Materials of Conferences

QUARK MASS UNIT

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A numerical value for an additional natural unit of a virial impulse is a hypothetical offer based on physical possibility of quark mass unit.

Quark – it is an elementary particle and a fundamental element of substance. Quarks unite to generate the composite particles named hadrons, steadiest of which protons and neutrons, components of nuclear kernels. The most knowledge about of quarks has been representing from supervision for hadrons directly. There are six types of the quark known as aromas:

1) Down, 2) Up, 3) Strange, 4) Charm, 5) Bottom, and 6) Top. (1)

All six aromas of a quark have observed since then in accelerator experiments. A quark has various peculiar properties, including a mass, spin, electric charge, and aromas.

By analogy to the atomic mass unit (AMU), which approximately equal to the atomic mass of easy hydrogen, it is possible to define quark mass unit (QMU) which approximately should equal to the mass of Up quark (1). The atomic mass unit and quark mass unit may be considering as the bases for construction of additional substance amount units. In addition, quark mass unit can matter for structure definition of nuclear substance amount units.

In article [1], the atomic mass unit for construction of a physical mass unit (natural mass etalon) in system of 4 + 1 physical natural units is used.

$$M = 15089 \cdot m = 191 \cdot 79 \cdot m, \quad (2)$$

where m – the mass of electron; M – natural mass etalon.

Thus, physical constants and natural units of temperature and of time [1, 3] define the quantity of natural unit for physical action.

$$H = F \cdot T \cdot S; \quad T = m \cdot c^2; \quad t = S/15089;$$

$$J = 94\ 628 \cdot 528 \cdot 304 \pm 62 \cdot S, \quad (3)$$

where c – the velocity of light; H, T, t – natural units of physical action, temperature, and time; S – a wave time of free electron standard; J – the wave time of hydrogen frequency standard (hydrogen maser); F – form-factor for natural unit of physical action.

Similarly, because of physical possibility of quark mass unit, it is possible to construct a unit of virial impulse, which is to add to hypothetical system of 4 + 2 natural physical units.

$$P = m \cdot c \cdot 79/2, \quad (4)$$

where P – a virial impulse unit.

By analogy with [1], quark mass unit we will define through a virial impulse unit (4).

$$Mk = F_1 \cdot g \cdot m \cdot 79/2; \quad g = e/q; \quad F_1 \approx 1;$$

$$Mk = F_1\ (2 \cdot 438\ 455{,}01 \pm 0{,}05 \cdot \text{eV}), \quad (5)$$

where q – the natural unit of an electric charge; e – module of an electron's charge; g – the electric charges ratio; F_1 – uncertain factor; Mk – quark mass unit.

For an estimation of the uncertain factor we will write out for six quarks (1) known values of the masses [3] in estimated natural units ($F_1 = 1$).

$$\{1\} = 2 \pm 0{,}2; \ \{2\} = 1 \pm 0{,}24; \ \{3\} = 39 \pm 2;$$

$$\{4\} = 523 \pm 11; \ \{5\} = 1714 \pm 13;$$

$$\{6\} = 71152 \pm 574. \quad (6)$$

By analogy to article [1], using physical representations about possibility of introduction of natural mass unit, we receive representations about an additional physical unit of a virial impulse. According to work of [2] quantities of a physical unit of virial are defined by the following values.

$$W = P^2/M = m \cdot c^2 \cdot 79/(4 \cdot 191) = T \cdot 79/(4 \cdot 191), \quad (7)$$

where W, T – the natural units of virial and temperature

It is necessary to notice that the natural virial unit is less than natural temperature unit approximately in ≈ 9,67 times. By hypothetical analogy to practical impedance unit [1], we receive representations about practical virial unit.

$$Wj = W \cdot 10^{-j};$$

$$W_3 = 52{,}838 \cdot 8944 \pm 0{,}000 \cdot 0012 \cdot \text{eV}, \quad (8)$$

where j – is integer parameter in sequence of coherent units; j = three – for practical system [1]; Wj – coherent units of virial; W_3 – practical unit of virial.

For example, we will write out for twelve high-melting metals the known approximate quantities of

the first ionization potential in estimated practical virial units ($F_1 = 1$).

$$\{V\} = 0{,}128;\ \{Nb\} = 0{,}130;$$

$$\{Hf\} = 0{,}132;\ \{Ta\} = 0{,}146; \quad (9)$$

$$\{Cr\} = 0{,}128;\ \{Mo\} = 0{,}135;$$

$$\{W\} = 0{,}151;\ \{Re\} = 0{,}149; \quad (10)$$

$$\{Ru\} = 0{,}139;\ \{Rh\} = 0{,}141;$$

$$\{Os\} = 0{,}165;\ \{Ir\} = 0{,}174, \quad (11)$$

where {} – is label for ionization energy of next twelve atoms: V, Nb, Hf, Ta, Cr, Mo, W, Re, Ru, Rh, Os, and Ir; here for quantities of the first ionization potential the practical virial unit has been used.

The given practical virial unit can matter for definition of an energy dispersion and brightness of a corpuscular bunch in the physics of the charged particles bunches and in corpuscular optics.

References

1. Dubas L.G. // Edition of RANH, European Journal of Natural History. – 2012. – № 1. – P. 41 – URL: http://world-science.ru/euro/pdf/2012/1/22.pdf (14.05.2013).

2. Dubas L.G. Dissertation, – Moscow: NRNU «MEPhI», 2009, – 141 p.

3. Beringer J. et al. Particle Data Group, PR D86, 010001. – 2012. – URL: http://pdg.lbl.gov.

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