

## ABSTRACT

Most 21<sup>st</sup> century scientists believe that mass can be directly converted into energy and also that energy can be directly converted into mass, represented by the Dr. Einstein 1905 popularized equation  $E = mc^2$ . They often cite nuclear fission and nuclear fusion as proof, or they simply accept the ideas as a given, without much critical thought, as this author did during his early schooling. Imagine raising your hand in a university physics class after the congenial professor has just derived  $E = mc^2$  on the board, as I saw done once, and saying "Dr. Malik, that is wrong; you cannot change mass into energy." This paper will dispute those mass – energy conversion ideas and show the comedy of errors that have so firmly planted this into virtually all of 21<sup>st</sup> century physics.

## ARGUMENT

A common sight in American high schools is a likeness of Dr. Albert Einstein and the most famous equation in the world,  $E = mc^2$ , on a corridor wall near the science departments. Dr. Einstein is generally thought of as the smartest man who ever lived, and that he totally revolutionized physics on the prestige levels of Isaac Newton and Michael Faraday.

Let's analyze how all this evolved. Albert Einstein, at age 26, and before he even received his PhD, wrote a paper about Special Relativity theory which incorrectly derived a collection of equations, starting with time dilation, ending with  $E = mc^2$ , and his radical interpretation of  $E = mc^2$  that mass can directly convert into energy and vice versa. Nobody paid much attention. Then, in 1915, he wrote his General Relativity theory which predicted, among other things, that light is directly affected by gravity, and this suggested that light was composed of some sort of mass like particles. He also proposed the radical idea that the presence of mass somehow "warps" empty space.

In the widely publicized 1919 solar eclipse, British astronomer Eddington thought that he observed light from a star near the perimeter of the sun being bent by the gravity of the sun. That caused the predictions of Dr. Einstein's relativity theories to be taken much more seriously by all scientists world wide.

Dr. Einstein received the Nobel Prize in physics for the so called photo electric effect in 1921. That, together with his pleasing personality and funny looking hair, were the perfect formula for what we now call "going viral." Albert Einstein went "viral."

Dr. Einstein's 1905 Special Relativity mathematics is extremely obscure and almost impossible to follow. Most scientists assumed that Dr. Einstein knew what he was doing and did not much bother further with it.

In 1938, thoroughly competent chemist, Otto Hahn, observed krypton and barium apparently resulting from uranium approximately splitting in half. He sent his curious results to Dr. Lise Meitner. She looked at the published atomic number and atomic mass figures, and there seemed to be missing an atomic mass of about 13.84 neutrons. She then "grabbed" the then well known formula,  $E =$

$mc^2$ , and plugged in the 13.84 atomic mass figure to thus calculate the huge amount of energy that would be predicted to be released when a uranium atom splits.

She, and apparently nobody else, considered the other possibility that two positive chunks of krypton and barium would have huge Coulomb forces pushing them apart in a similar order of magnitude as  $E = mc^2$ . She went to Neils Bohr with this, and it all ended up at Columbia University, where Enrico Fermi had just come aboard after just receiving the Nobel prize for his work with neutrons. They reasoned that all those 13.84 neutrons that must have been flying out from a splitting uranium atom could hit other uranium atoms, split them, etc., causing an enormous chain reaction.

They went to Dr. Einstein himself to have him sign a letter to President Roosevelt asking for money to develop this idea further and make uranium into a powerful atomic bomb. They were all correct about the huge energy that would be released but totally wrong about the reason so much energy would be released. It was actually Coulomb forces and not the conversion of mass into energy per  $E = mc^2$ .

And the fission atomic bomb worked! All people thought that Dr. Einstein surely must have been correct about mass – energy conversion,  $E = mc^2$ . What a genius! But they were never able to accurately calculate the energy released by the fission bomb because they were totally wrong about where the energy was coming from.

What Dr. Einstein did was to take his incorrect Special Relativity formula  $M' = [M_0] \times [1/\text{square root of } (1 - v^2/c^2)]$ , expand it with the binomial theorem to get  $M_0 = M' + \frac{1}{2} M' v^2 (1/c^2) + \dots +$ , etc. Multiplying both sides by  $c^2$ , he got  $M_0 c^2 = M' c^2 + \frac{1}{2} M' v^2 + \dots +$ , etc. = energy.

Dropping the kinetic energy terms leaves  $M'$ , which Dr. Einstein interpreted as containing “intrinsic energy” of all mass:  $M_0 c^2 = \text{energy}$  or  $E = mc^2$ .

When I mathematically demonstrated that Dr. Einstein’s derivation of  $E = mc^2$  was incorrect, I looked for another explanation of where all the atomic energy was coming from. See [www.k1man.com/c1](http://www.k1man.com/c1)

I calculated the huge amount of energy that would be released by Coulomb forces, as positive krypton and barium chunks fly apart. Dr. Richard Feynman independently did the identical calculation in 1962 and lectured about this in a 1962 Cal Tech lecture and briefly concluded that fission energy comes from Coulomb forces. This was the same independent conclusion that I also came to: that fission energy comes from huge Coulomb forces and not from mass to energy conversion according to  $E = mc^2$ . Listen eight minutes into this Dr. Feynman’s lecture at [www.k1man.com/Feynman620927.mp3](http://www.k1man.com/Feynman620927.mp3) Dr. Feynman’s informal off hand comment in this Cal Tech class lecture went absolutely nowhere.

What is actually happening in fission is that the masses of 13.84 or so neutrons are flying out everywhere in every direction in the mayhem of an atomic bomb fission explosion. The intact neutrons that do fly out can then quickly decay into hydrogen and then burn up forming water.

The ramifications of  $E = mc^2$  and mass to energy conversion being wrong have huge scientific ramifications, since  $E = mc^2$  is a pillar and the foundation of 21<sup>st</sup> century physics today.

## FUSION ENERGY

Fusion is another story. Four hydrogen atoms combine to form helium. Helium appears in published figures to be lighter by 0.029 atomic mass units than four hydrogen atoms. 0.029 atomic mass units is equal in weight to the mass of 53.24 electrons. This "mass defect" is incorrectly attributed to  $E = mc^2$ . But adding the masses of two protons, two neutrons, and the four electrons making up helium, are actually heavier (by the weight equivalent to the weight of 0.93277712 electrons) than the composite of four protons and four electrons. Thus there is conflicting published evidence regarding any "mass defect" in fusion. Undoubtedly, in the mayhem of fusion, all sorts of mass particles and radiation of every description must be flying out. But there is no direct conversion of mass into energy per  $E = mc^2$ .

What is actually happening is that two protons mate with two electrons, forming two neutrons and thus releasing enormous Coulomb energy, and these two neutrons combine with two other protons forming, one helium atom.

## MASS UNITS

Mass is normally incorrectly listed everywhere in terms of  $E = mc^2$  energy units. You could multiply all atomic mass units by any constant that you wish in order to represent it, as long as you use the same constant at all times. The actual atomic mass of a proton is about  $1.67 \times 10^{-27}$  kg. Normally used to calculate and then list and represent mass values by virtually all scientists is the constant  $c^2$ .  $E = mc^2$ . You could just as incorrectly have used the average speed of Roger Banister when he first ran the mile in less than four minutes.  $E = mB^2$  Instead of calling mass "energy" you could have just as incorrectly called it "bananas." But calling mass energy or calling mass bananas does not make it so, no matter how many times you do it, such as thousands of times in a current book of all the isotopes.

## SUMMARY

$E = mc^2$ , as an incorrect pillar and virtual foundation of 21<sup>st</sup> century physics, is a comedy of errors, partly driven by Dr. Einstein having gone "viral." It is wrong. Mass does not directly convert into energy nor does energy directly convert into mass as Dr. Einstein suggested by incorrectly deriving and interpreting what has become the most famous equation in the world,  $E = mc^2$ .

*"To kill an error is as good a service, and sometimes even better than, establishing a new truth or fact."*

*Charles Darwin*

"Great causes are never tried on the merits; but the cause is reduced to particulars to suit the size of the partisans, and the contention

is ever hottest on minor matters." - Ralph Waldo Emerson - From his essay "Nature" 1844

**Mr. Baxter has a degree in Industrial Engineering from the University of Rhode Island and is a Licensed Professional Engineer in Illinois and Maine. He is a graduate of Vermont Academy, which honored him in 1993 as a Distinguished Alumnus with the Dr. Florence R. Sabin Award. It was at Vermont Academy as a student where Mr. Baxter attended a talk and met the very popular relativity author James A. Coleman. Mr. Baxter has been doing research in relativity and physics ever since and is currently Executive Director of the Belgrade Lakes Institute for Advanced Research. His current interests include physics, philosophy, and theology.**



**Glenn A. Baxter, P.E., at his home in Belgrade Lakes, Maine U.S.A.**





Glenn A. Baxter, P.E., age 4, with his dad, Frank H. Baxter (Bachelor of Science Degree, Mechanical Engineering, 1914, Rhode Island State College), and President of Frank H. Baxter Associates, 370 Lexington Avenue, New York City. See [www.k1man.com/fhb](http://www.k1man.com/fhb) and also [www.k1man.com/w10](http://www.k1man.com/w10) and [www.k1man.com/Loons](http://www.k1man.com/Loons)

