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ATOMIC MASSES AND BINDING ENERGIES

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Key words:

Special theory of relativity, binding energy, atomic mass, mass deficit, mass-spectrometry, nuclear reactions, atomic nucleus, solar energy

The Summary

Einsteinian formula $E = mc^2$, declaring equivalence of such incompatible concepts as matter and its energy (i.e. finally its velocity) contradicts logic and common sense. Mass deficit revealed during measuring atomic masses of chemical elements has not to be qualified as an equivalent of binding energy, presumably used by nature to bind nucleons in atomic nucleus. Nucleons of atomic nuclei are bound together by the ethereal pressure. Mass deficits revealed during measuring atomic masses of chemical elements result from systematical errors of measurement ensuing from impossibility of the precise positioning of nuclides during their deflection by magnetic flow in mass-spectrometer. Solar energy creation by thermonuclear reaction of obtaining helium atoms from atoms of hydrogen is an unconfirmed and rather misleading hypothesis. Conducting in terrestrial conditions a thermonuclear reaction similar to the hypothetical solar one remains unsuccessful, not because of impossibility to imitate on Earth the solar conditions, but rather because of the principal impossibility of its conducting in any conditions.

One of the most extravagant and widely promoted conclusions of the Special relativity theory of Albert Einstein has become his statement on the equivalence of mass and energy, incarnated in formula

$$E = mc^2$$

Absurdity of the statement declaring the equivalence of incomparable items had not obstructed its acceptance by the scientific community, which could rather be explained by their shortage of just that common sense that according to the same Einstein is a collection of prejudices acquired before 18 years.

It seemed, and such an idea was obtruded upon common people, that the sacramental formula had to open way to produce necessary kinds of matter, as well as to utilize unnecessary matter to obtain unlimited amounts of energy.

Further precisions though had substantially restricted the range of efficiency of the above formula declaring that the energy could not be obtained from all matter, but only from such its part that enters atomic nucleus in form of certain binding energy.

The notion of binding energy appeared when experimenters had found that masses of atoms, ions, and atomic nuclei are a little lesser than the sum of masses of their components: protons, neutrons, and electrons. Thus the atomic masses determined in unified atomic mass unities usually were quite close to integers, but never equaled them, except for hydrogen-12. To this there had been found two explanations: firstly, protons and neutrons have different masses, and different nuclides have different ratios between protons and neutrons, and secondly, there appeared a suggestion that in the process of formation of atoms, ions, and atomic nuclei certain part of mass of the components transformed into a so called binding energy, which secured integrity of the said structures by the way of creation of the so called forces of strong interaction, and the amount of such binding energy had to be equivalent to the lost part of mass according to the above Einsteinian formula.

Further, during determination of atomic masses of different elements there had been found that the values of mass deficits due to one nucleon, and consequently the values of binding energies in atoms of different elements were different.

In column 2 of the here below Table 1 are gathered data about ratios between atomic masses in unified atomic mass unities and mass numbers of some most characteristic nuclides gathered in the column 1. The data are borrowed from [1] and represented in carbon-12 scale, in which the mass of one nucleon, in disregard to the presumed mass deficit, is assumed to equal unity. Then having recalculated in the column 3 the data of the column 2 in the scale of protium (H_1), we obtain the possibility to find mass deficits for each of the nuclides of column 1 in column 4. As we can see from the column 4, the obtained mass deficits make up a negligible part of the nuclides' mass; but if to recalculate them according to the above Einsteinian formula, the obtained amounts of hypothetical energy would be impressive.

Table 1

1	2	3	4
1H	1.00782505	1	0
2H	1.0070508885	0.999231848	0.000768152
3H	1.0053497592	0.997543927	0.002456073
3He	1.0053431064	0.997537326	0.002462674
4He	1.0006508135	0.992881465	0.007118535
6Li	1.0025204658	0.994736601	0.005263399
^{12}C	1	0.992235706	0.007764294
^{14}N	1.0002195718	0.992453572	0.007546428
^{16}O	0.9996821637	0.991920337	0.008079663
^{56}Fe	0.9988381696	0.991082896	0.008917104
^{210}Po	0.9999184462	0.992154785	0.007845215
^{232}Th	1.0001640315	0.992398463	0.007601537
^{238}U	1.0002133958	0.992447444	0.007552556

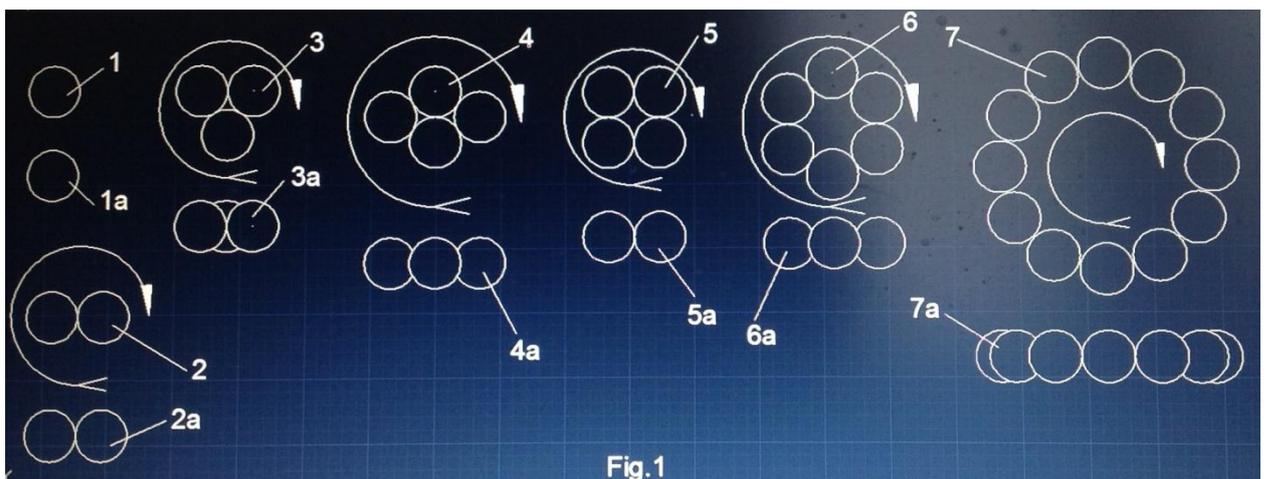
Seeking ways to obtain cheap thermonuclear energy, scientists examined hypothetical nuclear reactions comparing masses of the initial and resulting components, and trying to find out cases, in which the total resultant masses of the components would be lesser than the total initial ones. Of such reactions the broadest interest was attracted and remains attracted to one of obtaining helium from atoms of hydrogen, of which reaction the conditions on the Sun were announced favorable by Arthur Eddington in 1920 [2].

Nothing confirmed the idea, but from then on persists a conviction that the solar energy is continuously generating just due to the reaction of synthesis of helium from atoms of hydrogen, and that the problem of obtaining cheap energy could be resolved by means of creation on the Earth the conditions analogues to the solar ones. The search to create such conditions continues till now and has a chance to continue a long time on, until the mankind has overestimated its vision on physics of the Universe. Such searches have already costed to taxpayers only in Europe and only up to the end of 1990-s 10 billion euro, while the expenses only for one ITER reactor, which promises to become the world greatest tokamak one, and is in process of being erected in Cadarache of South France will cost 6.6 billion euro during 2008-2020 [3].

In [1] there is information that while determining atomic masses there are used methods of mass-spectrometry. The possible arising of systematical errors during determining atomic masses by means of spectrometry, such errors which are taken for mass deficits, will be analyzed later, but before proceeding to further explications I deem necessary to let the reader know or remind that conception of atomic nucleus structure which was disclosed in my article [4].

According to said conception, atomic nuclei, except the simplest ones (of protium, deuterium, and tritium) have form of necklace, for which beads serve spherical protons pressed together by forces generated by ethereal pressure, which forces are estimated by modern science as “forces of strong interaction”. Referring to two-proton nucleus of deuterium and three-proton nucleus of tritium, the first of them is imagined in form of two adhered protons, rotating around their contact point, and the other – in form of three adhered protons with centers placed in the apexes of a rectilinear triangle, such triangle rotating in its plane around its center. Here there ought to be added that according to the conception disclosed in [4] all the nucleons of atomic nuclei are protons, neutrons existing only in unbound state [5].

The representations of the atomic nuclei from top lines of Table 1 in form according to my proposed conception are represented at fig.1 in two projections (front view), and view from above (plan).



On fig.1 by numbers 1 and 1a are designated front and plan views of protium (^1H) nucleus, by numbers 2 i 2a – the same for deuterium (^2H), 3 and 3a – the same for tritium (^3H) and helium-3 (^3He), 4, 4a and 5, 5a – the same for two believable modifications of helium-4 (^4He), 6 and 6a - the same for lithium (^6Li), 7 and 7a – for carbon (^{12}C). Rotation of the nuclei goes on in their frontal planes and is designated with arrows. Though the arrows point the clock direction, the rotation direction may be opposite. The necklaces rotation generates centrifugal forces, which oppose the pressing forces of “strong

interaction". The proton mass being nothing else as its area directed toward external factors, such as gravitational waves (gravitons) or inertial resistance of ethereal medium, the necklace area in its rotation plane has to be its mass.

On fig.2 borrowed from [6] is represented the principal schema of one of the simplest mass-spectrometers that may be used for measuring masses of nuclides. According to [6] the functioning of mass-spectrometer consists of four principal stages:

- On the first of them atoms of the probe are ionized with the stream of electrons, which knock out of the atoms one or more electrons transforming them to positive ions;
- On the second stage the obtained ions are accelerated with electric field, which gives to ions of the same charge equal kinetic energies;
- On the third stage the straight trajectories of the accelerated ions are deviated with magnetic field, such deviations depending on their masses;
- And on the fourth stage in some or other way, the obtained deviations are registered, and by their values one determine the masses of the atoms.

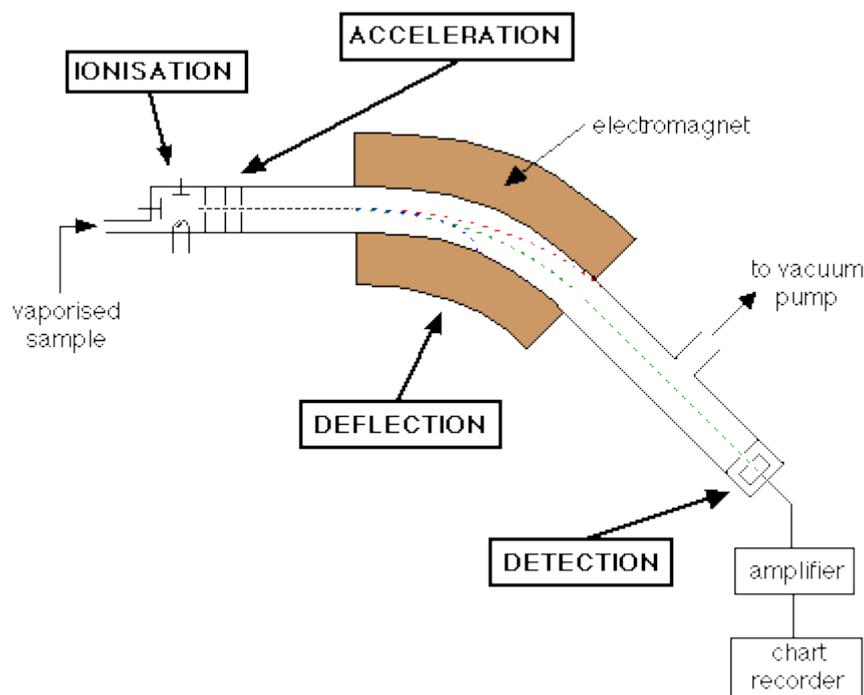


Fig.2

As I imagine, the process of measuring atomic masses with the spectrometer of fig.2, the ions created in the ionization camera acquire under the action of the electric field a speed, with which they enter the deflection camera, where they are deflected under the action of the magnetic field. The deflection meets resistance of the ether occupying the deflection camera, such resistance being greater for those particles, which would direct towards impeding ethereal particles greater surface areas, i.e. greater masses, and lesser for those ones, which would have lesser masses.

Greater or lesser deflected ions come to the detection unit, which registers deflection values, and on the basis of such registrations one calculates atomic masses of the measured ions.

In my mind, the nuclides accelerated by the electric field, have to fly in the deflection camera just in the same way as those disks or hoops, which quite possible might have being thrown by the reader during

his or her excursions on beaches or in other pleasant places. Therefore I think that a nuclide necklace has to flow in the deflection camera rotating in a plane coinciding with the direction of its flow.

Figures 3a-3d represent schema of a probable cause of incorrectness in measuring atomic masses.

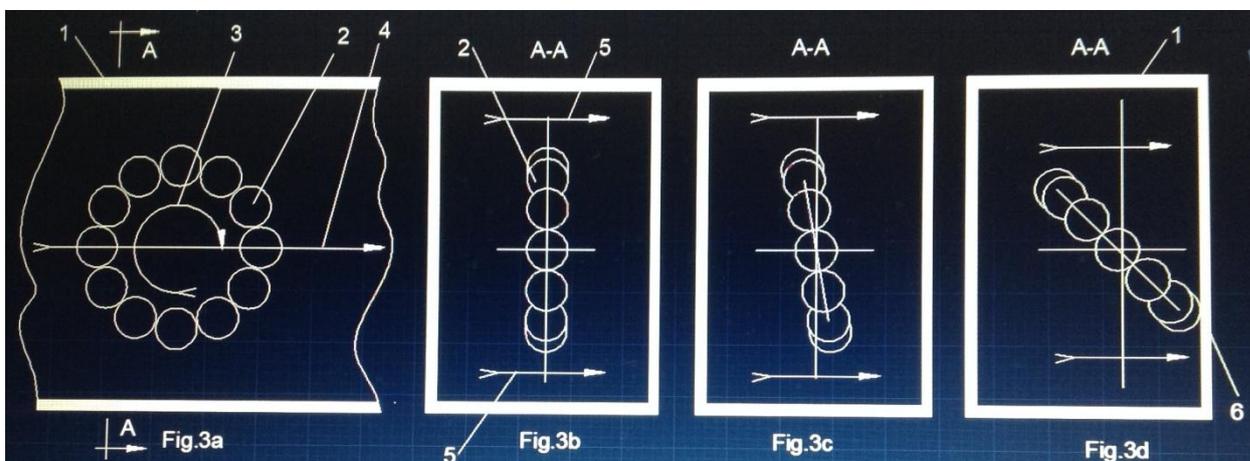


Fig.3a represents a longitudinal section of the deflection camera 1 together with a flowing there through nuclide 2. The nuclide rotation and motion directions are designated with arrows 3 and 4. Fig. 3b, 3c, and 3d represent cross sections of the camera 1, in which the rotation planes of the nuclide take different orientations relative to the direction of the magnetic field designated with arrows 5.

A nuclide represented on fig.3b, which is rotating in a plane perpendicular to the direction of the magnetic flow designated by arrow 5, undergoes the greatest impeding action of the ethereal medium, which results in its minimal deviation relative to the initial direction.

Another nuclide represented on fig.3c is rotating in a plane a little inclined to the perpendicular to the direction of the magnetic flow, from which there ensues that its area directed to the impeding ether is somewhat lesser then that directed to the ether by the nuclide of fig. 3b. As a result of such orientation has to be a somewhat greater deviation by the magnetic flow and a somewhat lesser value of the registered mass.

Yet another nuclide represented on fig.3d is shown while touching in the point 6 the wall of the deviation camera. The nuclide had rotated in a plane inadmissibly inclined to the above perpendicular. The touch results by ion's discharging and it's adhering to the wall.

As it has to be understandable from the above examples, only a little part of the measured ions may enter the registration unit, those ones that are rotating in planes nearest to the one, perpendicular to the magnetic flow direction. It has also to be understandable that even under the maximal possible precision, measuring instruments will always register areas (i.e. masses) somewhat lesser then those nominal masses that could have been registered if all the nuclides moved in the deviation camera with the orientation of fig.3b.

My calculations of possible mass deficits that might be registered due to inclinations of the rotation plane of lithium-6 at 30° (0,0244123), 15° (0,00323559), and 10° (0,000968886) are of the same order as the value 0.005263399 staying in the Table 1. This has to affirm the idea that the mass deficits are not the equivalent of hypothetical binding energy, but rather the result of systematical and incorrigible errors of measurement.

CONCLUSIONS

- 1) Einsteinian formula $E = mc^2$, declaring equivalence of such incompatible concepts as matter and its energy (i.e. finally its velocity) contradicts logic and common sense;
- 2) Mass deficit revealed during measuring atomic masses of chemical elements has not to be qualified as an equivalent of binding energy, presumably used by nature to bind nucleons in atomic nucleus;
- 3) Nucleons of atomic nuclei are bound together by the ethereal pressure;
- 4) Mass deficits revealed during measuring atomic masses of chemical elements result from systematical measurement errors ensuing from impossibility of the precise positioning of nuclides during their deflection by magnetic flow in mass-spectrometer;
- 5) Solar energy creation by thermonuclear reaction of obtaining helium atoms from atoms of hydrogen is an unconfirmed and rather misleading hypothesis;
- 6) Conducting in terrestrial conditions a thermonuclear reaction similar to the hypothetical solar one remains unsuccessful, not because of impossibility to imitate on Earth the solar conditions, but rather because of the principal impossibility of its conducting in any conditions

Bibliography

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[5] [http://gsjournal.net/Science-Journals/%7B\\$cat_name%7D/View/4983](http://gsjournal.net/Science-Journals/%7B$cat_name%7D/View/4983)

[6]

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