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Short Communication

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Structure and Functioning of Atoms

Emile Braunthal-Weisman

Physics Dept., Groupe HEURTEY, France

***Corresponding author:** Emile Braunthal-Weisman, Physics Dept., Groupe HEURTEY, France. E-mail : ebraw@wanadoo.fr

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Abstract

Atoms are spherical corpuscles and they interact with other atoms in the 3 dimensions of space. The current representation where orbits are circles occupied by defined numbers of electrons cannot explain their physical properties. We therefore propose a new representation of atoms and their mode of operation in order to account for the most recent observations.

Keywords: Theoretical Physics of Atom, Mechanics of Atom, Electrical Charge of Electron, Binding Force, Electromagnetic Radiation, Molecular Binding.

The current representation of atoms and their electronic procession does not consider the fact that they have volume. The representation of orbits and their electron content was determined empirically by considering only their chemical affinities, their valence.

However, the outer surface of the atoms of matter is that of a sphere and the interactions between the atoms occur on their entire surface and in all directions of space and not in flat and tangent circles as it might appear with the current representation.

Atoms, regardless of their crystal structure, are always surrounded by similar atoms inside that structure. Only outer atoms can have an extra bond on a very small part of their surface.

An atom is always composed of several electron-proton systems (sep) and a sep can only maintain one bond with an outer atom. All atoms of a solid structure maintain bonds with a maximum of 14 similar atoms. All the seps of an atom pulse in such a way that when one of them is at its maximum extension, its immediate neighbors are one after the other in the phase of maximum contraction. Not all at the same time indeed, otherwise they would have the same value of electric charge and would repel each other according to Coulomb's law.

I therefore take up here the Pauli Exclusion Principle: Two seps or two neighboring atoms cannot be in the same state at the same time. But, in quantum mechanics, this principle gives particles an immutable, permanent status, whereas here, it is only a question of defining the instantaneous state of neighboring particles.

In quantum mechanics this principle of exclusion is stated as a golden rule, a fundamental principle, without any justification other than, it seems, to endow this discipline with an article of internal regulations.

Here it is obvious that this principle follows immediately from Coulomb's law. Two particles of the same charge repel each other. Two particles of different charges attract each other. The cohesion of matter, the attractive interactions between atoms or between molecules therefore require that these particles are not at the same time in the same state of charge.

In addition, this rule imposes itself because seps and atoms are in perpetual pulsation movement, when one is in contraction its electric charge is surplus and its neighbors in the expansion phase have deficit charges, which creates very strong bonds of attraction or cohesion.

It should be noted that in quantum mechanics we ignore the fact that particles pulse and that their volume to contain the electric charge fluctuates at the rate of these pulsations. It is also unknown that particles can have variations in electric charge density, which has led to defining the characteristics of elementary particles with an overlay of ad hoc and rigid rules. (cf. quantum numbers)

For a heavy atom, composed of a large number of seps, to maintain bonds with other atoms, one or more seps of its outer surface must be momentarily orphaned during their expansion phase. A sep becomes an orphan when all its neighbors are, at a given moment, already interacting with their own neighbors and no longer have enough electrical charge to share with it. Recall that the electric charge of a sep is spherical and that when this charge is pumped by neighboring seps, part of its surface will not have a sufficient electric charge density to maintain a normal bond. Another situation can also occur in the next half period when all neighboring seps are in the maximum contraction phase, the charge of this sep becomes excess, allowing it to bond with an outer atom in the contraction phase.

We must not lose sight of the fact that atoms pulse at frequencies of the order of one hundred thousand to one million billion times per second. Thus, each situation, although random, can recur once in a billion so a hundred thousand or a million times during the period of a second. This gives us the impression of a stable and permanent state. In fact, it is not always the same seps that interact with the same outer atoms but on average, there are always practically the same number of interactions.

The internal structure of the atom is very difficult to apprehend. It does not seem that there is a well-defined rule for positioning seps inside the atom. It seems that interactions between seps are random encounters. Indeed, in an atom with several seps, when a sep contracts according to the description made above (§-8 - Mechanics of the atom), its electron can have a dimension such that it can capture the proton of the neighboring sep. The captive proton forms a new sep with its captor until an encounter does break this union... The released electron goes back to the outside of the atom where, along the way, it can find a new partner...

To justify the above, I still have to state a rule, a second Principle, as the Founding Fathers of Quantum Mechanics did: Interactions between particles can only take place when their electric charge density is comparable. What I call the Principle of Equivalence.

Thus, the seps can interpenetrate without interfering when their dimensions are very different. A small proton may be in the center of a large sep. Indeed, it is not the absolute value of the loads, but their local density that allows interactions. This is why all the seps can coexist in the volume of the atom because the neighboring seps are never, together, in the same state of expansion/contraction. The slightest time difference leads to significant deviations in their pulsation process and therefore in their dimensions. This is also why protons do not repel each other according to the fears of those who postulated the existence of the Strong Force.

It should be remembered that by pulsating from one orbit to the orbit immediately inland, the radius of the sep decreases by half, so that its volume becomes 8 times smaller and therefore negligible in the overall volume when it has contracted on 3 or 4 inner orbits.

Note in passing that it is this exchange of partners that makes the neutron superfluous. The electron, by capturing a proton, neutralizes it and the other proton, released at the time of this capture, regains its positivity.

Thus, in the atom, all seps pulse at their own pace and randomly encounters and captures. It is the number of seps that, in an atom, statistically determines its structure. According to this number, the atom will have a large or small global dimension that is theoretically indeterminable and only experience and measurement can specify it.

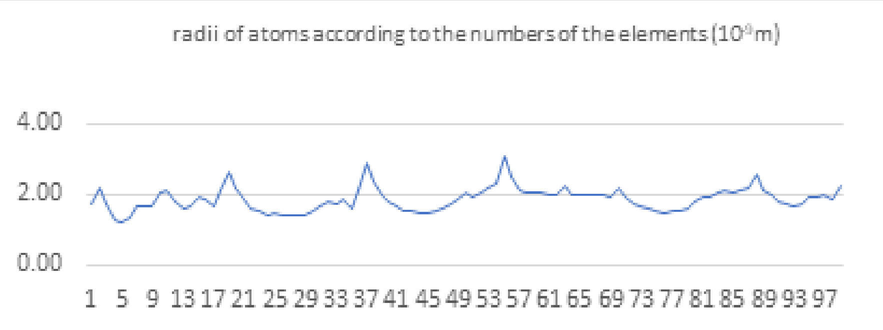

Fig.1 – The radii of atoms in 10-9 m

On the graph above are represented the radii of the atoms as a function of the density of the matter they form at atmospheric pressure and at 0°C. We see that all atoms, regardless of the density and state of matter, gas, liquid or solid, have radii between 1.25 and 3.04 billionths of a meter. These radii are calculated according to the density of the matter they form considering that there is no vacuum between the atoms, that they completely fill the volume in which this density is calculated. Thus, we see that the radii (and therefore the volumes) of the atoms are not proportional to the number of seps they contain. Moreover, adding a sep or two to an atom can reduce its volume and state as is the case with, for example, Krypton 84 in the gas state which becomes, with two more sep, Rubidium 86 in the solid state.

In fact, the properties and state of matter do not seem to depend on the number of seps in its atoms. The only observable criteria are melting and boiling temperatures under specific pressure conditions. But the question arises as to why an assembly of 20 seps (Neon) gives the atom a melting temperature of 25 K while the assembly of 23 seps (Sodium) only fuses at a temperature of 371 K.

The most obvious explanation is the equivalence between the amount of electric charge contained in seps and their cohesive or repulsive force. This does not give us an explanation as to why a particular sep may contain such an amount of electric charge. We are now led back to conclude that it is the number of seps that an atom contains that will determine this amount of charge. In fact, this amount of charge is determined by the internal arrangement of the atom, by the interactions between seps and it does not seem possible to predict that this sep, by contracting will be able to capture the proton of another sep which itself had just formed after capturing the electron of such another sep...

Thus, like the Founding Fathers of Quantum Mechanics, I must introduce a new Principle here: the principle of indeterminacy.

Thus, it is the interactions made possible by the number of seps inside the volume of the atom that will determine its macroscopic properties. With one more or less sep, the interactions will be different and the electrical charges of the seps will be too.

The so-called noble gases, helium, neon, argon, krypton, xenon and radon cannot have external bonds for the simple reason that their boiling (vaporization) temperature is very low. Thus, their outer electrons have a sufficient charge and do not need to seek additional charge from external atoms. This is an observation and not a statement of a theoretical explanation. I have not found a mathematical relationship that would consider the atomic masses of these elements to explain this state of affairs. I don't know if there is a law of mathematical or geometric progression between the mass numbers of these elements. On the other hand, this observation supports the proposition that heating increases the electric charge of electrons and at the same time that the wave fronts of electromagnetic radiation carry this charge.

However, to take extremely low boiling temperature as the sole criterion to justify that elements with this characteristic cannot bond with other elements would be wrong. Hydrogen, nitrogen, oxygen and chlorine also have this particularity and yet have external bonds. It is therefore necessary to look for what distinguishes the structure of the atoms of these latter elements from those of the noble gases.

The calculations to reconcile the densities of the sun's atmosphere and the wavelengths of the observed radiation led me to note that when the seps pulse, their rays followed a progression of order 2. Thus, in the atom, when a sep contracts several times according to the process described above its radius quickly becomes very small. After 6 contractions for example it will have a radius 64 times smaller and therefore a volume 260000 times smaller than its initial volume. This explains why a very large number of seps can coexist in the volume of the atom.

It is difficult (if not impossible) to know how the seps are organized in the volume of the atom but it is likely that some seps remain constantly in the heart and do not have time to go up to the periphery before being caught by a proton or a free electron. Conversely, some seps do not have time to contract to a very inner orbit before their proton is caught by a sep of compatible size. Thus, at the heart of the atom, there must be a whole population of seps that interact with each other without ever having time to take the air. Some of these seps can contract about twenty times and have radii of the order of 10-15 or 10-16 m as evidenced by the slow neutron capture sections in the Segree Table. (i.e., for Calcium 44, a section of s = 0.63 barn or a radius of 2.5.10-15 m). This is verifiable by observing the wavelengths of the radiation of atoms.

Indeed, some wavelengths correspond to emissions from the core of the atom where the pulsation frequency of the seps is much greater. For example, boron emits a radiation of 2066 Å (angstrom) wavelength, which corresponds, according to what we will see below (§ - 13) to a pulsation of the sep between orbits of radius 10-10 to 2.5.10-11 m that is to say inner orbits 200 times smaller than that of the atom itself (1.24.10-9). Other emissions of much smaller wavelengths must come from the cores of the atoms but they are not detected as such partly because the detectors are not tuned to these frequencies, and partly because the amount of electrical charge of their wave fronts is too low.

But, the amount of electrical charge that a wave front carries depends on the amount that the sep can absorb when it is in orbital pause and its ability to contain part of this charge during its contraction. The charge difference is then emitted in the form of a spherical wave front that propagates at the speed of light. Each surrounding sep captures part of this wave front to perfect its charge before contracting. Note that the electric charge of a sep comes from all the emissions of the surrounding seps. This process of capturing the load emanating from neighboring seps occurs at all levels, during orbital pauses, during the contraction of the sep. This means that in very interior orbits, the capacities of the seps are increasingly reduced and thus, the fronts of very short wavelengths carry very small amounts of electric charge.

For an atom to bind with another atom, their pulsation frequency must be exactly identical, this is what I will call the Covalence Principle. Indeed, if two neighboring atoms have different pulsation frequencies, the excess electric charge of one will only be able to fill the charge deficit of the other occasionally, which will not be able to ensure a permanent bond. This is what makes atoms have very chosen relationships with atoms of another element. This is also why when you heat a solution such as, for example, cooking salt, the two elements do not have the same specific heat, the pulsation frequency of sodium atoms for example will increase faster than that of chlorine atoms and their bond will no longer be covalent, the molecule will disintegrate. It must be remembered that each atomic element has a different pulsation frequency depending on the temperature. This is the principle of operation of infrared thermometers.

It is obvious that here covalence does not have the same definition as in quantum mechanics. These are not atoms that share electrons but that pool an electric charge under a well-determined condition that does not seem to be specified or even to have been seen in quantum mechanics: the concordance of pulsation frequencies.

Thus, during this study on the atom, we were led to state 4 fundamental principles:

- Principle of exclusion
- Equivalence principle
- Indeterminacy principle
- Covalence principle.

It is obvious that here these Principles are not ukases. They deduce themselves from the functioning of atoms.

We thus see that the system of periodic classification of simple bodies represented on Mendeleev's Table retains all its relevance but that this classification, which is made from the counting of the number of electrons in the outermost orbit, is unfounded. Further criteria will be needed to justify the common qualities and characteristics of the elements.