Mass Calculation of Antiproton

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Abstract In previous study, the masses of proton, kaon, and pion were calculated. Proton of 938.3 MeV is composed of two up quarks, one down quark, one strong particle force and the dark force, and one electromagnetic particle force and the dark force. The shell of antiproton is one anti-electromagnetic particle force, which is 2π times heavier than electromagnetic particle force. From this, the mass of antiproton was calculated as 5.895 GeV. The minimum kinetic energy required to produce an antiproton is 5.6 GeV, and the first experiment to confirm the existence of antiproton was the collision of copper target and protons accelerated to 6.2 GeV. The average mass of two values is 5.9 GeV, and the calculated value of antiproton is 5.895 GeV. Is this coincidence or necessity?

1. Introduction

In previous studies, the calculation of everything was suggested [1], and proton, kaon, and pion masses were calculated [2]. In this study, the mass of antiproton was calculated.

2. Shape and Mass of Proton and Antiproton

2.1 Shape and mass of quark and force

The shape and mass of up quark [u] was calculated as 2.251 MeV [Ref. 1, Page 32 Fig. 1 and Page 33 Table 1]. The shape and mass of down quark [D] was calculated as 4,760 MeV [Ref. 1, Page 41 Fig. 1 and Page 42 Table 1]. The shape and mass of strong particle force γ_{nG}^{6} was calculated as 42.15 keV [Ref. 1, Page 24 Fig. 2 and Page 25 Table 1]. The shape and mass of electromagnetic particle force β_{nG}^{56} was calculated as 828.1 eV. From the integration of four fundamental forces, the strong dark force ξ_{s}^{6} was calculated as 0.0065 times and the electromagnetic dark force ξ_{e}^{56} was calculated as 0.0460 times [Ref. 1, Page 26 Fig. 3(a) and Page 27 Paragraph 4.6].

The key is that the quantum mass must be calculated as logarithmic values.

2.2 Proton = uuD + γ_{nG}^{6} + ξ_{s}^{6} + β_{nG}^{56} + ξ_{e}^{56}

As suggested in previous study [2], The shape of proton is drawn at Fig. 1, and its mass is calculated at Case 1) of Table 1. The inside is composed of blue two up quarks [uu], red one down quark [D], and green one strong particle force γ_{nG}^{6}. The average mass is calculated as 6.0018. Its dark force ξ_{s}^{6} of 0.0065 acts on the strong particle force. Orange electromagnetic particle force of 2.9181 binds them together. Its dark force ξ_{e}^{56} of 0.0460 acts on the electromagnetic particle force. Therefore, the summation of them is calculated as 938.27 MeV.

2.3 Antiproton = uuD + γ_{nG}^{6} + ξ_{s}^{6} + β_{sT}^{56} + ξ_{e}^{56}

Throughout previous study [1], it has been suggested that antiparticle is 2π times heavier than particle. In Fig. 2 or Case 2), the electromagnetic force β_{nG}^{56} of Fig. 1 or Case 1) is replaced to the anti-electromagnetic force β_{sT}^{56}. The mass of Fig. 2 was calculated as 5.895 GeV. In Fig. 1 and Fig. 2, the shells are particle and antiparticle, but their interiors coincide with each other. Since the properties of the shell are observed, Fig. 2 can be misunderstood as antiproton.

The minimum kinetic energy required to produce an antiproton is 5.6 GeV, and the first experiment to confirm the existence of antiproton was the collision of copper target and protons accelerated to 6.2 GeV. The average mass or logarithmic average mass of two values is 5.9 GeV or 5.892 GeV. Why is this value equal to 5.895 GeV of Fig. 2? A new interpretation of the meanings of 5.6 GeV and 6.2 GeV is needed.

2.4 Antiproton = DDu + γ_{sT}^{6} + ξ_{s}^{6} + β_{sT}^{56} + ξ_{e}^{56}

A combination of anti-strong particle force and anti-electromagnetic particle force in Fig. 3 can be considered. In this case, its mass is calculated as 11.255 GeV in Case 3).

2.5 Antiproton = ddU + γ_{sT}^{6} + ξ_{s}^{6} + β_{sT}^{56} + ξ_{e}^{56}

In Fig. 1, [u] is the normal up quark, and [D] is the oscillating down quark. This means that the red neutrinos oscillate, and the blue anti-neutrinos do not oscillate. Therefore, the proton of Fig. 1 is [uuD]. Its exact opposite is [ddU]. It has been experimentally proven that neutrinos oscillate. Do anti-neutrinos also oscillate? Because this calculation is complicated, it was not performed in this study.

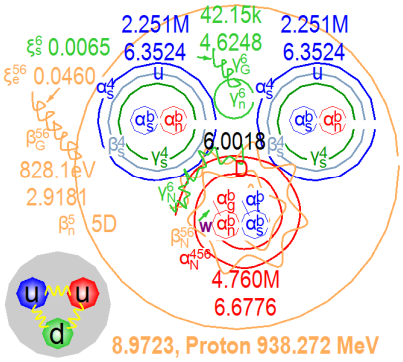

Fig. 1 Shape of Proton [uuD]

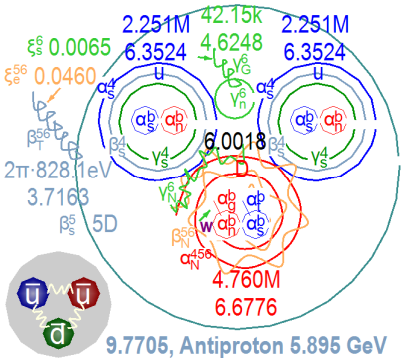

Fig. 2 Shape of Antiproton [uuD]

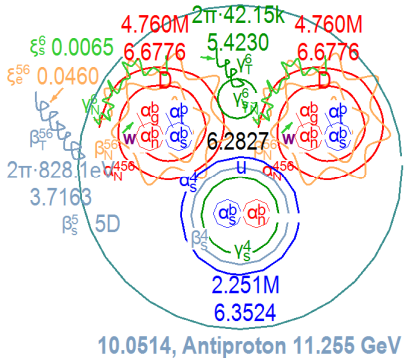

Fig. 3 Shape of Antiproton [DDu]

3. Characteristics of quantum particle mass

3.1 Logarithmic mass

The masses of quantum particles must be calculated logarithmically.

3.2 Basic particle and Combination particle

The basic particles are three generation neutrinos, graviton, photon, and gluon. The other particles are combinations of the above.

3.3 Basic particle and Basic Antiparticle

The mass of basic antiparticle is 2π times of basic particle.

3.4 Normal mass and Oscillating mass

Basic particle has a normal mass and various oscillating masses. This means that the mass of particle changes.

3.5 Three generation dark forces (= dark energies)

Three generation dark forces are acting on graviton, photon, and gluon. Here, the dark force acting on the weak force and gravity is the ratio of dark energy and dark matter.

3.6 Countless combinations

As can be seen in Figs. 1, 2, 3, It is understandable that countless combinations occur. Only proton of Fig. 1 is stable in our space, and all others are inevitably very unstable.

3.7 Origin of quantum particle mass

Quantum particles do not have an intrinsic mass, but a variable mass. Three generation quantum spaces dominate everything of particle.

4. Conclusions

The mass of antiproton was calculated as 5.895 GeV. Physically, the mass of antiproton is 5.6 GeV or 6.2 GeV, and their logarithmic average is 5.892 GeV. The above two values coincide. A new interpretation of the meanings of 5.6 GeV and 6.2 GeV is needed.

The calculation method in this study is the opposite of the Lagrangian of standard model. If the calculation method in this study is correct, the easiest study is quantum mechanics.

References

[1] D. Kim, 2021, Theory of Everything and Logarithmic Elliptic Equation, https://vixra.org/abs/2110.0023

[2] D. Kim, 2022, Mass Calculation of Kaon Pion Hadrons, https://vixra.org/abs/2203.0126

Table 1 Mass calculation of proton and antiproton.

Term	Case 1) Proton		Case 2) Antiproton		Case 3) Antiproton	
Quark 1	2.2512 MeV	u 6.3524	2.2512 MeV	u 6.3524	4.7601 MeV	D 6.6776
Quark 2	2.2512 MeV	u 6.3524	2.2512 MeV	u 6.3524	4.7601 MeV	D 6.6776
Quark 3	4.7601 MeV	D 6.6776	4.7601 MeV	D 6.6776	2.2512 MeV	u 6.3524
Strong force	42.153 keV	γ_{nG}^{6} 4.6248	42.153 keV	γ_{nG}^{6} 4.6248	42.153·**2π** keV	γ_{sT}^{6} 5.4230
Average		6.0018		6.0018		6.2827
Strong dark force		ξ_{s}^{6} 0.0065		ξ_{s}^{6} 0.0065		ξ_{s}^{6} 0.0065
Electromagnetic force	828.12 eV	β_{nG}^{56} 2.9181	828.12·**2π** eV	β_{sT}^{56} 3.7163	828.12·**2π** eV	β_{sT}^{56} 3.7163
E.M.F dark force		ξ_{e}^{56} 0.0460		ξ_{e}^{56} 0.0460		ξ_{e}^{56} 0.0460
Mass Σ	938.27 MeV	8.9723	5.895 GeV	9.7705	11.255 GeV	10.0514