

Physics and the Universe, Realities of Appreciation

Don Okpala, Uchechukwu Vincent

Abstract—In this paper, Physics and the universe were studied. The philosophy of reflecting on the basic metaphysical and epistemological questions posed by physics was answered. It was discovered that we live in a matter universe where particles of matter are interacting with each other resulting to the release and recycling of energy. Physics studies matter and energy and their interaction with each other. Matter is anything that has mass and occupies space. Mass is the quantity of material contained in a body. Energy is the capacity to do work. It was established that the product of the change in the mass of the interacting particles of matter and the square of the speed of light holds the universe.

Index Terms— Physics, Universe, Matter and Energy.

I. INTRODUCTION

The Universe is all about space time and everything that exists therein, including all planets, stars, galaxies, the contents of intergalactic space, the smallest subatomic particles, and all matter and energy [1,2,3,4,5,6]. The observable universe is about 46 billion light years in radius [7]. Scientific observation of the Universe has led to inferences of its earlier stages. These observations suggest that the Universe has been governed by the same physical laws and constants throughout most of its extent and history. The Big Bang theory is the prevailing cosmological model that describes the early development of the Universe, which is calculated to have begun 13.798 ± 0.037 billion years ago [8,9]. Observations of supernovae have shown that the Universe is expanding at an accelerating rate [10].

The size of the Universe is unknown; it may be infinite. The region visible from Earth, the observable universe is a sphere with a radius of about 46 billion light years, [11] based on where the expansion of space has taken the most distant objects observed. For comparison, the diameter of a typical galaxy is 30,000 light-years, and the typical distance between two neighboring galaxies is 3 million light-years [12]. As an example, the Milky Way Galaxy is roughly 100,000 light years in diameter, [13] and the nearest sister galaxy to the Milky Way, the Andromeda Galaxy, is located roughly 2.5 million light years away [14]. There are probably more than 100 billion (10¹¹) galaxies in the observable Universe [15]. Typical galaxies range from dwarfs with as few as ten million [16] (10⁷) stars up to giants with one trillion [17] (10¹²) stars, all orbiting the galaxy's center of mass. A 2010 study by astronomers estimated that the observable Universe contains 300 sextillion (3×10²³) stars [18].

The observable matter is spread homogeneously

(uniformly) throughout the Universe, when averaged over distances longer than 300 million light-years [19]. However, on smaller length-scales, matter is observed to form "clumps", i.e., to cluster hierarchically; many atoms are condensed into stars, most stars into galaxies, most galaxies into clusters, super clusters and finally, the largest-scale structures such as the Great Wall of galaxies. The observable matter of the Universe is also spread isotropically, meaning that no direction of observation seems different from any other; each region of the sky has roughly the same content [20]. The Universe is also bathed in a highly isotropic microwave radiation that corresponds to a thermal equilibrium blackbody spectrum of roughly 2.725 kelvin [21]. The hypothesis that the large-scale Universe is homogeneous and isotropic is known as the cosmological principle, [22] which is supported by astronomical observations.

The relative fractions of different chemical elements — particularly the lightest atoms such as hydrogen, deuterium and helium — seem to be identical throughout the Universe and throughout its observable history [23]. The Universe seems to have much more matter than antimatter [24]. The Universe appears to have no net electric charge, and therefore gravity appears to be the dominant interaction on cosmological length scales. The Universe also appears to have neither net momentum nor angular momentum.

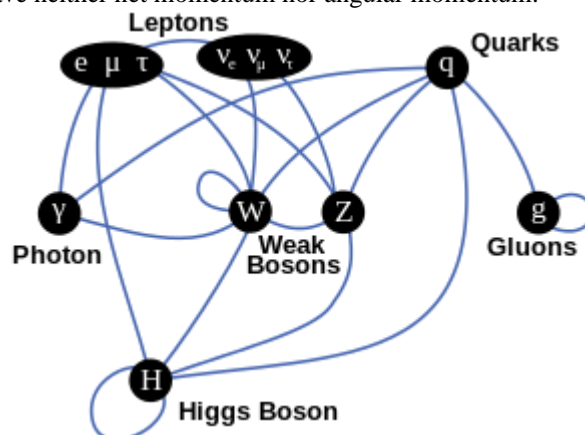


Fig 1: The elementary particles that formed the universe [25].

The universe is made up of six leptons and six quarks comprise most of the matter; for example, the protons and neutrons of atomic nuclei are composed of quarks and the ubiquitous electron is a lepton. These particles interact via the gauge bosons shown in the middle row, each corresponding to a particular type of gauge symmetry. The Higgs boson is believed to confer mass on the particles with which it is connected. On the average, space is observed to be very nearly flat close to zero curvature [25].

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The Universe appears to behave in a manner that shows that it is governed by a set of physical laws and physical constants [26]. The laws are conservation of charge, momentum, angular momentum and energy, etc. Astronomy research shows that our Solar System is embedded in a galaxy composed of billions of stars; the Milky Way and that other galaxy exist outside it, as far as astronomical instruments can reach. Careful studies of the distribution of these galaxies and their spectral lines have led much of modern cosmology. Discovery of the red shift and cosmic microwave background radiation suggested that the Universe is expanding and had a beginning [27]. The prevailing scientific model of the Universe, the Big Bang suggests that the Universe expanded from an extremely hot, dense phase called the Plack epoch in which all the matter and energy of the observable universe was concentrated.

II. PHYSICS

Physics is the study of the laws that determine the structure of the universe with reference to the matter and energy of which it consists [28]. The philosophy of physics began by reflecting on the basic metaphysical and epistemological questions on the existence life. It then turned to questions raised by important topics in contemporary physics:

- Physical cosmology: space, time and the origin and ultimate fate of the universe;
- Thermodynamics and statistical mechanics: energy, work, randomness, information;
- Quantum mechanics;
- Relativity.

Before now, the study of causality and of the fundamental nature of space, time, matter, and the universe were part of metaphysics but today the philosophy of physics is part of philosophy of science. Physicists use scientific method to delineate the universal constants governing physical phenomena and the philosophy of physics reflects on the results of this empirical research.

III. INTERACTION OF PHYSICS AND THE UNIVERSE

Many people taught that Physics is an abstract course or purely an academic exercise but this is entirely a wrong notion for the universe (World) without Physics has no definition. The universe is the entity studied by physics and physics contributes in reshaping the universe through its study of her laws. The universe and Physics are concomitant, each calls for the other. Physics was an abstract concept applied in the beginning of time in the formulation of the formless and form universe. Although nothing is formless because the maker of all things, the ultimate reality, the resultant force of existence, the origin of all explosions (Big bang and others), the space-time of form, the theological eternal now and above all, the Almighty God is of form. No being gives what it does not have. This is why the universe and our planet earth which it houses are made based on laws. The earth is based on the laws of contradiction and complementation so that the whole is always sustained and for constancy. Physics modifies the universe based on its study. The diversion of comets and asteroids that threatened the earth in the past was a function of the study of her natural

functions. The creation of gigantic building that kiss the sky, gargantuan bridges that span the seas and fantastic gadgets that adorns the beauty of the earth is functions of the observance of fundamental laws of nature (Physics). The resultant effects of this discoveries and inventions affect the earth and in turn the universe.

IV. MATTER AND THE UNIVERSE

We live in matter universe. Matter is anything that has mass and occupy space. Mass is the quantity of material or matter contained in a body. The universe is made up of ordinary matter (4.9%) including atoms, stars and galaxies, dark matter (26.8%) which is a hypothetical particle that has not yet been detected and dark energy (68.3%). Dark energy is a kind of energy density that seemingly exists even in completely empty space [17,29].

V. THE MATTER WORLD

The earth which is our own planet in the solar system in the Milky Way is entirely matter. Everything is of matter both the seen (human beings, other animals, plants, land, mountings, water) and unseen (Air and all radiations). Under the sun which is the main energy of the earth, there is nothing like nothing. What we call nothing in the range of the visible spectrum is everything beyond the spectrum. This is true because the sun which supplies the energy of the earth undergoes thermonuclear reaction to produce its energy. In the sun, isotopes of hydrogen; proton, deuterium and tritium fuse together through the process of fusions to produce helium nuclides and radiant heat which reaches the earth. It passes through vacuum to us. If vacuum where entirely void the radiant heat may not get to us. Einstein in his equation showed that Energy is equal to change in mass times the square of the speed of light i.e. $E=\Delta mC^2$. The interactions of mass produce energy and change in energy produce mass. If there is no replacement the mass of the sun would decrease and the sun may fall from its cavity and this may be the end of the solar system.

VI. THE END OF TIME

If I should go by my religious understanding of life, it is believed that our own world we end one day. Scientifically, we know that the resultant energy of the earth comes from the sun. The sun is a cloud of gases with mass of about 1030Kg, 7×10^5 Km in radius and temperature of about 600K held together by gravity and sustained by the thermonuclear reaction taking place at its core [29]. It contains 70% hydrogen (H), 28% helium (He) and 2% heavier elements. It has many isotopes of hydrogen that fuse together in the presence of energy to form He and energy in the form of radiant heat that is transported to the earth through radiation and convections. This radiant heat is an electromagnetic spectrum that contains ultraviolet, visible and infrared regions. The earth is made such that various layers exist that sustains the energy of the earth. The ozone layer shields off the ultra violet portion of the sun from touching us and as such prevents us from its harmful effects. The ozone layer is mainly found in the lower portion of the stratosphere, from approximately 20 to 30 kilometres (12 to 19 mi) above Earth,

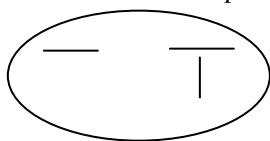
though the thickness varies seasonally and geographically, [30] and the greenhouse layer helps to maintain the temperature of the earth, [31].

If there is no meaningful replacement of the constituent elements of the sun and Einstein mass energy relation; $E=\Delta mC^2$ holds then it implies that mass is lost and the sun will one day fall out of its cavity and die and the earth will be burnt by fire. It then confirms the scriptural fact that God will destroy the earth by fire, [32].

VII. THERE IS NO END TO LIFE

When the sun dies, all the hydrogen will be converted into He, the helium will burn into many isotopes of carbon, oxygen and other elements, it then becomes a white dwarf. At this stage the earth is filled with matter (gases and solids) that will continue to interact. Series of collision of these gasses will at a time trigger light that we lead to the formation of a new world. Nature is symmetrical, at the death of the sun and the energy of the earth; series of combustion would take place and this will let gases and radiant heat leak out of the earth into space and begin to assume another form by triggering new life. This new life if likened to the scripture may be New Jerusalem, [29, 33,34]. Going by the particulate duality of matter, matter at one time behaves as wave and some other time as particle. It then implies that the interaction of light as the earth burns we leak into space interacting with other particulates to trigger new lives, (human beings, lower animals, plants etc.).

Looking at it through the point of numbers, the decimal number system runs from zero to nine (0-9). It then implies that zero is a number and not nothing. So many things are existing at zero. If we look at the cartesian coordinate system, you see that the intersection of X (abissca) and Y (ordinate) axis is at the origin (zero). Considering the case of water (matter), we see that water can assume all the states of matter depending on the temperature. Water freezes at zero and melts at zero. We know that freezing is removal of energy and melting is addition of energy yet water melt and freezes at zero degree, it then implies that we have many pluses and minuses in zero. It then implies that many things exist at zero.



It then implies that life has no end when it changes from the one we see with our naked eyes it starts to exist at the place we do not see with our naked eye (the land of the living) located at infinity ($1/0 = \alpha$ and $1/\alpha = 0$).

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