Is There Any Truth in Modern Physics?

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Abstract. Modern Physics as taught in the scientific community is based upon four fundamental forces, i.e. the electrodynamic force holding atoms, molecules and crystals together, the force of gravity holding the solar system and galaxies together, the strong force holding the protons together in the nucleus, and the weak force governing nuclear decay. In addition there are the pseudo forces of inertia and the centripetal force which are always proportional to the mass m. A proper examination of atomic and nuclear data shows that there is no strong force holding the positively charged protons together in the nucleus and no weak force governing nuclear decay. There is only one force in the nucleus which is the electrodynamic force. Previous work in electrodynamics has shown that the force of gravity, the force of inertia, and the centripetal force are due to specific terms in the electrodynamic force. [1]. Thus it appears that there is little or no truth in modern physics. The primary reason for this is that the modern scientific method is flawed due to its failure to falsify scientific theories based on false axioms, postulates, idealizations, or assumptions.

Introduction. Is it important that modern physics be true? Engineers build all sorts of bridges, buildings, airplanes, cars, cell phones and other technologies stemming from the theories of modern physics. As long as the equations resulting from these theories appear to explain these devices and technologies, the engineers are happy and can continue to innovate.

False theories that give rise to useful equations can enable some limited innovation to occur in technology, but they give a false view of the universe and do not allow the best technologies to be developed. They do not give a correct answer to the human quest to know why the universe is the way it is. They do not show the simplicity and beauty of the universe. They limit the range of technologies that can be developed. They usually deny the Biblical description of the universe that God created and continues to control.

In this paper we will discover from empirical atomic and nuclear data that the only force in the atom and nucleus is the electrodynamic force. In previous work [1] we have shown that the force of gravity is due to the force between vibrating neutral electric dipoles resulting from one term in the properly derived electrodynamic force. Also the force of inertia is the force between a charge and a vibrating neutral electric dipole due to another term in the properly derived electrodynamic force. Finally the centripetal force is due to an additional term in the properly derived electrodynamic force. As a result of these discoveries, the properly derived electrodynamic force appears to be the universal force.

An Analysis of Isoelectronic Data for One Electron Atoms. In atomic spectroscopy there are several types of sequences of elements that are useful because of regularities in the progressive

values of parameters relating to the internal structure and forces in atoms. One of these sequences is known as the isoelectronic sequence. An isoelectronic sequence consists of a neutral atom and those atoms of other elements having the same number of electrons as the neutral atom.

Consider the isoelectronic sequence for the hydrogen atom with one electron. The other atoms in the sequence consist of the helium atom ionized to have only one remaining electron, the lithium atom ionized to have only one remaining electron, etc.

The National Institute of Science and Technology (NIST) has given grants to various laboratories in the world to measure to high precision various properties of isoelectronic sequences. One of those properties is the ionization energy. For the hydrogen one electron isoelectronic sequence the ionization energy is the energy to remove the remaining electron in each member of the sequence. These measured ionization energies are given on the NIST website. [2] By searching on each element of the hydrogen isoelectronic sequence on this website, one may construct a table of the ionization energy for each member of the isoelectronic sequence. This data may be entered into a Microsoft Excel spreadsheet and analyzed graphically as shown in Figure 1 below.

Now the ionization energy of a one electron atom such as hydrogen is the electromagnetic energy that must be given to the electron to remove it from the atom so that it is no longer bound to that atom's nucleus. Coulomb's Law says that the electrical attraction between two oppositely charged particles such as the electron and the nucleus is directly proportional to the charge of the electron and the charge of the nucleus divided by the square of the distance between them. For the Bohr model of the atom the simplest atom is the hydrogen atom with one negative electron orbiting a nucleus with one positive charge. The energy of attraction between the opposite charges is measured to be 13.598434 electron-volts. For the second member of the isoelectronic sequence, i.e. the helium ion, the nucleus contains two positive charges with one electron orbiting it. According to Coulomb's Law the attraction between the electron and the nucleus should be twice as great. However, when this is measured it turns out to be 4.00177 times as great as that of hydrogen (54.417763 electron-volts). For the third member of the isoelectronic sequence, i.e. the twice-ionized Lithium atom, there is a single electron orbiting a nucleus with three charges in it. Is the attraction three times as much as the hydrogen atom as predicted by Coulomb's Law? No! It is experimentally 9.00503 times as great as that of hydrogen (122.454350 electron-volts). The graph in Figure 1 shows that the ionization energy of the hydrogen isoelectronic sequence is a function of the charge of the nucleus squared for all members of the isoelectronic sequence for nuclear charge 1 – 110. The curve defined by the data is a parabola.

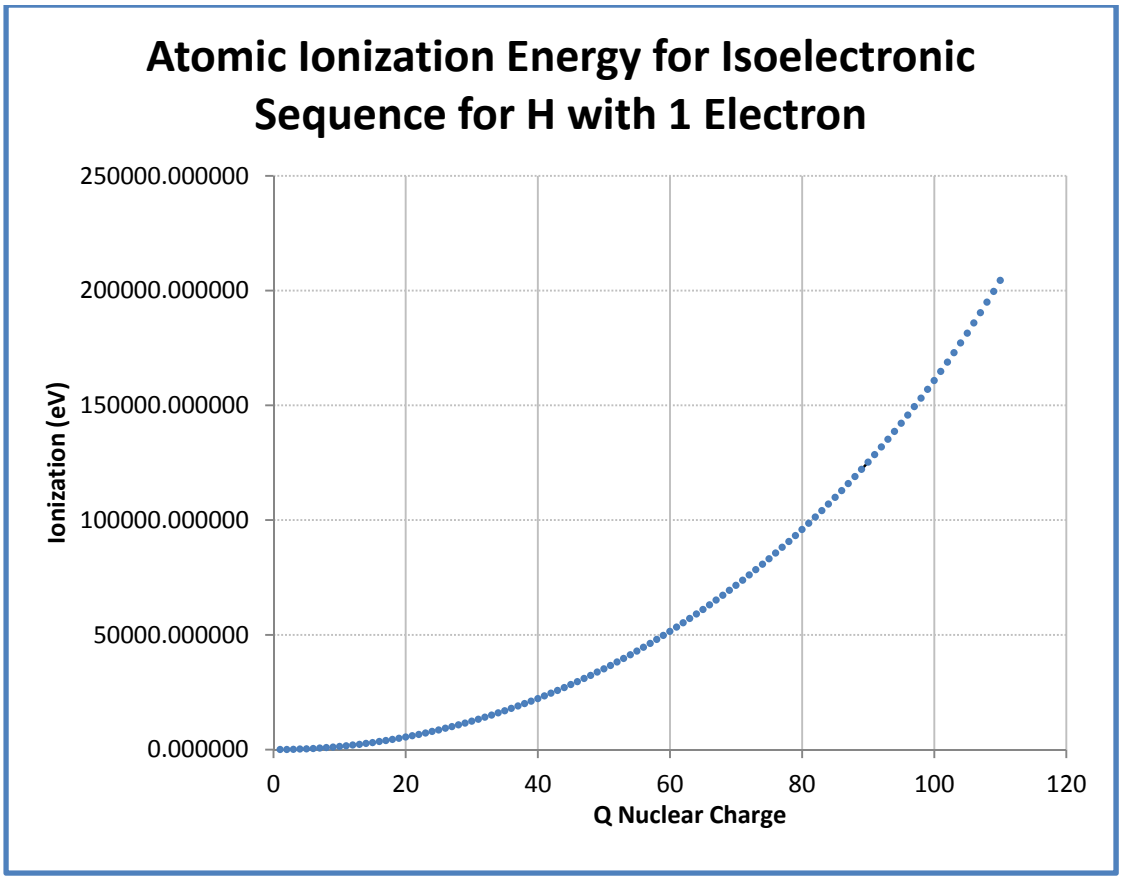

Figure 1. Ionization Energy for H Isoelectronic Sequence

An Explanation of the Observed Atomic Ionization Energy Z^2 Dependence. Coulomb's Law says that the ionization energy to remove the electron from the hydrogen isoelectronic sequence of atoms is proportional to the charge of the electron times the charge of the nucleus divided by the relative distance between them. What is observed in Figure 1 is that the ionization energy is proportional to the charge of the nucleus squared. How can this be explained?

Consider an atom consisting of a nucleus of charge +Ze and mass M and a single electron of charge –e and mass m. Assume that the electron is in a circular orbit about the nucleus. Since the mass of the electron is very small compared to the mass of the nucleus, assume that the nucleus remains fixed in space as the electron orbits. Thus the condition for mechanical stability for the electron orbit is that the Coulomb electrical force is equal to the centripetal force.

$$\frac{Ze^2}{r^2} = \frac{mv^2}{r} \qquad (1)$$

where v is the velocity of the electron in its orbit and r is the radius of the orbit.

Now the orbital angular momentum of the electron must be a constant, because the force acting on the electron is entirely in the radial direction. The angular momentum L is

$$\mathbf{L = mvr} \quad (\mathbf{2})$$

Applying Bohr's quantum postulate to the angular momentum obtain

$$\mathbf{L = mvr = n\hbar} \quad \mathbf{n = 1, 2, 3, \ldots} \quad (\mathbf{3})$$

Solving equation (1) for Ze^2 and using equation (3) obtain

$$\mathbf{Ze^2 = \frac{mv^2r^2}{r} = \frac{L^2}{mr} = \frac{n^2\hbar^2}{mr}} \quad \mathbf{n = 1, 2, 3 \ \ldots} \quad (\mathbf{4})$$

Solving equation (4) for r obtain

$$\mathbf{r = \frac{n^2\hbar^2}{mZe^2}} \quad \mathbf{n = 1, 2, 3, \ldots} \quad (\mathbf{5})$$

Consider the total energy of an atomic electron moving in one of its allowed orbits. If we define the potential energy of the electron to be zero when the electron is infinitely distant from the nucleus, then the potential energy V at any finite distance r can be obtained by integrating the energy imparted to the electron by the Coulomb force acting from infinity to r:

$$\mathbf{V = \int_{\infty}^{r} \frac{Ze^2}{r^2} dr = -\frac{Ze^2}{r}} \quad (\mathbf{6})$$

From equation (1) the kinetic energy T of the electron is

$$\mathbf{T = \frac{1}{2}mv^2 = \frac{Ze^2}{2r}} \quad (\mathbf{7})$$

The total energy E of the electron is then from equations (6) and (7)

$$\mathbf{E = T + V = \frac{Ze^2}{2r} - \frac{Ze^2}{r} = -\frac{Ze^2}{2r}} \quad (\mathbf{8})$$

Substituting for r from equation (5) into equation (8) obtain

$$\mathbf{E = -\frac{Ze^2}{2r} = -\frac{Ze^2}{2\frac{n^2\hbar^2}{mZe^2}} = -\frac{mZ^2e^4}{2n^2\hbar^2}} \quad \mathbf{n = 1, 2, 3, \ldots} \quad (\mathbf{9})$$

Thus the ionization potential energy which is equal to the binding energy for the n=1 state is proportional to Z^2. This result holds for the Bohr model of the atom and the toroidal ring model of the electron atom. The method of explaining these results for the non-relativistic Schrödinger wave equation model of the atom and the relativistic Dirac wave equation model of the atom is given in reference [3].

An Analysis of Nuclear Isotopic Masses. In the past nuclear isotopes have always been examined as parts of a family of same-element isotopes. The approach of this paper will be to analyze them instead as members of families of the same atomic weight isotopes. This approach will reveal very strong empirical evidence that neutrons do not actually exist as neutrons within atomic nuclei. Neutrons do exist in free space, but they do not exist within the atomic nuclei. The nuclear isotopic mass data is only consistent with neutrons existing as separate protons and electrons within the nucleus.

Nuclear physicists agree that the heaviest nuclei are generally all unstable, because they contain too many neutrons. Such a statement seems to imply that a common method of nuclear decay should be the spontaneous emission of a neutron in order to enable a nucleus to become more stable. However it has long been known that none of the heaviest nuclei decay by emitting a neutron. Only three relatively common isotopes decay by emitting a neutron, i.e. $^{88}Br_{35}$, $^{87}Br_{35}$, and $^{5}He_{2}$. The first two of these isotopes do not naturally occur and are only produced as fission products of $^{235}U_{92}$. If discrete neutrons actually existed within nuclei, it seems that at least some nuclei would decay naturally by releasing some of them. Instead, virtually the only time that neutrons are released from any nuclei is as the result of an external disturbance by an external thermal neutron from nuclear fission or incoming radiation.

First Proof That Neutrons and the Weak Force Do Not Exist in Nuclei. Consider the natural decay of Tritium $^{3}H_{1}$ with a half-life of 12.33 years into $^{3}He_{2}$ and an escaping electron which then is captured as an orbiting electron of the Helium nucleus. This situation is clearly one where the exact same amount and number of objects are involved, i.e. three protons and three electrons, but where some of the protons and electrons are allegedly bound together as neutrons in the Tritium nucleus. The laws of conservation of mass and energy should apply, so a strict energy accounting for this decay should show exactly the same total energy and mass before and after the decay. Initially there is one neutron in the Tritium nucleus which no longer exists in the final Helium-3 nucleus. The difference in the total mass and energy of these two nuclear atomic masses should therefore include the 0.782 MeV of binding energy of the one neutron inside the Tritium nucleus which is no longer a neutron in the final Helium-3 nucleus. However, using the accepted NIST data [4] for the atomic masses, the difference in atomic masses is (3.016 049 2777 AMU – 3.016 029 3191 AMU = 0.000019958 AMU = 0.018589 MeV). This is the total amount of energy available to get released in the decay conserving energy. Experimentally the escaping electron carries away 0.01859 MeV of kinetic energy. Thus there is no energy produced that even suggests that there had been an initial neutron binding energy of 0.782 MeV. The energy accounting for this decay exactly accounts for the kinetic energy of the escaping electron. No possible neutron binding energy is involved.

In the 1930s when the neutron and neutrino were originally discovered, physicists tried to explain how a neutron having spin of ½ could decay into a proton having spin ½ and an electron

also having spin ½. For some reason these early physicists assumed that spin angular momentum was a scalar quantity and not the vector quantity which it actually is! The fact that neutrons apparently do not actually exist in atomic nuclei seems to suggest that there could be no source for the multitude of neutrinos which most scientists assume fill the universe. Conservation of energy and mass requires that there should have been 0.782 MeV of neutron binding energy released in the Tritium decay plus whatever energy would have been necessary to create the anti-neutrino plus whatever kinetic energy that anti-neutrino would carry away. Even if the neutrino has zero rest mass, some amount of energy must be provided to give it motion energy. For example photons do not have rest mass, but they still have some measureable radiation energy. In the analysis above we found that less than 10 eV was available from Tritium decay for the neutrino. This amount of energy is too small to allow a neutrino to be emitted from Tritium beta decay with any energy related to motion.

There is also the matter of the Weak Nuclear Force which is universally assumed to exist within atomic nuclei and controlling the occurrence of beta decays and electron captures by the nucleus. The Weak Nuclear Force was assumed to be required by physicists in the 1930s in order to have conservation of energy and mass. However, the analysis above shows that there is no energy or mass which is not fully accounted for when neutrons do not exist within atomic nuclei. These results based on the highly respected NIST data [4] suggest that the Weak Nuclear Force also does not exist within atomic nuclei.

Second Proof that Neutrons Do Not Exist Within Nuclei. There is a second nuclear process supposedly governed by the Weak Nuclear Force where an orbiting electron is captured into the nucleus of an atom. This is known simply as Electron Capture or EC. A careful examination of the energy accounting in such processes shows that no neutron self-binding energy exists in such nuclei.

Consider $^{4}Be_{7}$ which decays with a half-life of around 54 days by Electron Capture. When the nucleus is considered to contain electrons and protons and no neutrons, no difference of mass occurs in the process. The result of the Electron Capture is $^{3}Li_{7}$. It is experimentally determined that radiation of 0.8618 MeV energy is released in this decay. An examination of the NIST isotopic masses reveals that the 7.0169292 AMU mass of $^{4}Be_{7}$ is converted into the 7.0160040 AMU mass of $^{3}Li_{7}$. This is a difference of 0.0009252 AMU mass which disappears. Converting this to MeV gives 0.8618 which provides the energy of the radiation given off by the decay.

If a newly formed neutron within the $^{3}Li_{7}$ nucleus had required 0.782 MeV to bind that electron to a proton to form the new neutron, then most of the 0.8618 MeV would have been used up. But this is not the case. The energy accounting shows that the emitted radiation is exactly the amount of the mass difference of the initial and final nuclei. This situation is also true for many EC decays such as $^{6}C_{11}$ releasing 1.982 MeV of radiation which exactly accounts for the mass difference. EC for $^{19}K_{40}$ (1.5048 MeV), $^{20}Ca_{41}$ (0.4213 MeV), $^{23}V_{49}$ (0.6018 MeV), $^{24}Cr_{51}$ (0.7527 MeV), $^{25}Mn_{53}$ (0.597 MeV), $^{26}Fe_{55}$ (0.2314 MeV), and $^{32}Ge_{68}$ (0.106 MeV) are

additional examples. Thus the only reasonable interpretation of these Electron Capture processes is that there are no neutrons in nuclei.

Proof That the Strong Interaction Does Not Exist Within Nuclei. Consider the two isotopes $^{75}Re_{181}$ and $^{76}Os_{181}$. Both have an atomic weight of 181. Physicists assume that they each contain 181 protons and neutrons inside the nucleus. The first atom contains 75 protons and 106 neutrons in the nucleus with 75 electrons orbiting the nucleus. The second atom contains 76 protons and 105 neutrons in the nucleus with 76 electrons orbiting the nucleus. As a result they are very similar. The first atom has an additional neutron inside its nucleus. Now the neutron is unstable decaying into a proton and an electron with a half-life of a few minutes. Thus it could be said that these two atoms have the same constituent parts as long as that one extra neutron is identified as a proton plus an electron plus binding energy and a neutrino.

These two atoms have the same nominal atomic weight, but their precise weight is different. According to the NIST [4] data, the atomic weight of $^{75}Re_{181}$ is 180.950068 AMU and that of $^{76}Os_{181}$ is 180.95324. Since the actual components (considered as protons and electrons) are in the same exact numbers, this difference must be completely due to differences in (1) the binding energy holding each of the atomic nuclei together, (2) the binding energy holding each of the neutrons together, (3) the energy due to the neutrinos associated with individual neutrons inside the nucleus, and (4) the energy equivalent of whatever pions are present inside the nucleus.

According to standard nuclear physics, there are a lot of different binding energies that must be taken into account. The primary one is called the Strong Nuclear Force. It was invented by physicists as a way to overcome the incredibly powerful electrostatic repulsion between the positively charged protons in the nucleus and make it stable. Many isotopes are observed to be stable. Since the electrostatic repulsion is extremely strong and has an inverse-square dependence on distance, the Strong Nuclear Force was postulated to have an inverse-cube or higher distance dependence so as to be extremely powerful at short distances between protons but not to have any measureable effect beyond the nucleus.

In addition to the Strong Nuclear Force binding energy, there must be a binding energy that holds internal neutrons together. From the study of the decay of free neutrons that binding energy is known to be 0.78235 MeV or 0.000841 AMU. There is also a very small factor due to there being one less electron orbiting the $^{75}Re_{181}$ nucleus. The difference in ionization-related binding energy due to that electron is rarely higher than 0.0001 MeV or 0.0000001 AMU. Conventional physics also postulates that there are also many other binding energies inside the nucleus resulting from the presence of various pions, neutrinos and other objects as well as the energy equivalents of the rest mass of these particles.

Thus the measured difference of NIST atomic weights must be due to a combination of these many contributions, but primarily due to the Strong Nuclear Force. This suggests that if we graph all the NIST atomic weights of isotopes [4] of any one atomic weight, such as the 13

known isotopes of atomic weight 181, we should get a very complex graph. Figure 2 gives a graph of the NIST isotopic masses of all the known isotopes of nominal atomic weight 181. Notice that the graph of the data gives an amazingly pure parabolic shape just like that obtained for the one electron isoelectronic sequence of ionization energies. Why is it that we obtain such a well-defined parabolic shape dependent on the square of the charge in the nucleus?

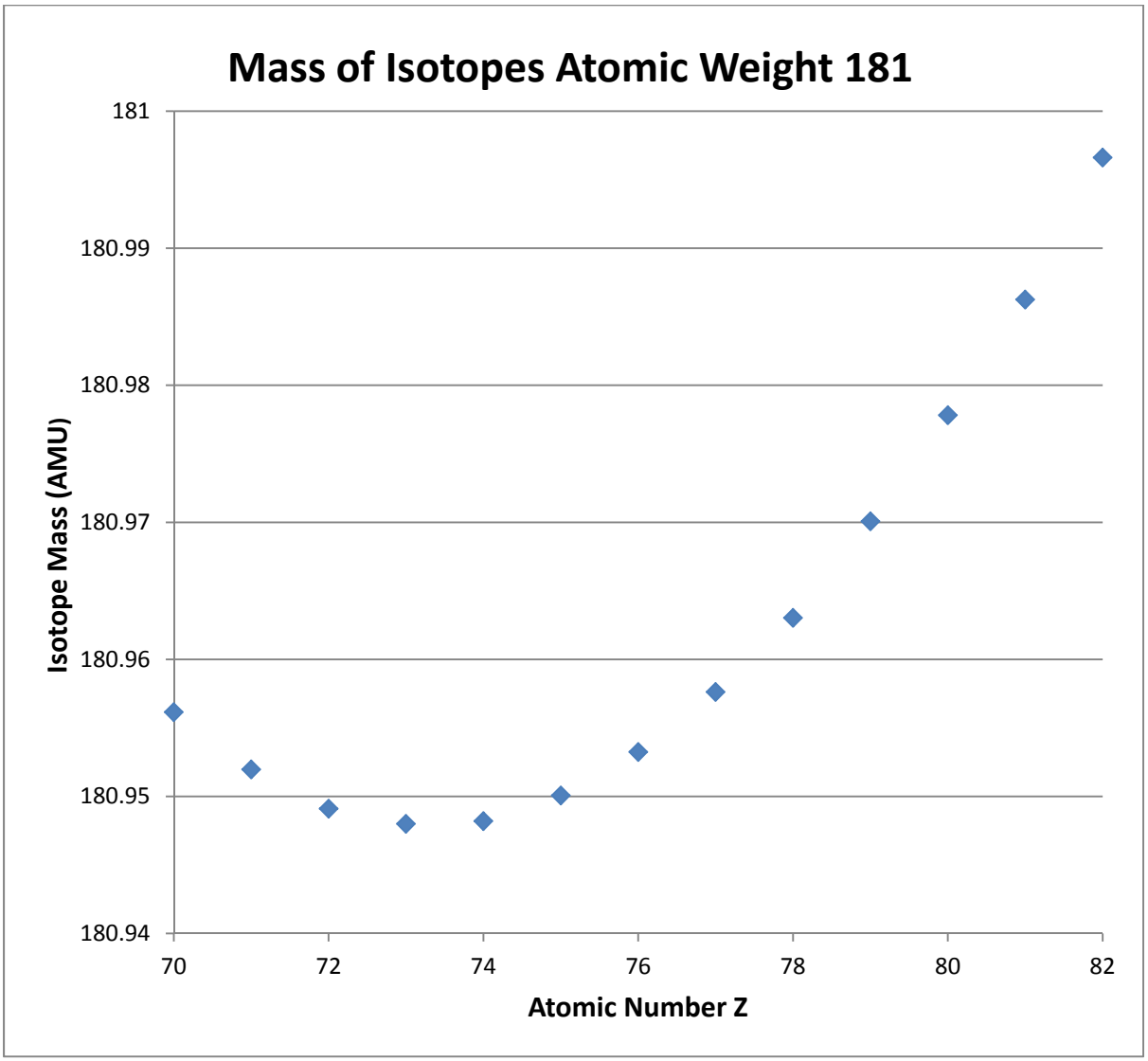

Figure 2. Nuclear Isotope Mass for Atomic Number 181

A simple curve fit (See Figure 3) shows that indeed the curve is a parabola with a fit of 0.9992. This graph is representative of all same-atomic isotope families. Such graphs have been generated for every atomic weight where more than two isotopes are known. The group for 181

was chosen for this paper, because it contains many known isotope members. Also this group provides enough data points to get a statistically reliable curve shape. Note that the isotopes at the bottom of the parabola are always stable nuclei.

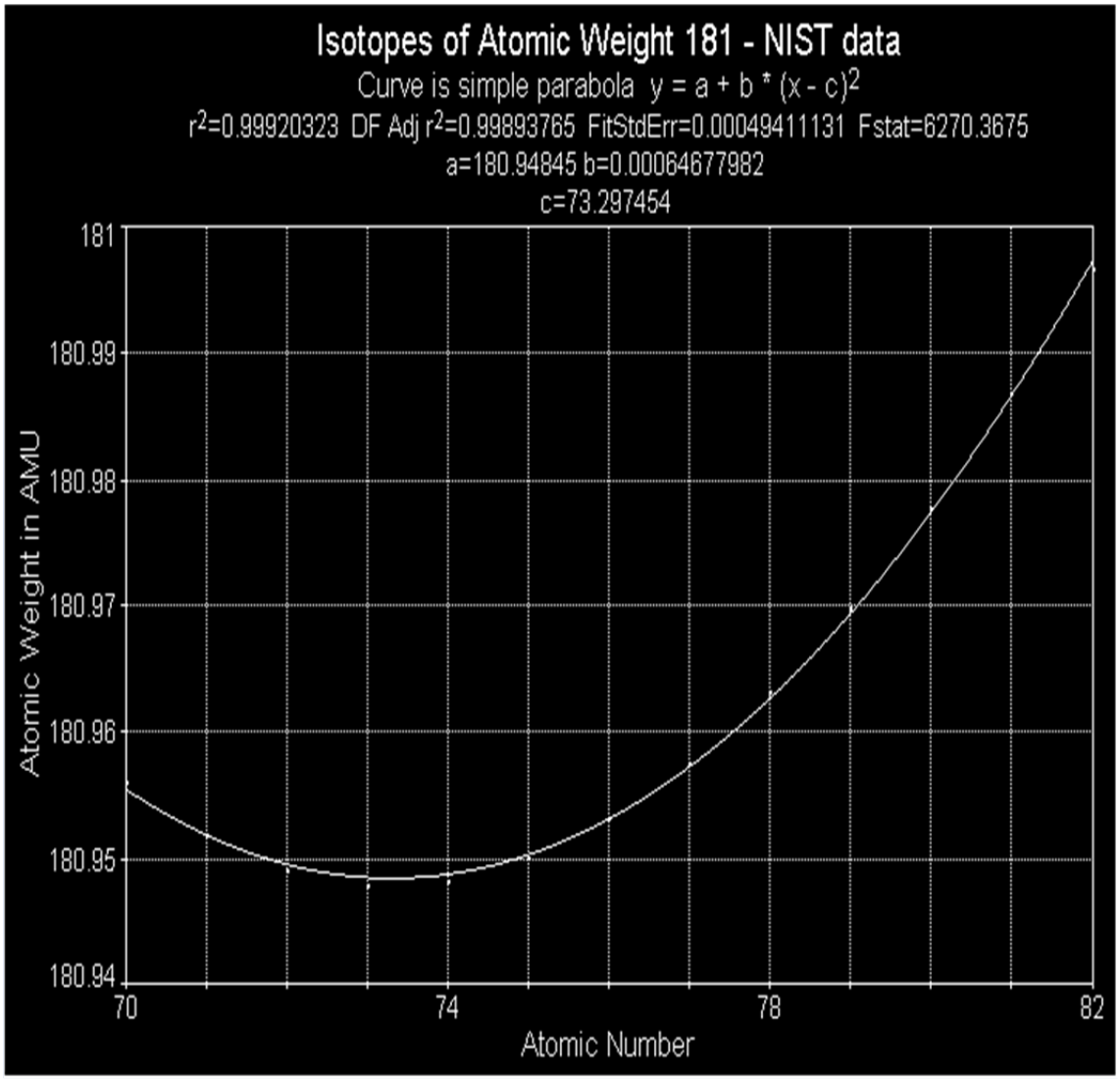

Figure 3. Isotopic Mass of Isotopes of Atomic Weight 181

If the constituent neutrons are considered to be a combination of a proton and electron, then each of the 13 isotopes represented have the same exact quantity of electrons and protons. Therefore the amount of actual mass attributable to actual protons and electrons is identical in each case. Thus the different actual atomic weights are then purely due to differences in the binding energies, energy equivalents of pions, neutrinos, etc.

The parabola shape that fits the data very precisely strongly implies a second power $1/R^2$ dependence of the electrodynamic force and definitely not a third power or higher dependence attributed to the Strong Nuclear Force. Thus it seems reasonable to interpret the parabola as due

to the electrodynamic force involving $1/r^2$ dependence just as in the case for atomic ionization potentials. An examination of over 200 such graphs of the NIST data for each atomic weight always shows this extremely prominent parabolic shape. The lack of any curve distortions due to any other very strong binding force source seems to deny the possibility of the Strong Force existing in nuclei.

Conclusions. Modern science is ultimately based upon the forces of nature and the models for elementary particles, atoms, nuclei and molecules. In this paper an analysis of the NIST ionization energies of the hydrogen one electron isoelectronic sequence has identified a precise Z^2 nuclear charge dependence in the electrodynamic ionization energy. A second analysis of the NIST isotopic masses of various nuclei has discovered that there is no data in the entire table of isotopic masses to justify (1) the existence of neutrons inside nuclei, (2) the existence of the Strong Force inside nuclei to keep the protons bound together in the nucleus, and (3) the existence of the Weak Force controlling the decay of various nuclei. Only evidence for the electrodynamic force is found.

These conclusions are compatible with previous work on an improved electrodynamic force that was declared to be the universal force. [1] In that work the forces of gravity and inertia plus the centripetal force were obtained directly from the improved electrodynamic force law. In declaring the improved electrodynamic force to be the universal force, it was assumed that the very short range strong and weak interaction forces were due to finite-size effects, since those forces were based on the point particle idealization and had very short range. The analysis of this paper challenges the very existence or necessity for the strong and weak interaction forces in nuclei.

Also this work further confirms the author's purely electrodynamic model of the nucleus which explains more nuclear data than any previous model. [5-12]

Thus the answer to the question "Is there any truth in modern physics?" appears to be "very little". The primary reason for this is that the modern scientific method is flawed due to its failure to falsify scientific theories based on false axioms, postulates, idealizations, or assumptions. Also there appears to be a willingness to ignore any data that does not agree with the current scientific theories. **Modern science based on modern physics is due for a major reformation!**

The current theories of Modern Physics give an unreal picture of the universe. This work makes possible the declaration of a universal force which gives a different picture and understanding of the universe than was possible before. It is fully compatible with the Biblical view in Habakkuk 3:2 that God "created and controls the universe by (electrodynamic) rays of light that flash from his hand". Also it is compatible with Romans 1:20 which states that "the nature of God, even his eternal power and the structure of the Godhead can be understood by the things that he created".

Since man was created in the image of God, he can control some aspects of his local environment by electrodynamic means. [13]

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