any nuclear reaction, the basic elementary charges present in the reactants can join in different combinations to form the products of the reaction. This is like a balanced chemical equation where the number of atoms of each element is conserved. We apply this suggested principle of conservation of basic elementary charges in any nuclear reaction to suggest an explanation of the mechanism of the neutron-proton transmutation in the beta-minus and beta-plus decays. We also suggest that another type of transmutation reaction that does not lead to emission of an electron or positron is feasible. The suggested new reaction of neutron-proton conversion is reversible and can go preferably in that or the other direction, depending on the relative availability of the reactant (neutrons and protons) in a nucleus. Because there would be no emitted particles in that reaction, it could go in a background without clear indication for the observers.

References

1. Perov, Polievkt, "Electron And Other Quarks As Particles Made Off Elementary Particles of Charge e/3 And Mass me/6", http://dc.suffolk.edu/cas-faculty/7
2. Perov, Polievkt, "Fractional charge concept opened gates for new ideas on composition of matter", http://dc.suffolk.edu/cas-faculty/