

If it from bit, what does it mean ?

(Puzzle of number 18)

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Abstract

Enigmatic unheeded link revealed between the values of mass some elementary particles and angle of 18 degrees. Shown the relationship 18 degrees with Golden ratio. It is surprising that, along with the angle of 18 degrees mass of some particles (Higgs boson, the ratio of the mass of the proton and electron, some baryons) were a multiple of 18.

John Wheeler [1] summarizes his life in physics as follows:

"I think of my lifetime in physics as divided into three periods. In the first period, extending from the beginning of my career until the early 1950's, I was in the grip of the idea that **Everything Is Particles**. I was looking for ways to build all basic entities - neutrons, protons, mesons, and so on - out of the lightest, most fundamental particles, electrons, and photons." ...

"I call my second period **Everything Is Fields**. From the time I fell in love with general relativity and gravitation in 1952 until late in my career, I pursued the vision of a world made of fields, one in which the apparent particles are really manifestations of electric and magnetic fields, gravitational fields, and space-time itself." ...

"Now I am in the grip of a new vision, that **Everything Is Information**. The more I have pondered the mystery of the quantum and our strange ability to comprehend this world in which we live, the more I see possible fundamental roles for logic and information as the bedrock of physical theory."

If you compare the amount of **information** stored by high energy physicists, the most quantity and diversity of **information** to be the **mass** (more than 350) of elementary particles. In spite "There remains one especially unsatisfactory feature: the observed masses of the particles, m . There is no theory that adequately explains these numbers. We use the numbers in all our theories, but we do not understand them – what they are, or where they come from. I believe that from a fundamental point of view, this is a very interesting and serious problem" [2]. Particularly challenging to analyze the information about dimensionless ratios of mass.

John Baez [3] calculated 15 dimensionless values of masses of the fundamental particles (relative to the Planck mass), namely: 6 quarks, 6 leptons, the Higgs boson, the W boson, the Z boson. The most important, in our opinion, is the proton-to-electron mass ratio, the rest mass of the proton divided by that of the electron (**$M_{pr}/M_{el} \approx 1836.15$**). Yuri Manin calls it a number of truly fundamental, and the theory is explained to him, probably will be an important theory[4].

I will try to show some specific observation concerning of mass elementary particles and call it phenomenon of 18 degrees. Actually (17-19) degrees

The phenomenon of 18 degrees I found in 1990. It was calculating experiment with values of mass enigmatic , but I couldn't find a explanation.

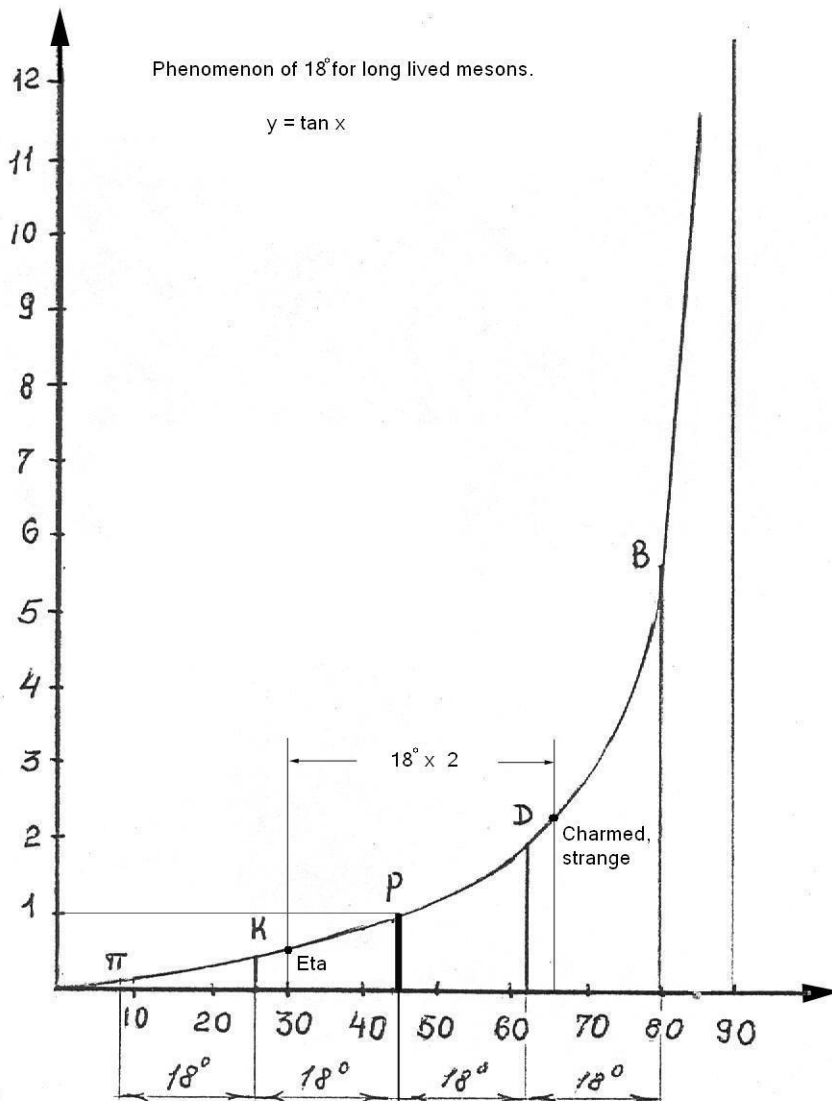


Fig1. Ignoring Eta mesons, where is life time is very small ($10^{-21}, 10^{-23}$ sec). I divided values of pseudoscalar meson mass to mass of proton $M_p(938.27 \text{ Mev})$. Then interpreted a quotients as a inverse tangent and analyzed the angles.

m(Mev)	$\tan^{-1}(m/M_p)$
π^+ 139.57	8.41(deg)=(45-37)deg
π^0 134.97	8.13(deg)=(45-37)deg
η 547.85	30,26(deg)=(45+15)deg
$\eta'(958)$ 957.78	45,58(deg)=(45+0,6)deg
η c(1S) 2,980.3	72,52(deg)=(45+27,5)deg
η b(1S) 9,390.9	84,29(deg)=(45+39,3)deg
K ⁺ 493 27.	75(deg)= (45-18)deg
K ⁰ 497.614	27.9(deg)=(45-18)deg
K ⁰ S 497.61	27,93 deg=(45-18)deg
K ⁰ L 497.61	27,93 deg=(45-18)deg
D ⁺ - 1869	63.34(deg)=(45+18)deg
D ⁰ 1864	63.28(deg)=(45+18)deg
D ⁺ s 1968	64.5(deg)=(45+18)deg
B ⁺ 5279	79.9(deg)=(45+35)deg
B ⁰ 5279	79.9(deg)=(45+35)deg
B ⁰ s 5,366.	80,08 (deg) = (45+35)deg
B ⁺ c 6,277±6	81.41(deg)= (45+35)deg

Approx. summary: $M_{\pi} = M_{pr} \times \tan(45 - 2 \times 18) \text{deg}$

$$M_k = M_{pr} \times \tan(45 - 18) \text{deg}$$

$$M_d = M_{pr} \times \tan(45 + 18) \text{deg}$$

$$M_b = M_{pr} \times \tan(45 + 2 \times 18) \text{deg}$$

Other case of 18 degrees where mass of proton vs. mass of charged leptons

$$\mu^- \text{ 105.65 Mev} \quad 6.424 = (45 - 38.576) \text{ deg} = (45 - 2 \times 19) \text{deg}$$

$$\tau^- \text{ 1777 Mev} \quad 62.16 = (45 + 17.165) \text{ deg} = (45 + 17) \text{ deg}$$

Heaviest baryon mass $M_b = 5788 \text{ Mev}$

$$M_b / M_{pr} = 6.168; \tan^{-1} = 80,8 \text{ deg}; 80,8 \text{deg} - 45 \text{deg} = 35,8 \text{deg};$$

Gap of $36(18 \times 2)$ degrees revealed for baryon mass.

B.t.w. $\tan 18,4 \text{ deg} = 1/3$. We meet ratio 1:3 [7]

Angle of 18 degrees has indirect connection with Golden ratio.

$$\frac{a+b}{a} = \frac{a}{b} = \varphi.$$

Through simplifying the fraction and substituting in $b/a = 1/\varphi$

$$\varphi^2 - \varphi - 1 = 0.$$

$$\varphi = \frac{1 + \sqrt{5}}{2} = 1.6180339887 \dots$$

$$\varphi = 1 + 2 \sin(\pi/10) = 1 + 2 \sin 18^\circ$$

$$\varphi = \frac{1}{2} \csc(\pi/10) = \frac{1}{2} \csc 18^\circ$$

$$\varphi = 2 \cos(\pi/5) = 2 \cos 36^\circ$$

$$\varphi = 2 \sin(3\pi/10) = 2 \sin 54^\circ.$$

One can construct a golden spiral, a logarithmic spiral that grows outward by a factor of the golden ratio for every 90 degrees of rotation (pitch about 17.03 degrees), or approximate it using Fibonacci number.

In regular icosagon (20-sided polygon) interior angle is 162 deg that exterior angle would be 18deg.

Platonic solids dodecahedron and icosahedrons also have connection with angle 18 degrees.

Then I found an amazing relationship between the number of 18 and mass of quarks.

Consider natural logarithms mass of 6 quarks [5] and explore them:

$$M_u = 1.8 - 3 \text{ MeV}; M_d = 4.5 - 5.5 \text{ MeV}$$

$$\ln M_u = 0.58 - 1.09; \ln M_d = 1.50 - 1.70$$

$$M_s = 90 - 100 \text{ MeV}; M_c = 1250 - 130 \text{ MeV};$$

$$\ln M_s = 4.49 - 4.60; \ln M_c = 7.13 - 7.17$$

$$M_b = 4150 - 4210 \text{ MeV}; M_t = 172900 - 174300 \text{ MeV};$$

$$\ln M_b = 8.33 - 8.34; \ln M_t = 12.06;$$

We obtain next logarithm values: 1;2;4;5;7;8;12. Note that numbers divisible by 3 (3, 6, 9) are absent, except the last number $n=12$.

That means absent values: e^3 ; e^6 ; e^9 ; e^{10} ; e^{11} . One more confirmation comprehensive Ratio 3:1. See my essay [6]

Three of these divisors (3, 6 and 9) add up to 18, $3+6+9=18$. 18 is semiperfect number in mathematics.

Some special properties of number 18:

1. 18 is the only number that equals twice the sum of its decimal digits.

2. In the rectangle 3x6, the sides of which are expressed in whole numbers, the area is numerically equal to the perimeter.
3. Any integer always gives only one digit in the period when divided by 18.
 $1/18=0.055555$; $55:18=0.2777777$; $71:18=3.944444$
4. 18 is intermediate number between full reptend prime 17 and 19.

Recently discovered Higgs boson value of mass divisible to 18. Mass of Higgs 126 Gev=18x7. Mass of Z-boson 91.1Gev =18x5

Ratio mass of proton to electron 1836.15 = 18x102

Other interesting observation revealed on the masses of baryons.[8] I selected particles with quantum number $\frac{1}{2}$ and 4-star status. Most of these values divisible to 18.

Proton (938.27Mev)18x52,1,neutron (939.56Mev)18x52.1,

Lambda(1115.7Mev)18x62,charmed Lambda(2286.4Mev)18x127,

Sigma(1189,3Mev)18x66. Charmed Sigma(2575,6Mev)18x143,

Xi(1314,8Mev)18x73,charmed Xi(2467,8Mev)18x137.

What mean this coincidence between angle of 18 degrees and number 18?

Is it accidental coincidence or not?

References:

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