On the Structure of Atoms

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The idea of atoms being structured by particles that are physically attached to each other, like connected pieces of a Meccano set, has been around a long time. As a broad proposition, it has a certain appeal. However, it is not in vogue at the present time, perhaps because it is difficult to envision its precise details, such as how might the particles be shaped and how can they physically form structures. Present day science conceives that forces, such as the strong force and electromagnetic forces, provide atoms with structure. What if the force concept turns out to be wrong? Then, the physical attachment approach comes back into focus.

This article brings the physical attachment concept back into consideration. It suggests that atoms are structured by means of their constituent particles being physically connected to each other. Implications of the concept are discussed in the article.

1. Introduction

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The article relates to the structure of atoms. It proposes a concept of atomic structure based upon the underlying premise that the particles that constitute atoms are physically joined to each other.

2. The Concept

The proposed concept is that the atom is a mechanical structure in the sense that all its particles are physically connected together. This concept encompasses the particles in the nucleus and the particles that occupy the volume that extends from the nucleus to the atom's outer perimeter. The particles physically anchor each other such that when combined together they form a solid structure, that structure being the atom.

This proposition has many implications. One is that if the concept is correct, it may eliminate the present generally accepted concept that the "strong force" is the means by which the constituent parts of the nucleus are held together. Another is that it may eliminate the concept that "electromagnetic forces" bind the constituent parts of the atom together. Why? Because actual physical connections provide the cohesion, rather than forces.

3. The Need for Structure

For the following reasons, it is suggested that atoms need to have solid structure. The word "solid" is used in the sense of particles being firmly but flexibly held together so as to form a structure. The word "structure" is used in the mechanical sense – as in in regard to a building or a bridge – where a stable structure is formed by its constituent parts being physically joined together.

Why must atoms have solid structure? To answer this question, it helps to visualize the four states of matter, namely solids, liquids, gasses and plasmas. To start with, consider atoms in their solid state, that is, atoms that are the constituents of solid structures such as buildings and bridges. Without solidly structured atoms, it is fair to say that buildings and bridges would collapse. Indeed, they could not even be constructed. Simply put, if atoms do not have solid structure, they cannot form solids with other atoms.

4. Implications

There are numerous potential implications to the mechanical structure proposition. Here are several.

The strong force. Present day physics considers that the nucleus is held together by what is called the "strong force". Does this force in fact exist? There is good reason to conclude that it does not. Keep in mind that the concept of the strong force is based upon the fact that it takes considerable force to break the grip of whatever holds the nucleus together. It is a matter of inference that there must be a strong force that holds the particles of the nucleus together. But, if one accepts the proposition that the particles are physically connected and thereby resist being broken apart, then the inference of a strong force that does the binding is not needed.

Electromagnetic forces. In addition to the strong force, electromagnetic forces are invoked to explain the internal cohesion of the atom, i.e., why the atom does not fly apart. As with the strong force, the concept of physically linked particles may eliminate or perhaps supplement the explanation that electromagnetic forces provide binding structure.

Orbit and cloud concepts. There is a fundamental problem with the "solar system" and the "cloud" concepts of electrons in atoms. The problem is that these concepts connote a lack of structure. How can electrons that are in orbit or which form a cloud physically latch on to the clouds or orbiting electrons of neighboring atoms? How can they do so and form solids? It simply does not make sense. It stands to reason that atoms must physically attach to each other to form solids. If they cannot firmly attach, they will slide on by each other and not form a solid. The orbital and cloud concepts are incompatible with the proposed structure concept.

Storage of energy. There are various methods said to be the means of storing energy in atoms. The main contenders are spin, rotation, vortices and vibrations. Which is preferable? It is sug-

gested that vibrations is the simplest and the most likely candidate. Spin, rotation and vortices are the antithesis of structure. Think of constructing a house with materials that spin, rotate or swirl in vortices. Not easy to imagine. Parts that spin, rotate or swirl might be attached to buildings, but they do not form the essential structures that provide buildings with their strength. On the other hand, vibrations are part and parcel of all structures. There is no building that does not have vibrations, just as there are no atoms that do not have vibrations. It is suggested that Occam 's razor argues for the simplest method of storing energy, that being by way of vibrations.

Shape of particles. The physical linkage concept raises the problem of the actual make-up of particles that connect with each other. This is probably the most fundamental issue associated with the physical connections concept. Some physicists theorize that particles called "gluons" do the job, and perhaps they do. But, on the assumption that particles in the nature of gluons or some fundamental particles of similar properties in fact exist, there remains the question of how these particles might accomplish mechanical linkage. It is suggested that to effect physical linkage, particles must be shaped such that they can hold onto each other, much like pieces of a Meccano set. For discussion purposes, consider the possibility of such particles being shaped like the letter "C" or the letter "S". Might particles of these configurations combine by random interactions and set in train the formation of all the substances that make up the universe? Has any one got other suggestions of the shape of fundamental particles that might be capable of physical attachment? Ideas bearing on this matter would be most welcome.

Shells. Visualize an atom with its constituent particles being physically held in place. Visualize these particles fitting together as structures. Consider the structures being like shells, with each shell having set numbers of particles that fit together and occupy set positions. Consider the particles vibrating and, by successive collisions, transferring their vibrations to neighboring particles and, in doing so, circulating the energy of the vibrations continuously inside the shells. Might this be the essential means of storage of the immense energy of atoms? See the Storage of energy section above.

Impression of orbiting. Energy that is circulating in electron shells might give the false appearance of being electrons in orbit. Assuming that electrons stay put in their respective shells, might their vibrations, as distinct from the electrons themselves, circulate in the electron shells, thus creating the incorrect impression of electrons being in orbit?

Electrons framework. The volume of the part of the atom that extends from the nucleus to the atom's outer perimeter is far greater than the collective volume of the electrons that are situate in that space. This fact raises the question of how the electrons can be held in structured positions and be physically connected to each other and to the nucleus. A suggested response to this question is that a subatomic substance occupies the volume from the nucleus to the outer perimeter that provides structural framework -- in the form of shells -- that holds electrons in their positions and provides the necessary attachments. Might the subatomic substance be aether?

Expulsion and absorption of electrons. Vibrational energy of atoms can become so elevated that the vibrations force electrons from their structured positions. When this happens, electrons may be expelled from their shells or caused to change positions from one shell to another. Each expulsion or position change would open up gaps in electron shells and, when this occurs, the pressure of surrounding particles may force electrons that are in the vicinity to fill the gaps.

The outer reaches of the atom. The physical attachment approach to the atom's structure has implications in regard to the borders of the atom. It is suggested that atoms must have boundaries that permit them to physically connect to neighboring atoms. Without firm attachments between atoms, it seems evident that the solid state of matter cannot be formed. As for the liquid state of matter, there must at least be partial connections that permit the reduced level of cohesion that is characteristic of fluids. All atoms, including gasses, must at least have outer surfaces of substance that accommodate collisions and rebounding. What, then, might constitute the outer borders? Consider this possibility: that the atom's outermost shell forms the atom's physical perimeter. If the assumption that aether forms shells is correct (see the Electrons framework section above), it appears reasonable that shells would have the capacity to physically connect with the shells of neighboring atoms. Out of interest, might this idea provide an explanation for the phenomenon of surface tension?

Conclusion

Physical attachment of the particles that make up the atom is seen as a possible replacement to the present-day concept that forces are the basis of the atom's cohesion. The proposal that atoms must have mechanical structure is based upon propositions that: (1) without atoms being solidly structured, there can be no solid structures such as buildings and bridges; (2) solid structure is necessary for atoms to contain, without breaking apart, the immense energy they possess; and (3) strength is required for atoms to withstand collisions between atoms. The physical attachment concept of the structure of atoms has far-reaching implications, several of which are raised in this article.