New productive forms of atomic theory

Science, Physics

Human understanding to the world of the minuscule atoms had changed over the passing of time. Several scientist physicists had almost devoted their entire life in order to achieve a better view to the building blocks of matter. Numerous persons had attained to be acknowledged by the Nobel Peace Price for Physics about this matter. Two of them were Erwin Schrödinger of Austria and Paul Adrien Maurice Dirac of the United Kindom. Their contributions, The Fundamental Idea of Wave Mechanics and the Theory of Electrons and Positrons respectively were accounted for the discovery of new productive forms of atomic theory.

To know how atomic theory is related with wave mechanics, Schrödinger explained the different phenomenon attributed with waves. Mechanics of waves has a topic concerned with the change in the direction of light as it passes through several kinds of mediums or barriers. Schrödinger emphasized that the path of light rays can be predicted if we will consider two simple laws, they were the law of refraction by Snellius a few centuries ago and the law of reflection by Archimedes dated back 2, 000 years ago. The two laws can simply be viewed with the use of convex and concave lenses which were present in the mechanism of a telescope and a camera. The occurrence of refraction was cited by Schrödinger as a result of Fermat's principle.

Fermat's principle states that light propagates with different velocities in different mediums and the path of light visible to the human eye is the path that could quickly fetch the light particles to its destination (Schrödinger, 1933). If there is a need to refract and suppose the light intends not to refract, it would mean of a delay. Refraction happens when there is gradual change in the nature of medium. Schrödinger gave an example. The path that sunlight takes is earthward rather than the shorter straight path because light particles tend to take the “ higher faster layers” to reach its destination more quickly.

Refraction of the sun is observed when it is deep down in the horizon and it appears flattened. Refraction is commonly observed when viewing a straight object that is half part in one medium, say water and half part into another medium, say air. Schrödinger further explained it by comparing the phenomenon to a travel of soldiers in an unleveled terrain. The soldiers tend to take the not up hilled part so as they can travel at the least time possible.

Fermat’s principle was then compared to the discovery of Hamilton that true mass point’s (components of matter) movement in forces field is governed by the same said principle. Hamilton principle does not suggestively states that the mass point chooses the quickest way, example would be in a planet revolving around the sun or a stone thrown in a body of water. But the analogy of matter with the light’s tendency for shortest traveling time would still arise. After thisobservation, the proposition that matter has a wave property had then been revived since the time of Christiaan Huygens.

The theory of Electrons and Positrons on the other hand supports the claim that matter is a particle. It states that matter is composed of various kinds of particles, the particle of the same kind exhibiting almost the same properties (Dirac, 1933). The classification of elementary particles present is still on debate. But a classification of the simpler kinds of particles was enumerated by Dirac. They were the photons or light-quanta, of which light is composed, the electrons and the positrons (which appear to be a sort of mirror image of the electrons, differing from them only in the sign of their electric charge), and the heavier particles – protons and neutrons.

Dirac focused on the study of electrons and positrons because of various reasons. He emphasized that we must first consider how theory can give any data on the properties of elementary particles. General quantum mechanics is used to describe the motion of a particle. However, it is only applicable to particles having small velocities. It is in here that the theory of relativity comes in with regards to particles having velocities comparable to the speed of light. As of today, introduction of relativistic quantum mechanics had yet pushed through (Pfeifer, 2004) which, according to Dirac, is needed to be applied in the observation of particles with arbitrary properties. That procedure would be successful in the case of electrons and positrons such as observing their spin properties (Dirac, 1933).

To have a background about electron, it is a fundamental subatomic particle that carries a negative charge. It is found that an electron must actually have a high frequency oscillatory motion of small amplitude rather than the slow movement that have been thought of for the past. This oscillatory motion results to the velocity of an electron to be equal at any time to the velocity of light. This prediction cannot be proved by experiment as of Dirac’s time since the frequency of the oscillatory motion is said to be high while its amplitude is said to be so small. But one must still believe this matter since related topics such as the scattering of light by an electron are confirmed by an experiment that time.

The positron, on the contrary, is the antimatter or antiparticle counterpart of electrons, as theorized by Dirac. It has the same mass but the opposite charge and spin as compared to electrons. Annihilation occurs when a low energy positron collides with a low energy electron, resulting in the production of two gamma ray photons (Dirac, 1933). This phenomenon about positron makes it prone to use in fictional stories of today.

A proposal, coming from the said discoverer of positron, Carl D. Anderson suggested to change the name of electron to negatron and then later on change the use of electron as the generic term for both the positively and negatively charge subatomic particles. But the move did not prosper.

Implications

The study about the minute atoms brought many beneficial effects to the human society. Going even deeper to the world of subatomic particles gave the modern society an edge to various fields.

In industry, most common uses of Electron beams are in cathode ray tubes in television sets and computer monitors. Some other less known uses are in welding, lithography (practice of using beams to generate patterns on a surface), scanning electron microscopes (SEM) and transmission electron microscopes (TEM). Low energy Electron Diffraction (LEED) and Reflection High Energy Diffraction (RHEED) are also the most current innovations man had discovered to gain benefits to Electron Beams (Wikipedia, the free Encyclopedia).

In the laboratory, electron and scanning tunneling microscopes are used to study objects in the atomic scale. In medicine, radiation therapy makes use of electron beams for treatment of superficial tumors.

There is a wide range of benefits subatomic particles give to us as of today. But the doubt of discovering something about them that could harm not only the humans but the whole living things in the world is still there. Positron, having the negative name of being antimatter, is now being fictionalized as something that could be used for mass destruction. Nonetheless, it is still in man's judgment if he will use it or not against him and unto others.

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