

# Did we get the fundamentals in Physics wrong?

Karunakar Marasakatla

(June 19<sup>th</sup>, 2010)

**Abstract:** *Definition and measurement of the fundamental units is essential to the principles of physics. Distance has an obvious and simple relationship with the measuring scale. Such a relationship is absent in measuring the mass of an object using the balance scale. This is one of the important factors for the present chaotic scenario in the field of physics.*

The concepts of mass and force were deep rooted in the principles of physics. A thought of something wrong with these fundamental concepts is unimaginable. Our whole understanding of physical phenomenon and countless theories are based on these very fundamental concepts. Can these basic concepts stand for scrutiny with simple reasoning?

## Measurement of Mass

Mass is defined as the amount of matter inside an object and the matter is defined as the basic particles. Amount by any standard is a count of elements of a particular unit. In the case of mass, it is the count of basic particles inside an object.

It is not sure of how many basic particles were there in the platinum bar approved as the international standard for a kilogram of mass and went onto to compare that standard kilogram of mass with other objects using a balance scale. Here, the balance scale doesn't compare the number of basic particles inside an object, rather it compares the amount of gravity earth exerts on each the objects. By comparing the objects using the balance scale, we are equating the gravity of the objects with the amount of matter inside those objects.

As it is already evident, a group of same number of basic particles will never measure same amount of mass or in other words gravity. Different nuclei with same number of baryons will measure different amount of gravity to the earth. To bridge the gap between the definition and the observed difference in measurement of mass, a fancy word called "deficit of mass" was coined.

Whatever we do with an object, as long as the number of each type of basic particles within that object remains same then there is no possibility for the mass to be deficit inside that object because the mass is simply particles. The object gains mass if we add a particle to it and the mass will be deficit only when we take out particles from the object.

We observed deficit of mass in each and every nuclei because we were measuring the mass using a wrong scale. We attributed the deficit of mass to the binding energy inside the nucleus but the binding

energy was never part of the definition of mass. Even the standard kilogram of titanium bar also contains millions of atoms and each of those atoms has a nucleus. Each nucleus will have certain amount of binding energy. While manufacturing the standard titanium bar for a kilogram, we never considered the binding energy and the deficit of mass within that bar as part of the standard.

First of all, with the measurement of mass, we are not sure what the standard mass is meant for and went onto compare that mass using a wrong device. In my opinion, it is similar to measuring the distance in gallons. Mass is one of the fundamental concepts in physics and we got it completely wrong.

The mass, according to the definition, can only be measured by a count of basic particles. There is no possibility for the mass to be deficit in this scenario. As long as the number of particles were same, irrespective of the shape and size of the object, the mass within that object remains same. Each of the nuclei with same number of baryons should measure same amount of mass.

But none of the two nuclei with same number of baryons were measuring same amount of mass as we are measuring it today. In reality, they were exhibiting different amount of gravity, not the amount of matter. It means, same amount of matter can exert different amount of gravity to the earth. What makes a nucleus to exert more gravity than the other nucleus with same amount of baryons? Gravity exerted by a nucleus depends upon how closely the matter is grouped together within the nucleus. The same is true for an object as well. If two objects were having same number of particles, the one in which the matter is occupied in less space will exert more gravity to the earth. If we convert the sun to a point size object then that object will exert more gravity than the present volume of the sun. The same amount of matter inside the sun will exert less gravity on earth if its radius increases more than its present size. Pioneer anomaly is due to the additional gravity exerted by the sun when it appears as a point size object from the outskirts of the solar system.

Distance and the meter have obvious relationship with each other. In the case of mass, the definition and the measurement have no relation to each other. Balance scale was being used for centuries to compare the gravity. Mass was defined around three hundred years ago when the concept of matter was not even existent. The matter, as we call it today, was discovered in the early 1900s. We mixed all these three different things even though there is no commonality between them and went onto build the modern physics based on these loosely coupled fundamental concepts. It is no wonder why we have so many inconceivable theories prevailing in physics at this time.

## **Concept of Resultant Force**

The concepts like force, work, power and energy were developed over the centuries just like the balance scale, definition of mass and the concept of matter. There is lot of overlap between these concepts. The incompleteness between these concepts can easily be made evident with a question like how much gravity is there on an object kept at the center of the earth.

Let's assume a one meter diameter hole at the center of the earth and place a half meter diameter object made of iron at the center. Both of these objects are two different objects and they are not

touching each other. According to the shell theorem, the gravity between these two objects is zero. It means, nothing happens to the object at the center in this scenario because the forces get cancelled all around the body.

There is certain amount of gravity between two objects for example earth and moon. We see the strength of gravity between earth and the moon in the form of waves in the ocean. Let's assume earth and the moon, nothing else in the picture, with the moon revolving around the earth. Let's keep another object similar to the moon on the other end of the moon's orbit. Even though the resultant force of the two moons on the earth is zero, the strength of individual moons doesn't change. In fact the strength of the gravity on the ocean doubles. As a result, we will see two bigger waves in the ocean aligning with the two moons. In the next step, let's cover the entire orbit of the moon with similar objects in a form of ring around the earth. Approximately we fit around three fifty thousand pairs of moons in the orbit of the moon. Even in this scenario, the resultant force will be zero but the actual strength of gravity pulling the ocean increases by seven hundred thousand times. Now we will have that many waves covering the entire ocean and it will probably form like a continuous bulge in the ocean.

Let's increase the number of moons by covering the entire sky at the orbit of the moon with objects like moon, in a form of shell over the earth. At this stage, the water in the ocean will probably flood the entire earth. Now, let's cover the moons in a thick layer around the earth from the orbit of the moon to a million miles. All the water and the earth will gradually disintegrate and attach to the inner edge of the moon shell because of the enormous amount of gravity exerted by the moon shell.

The concept of resultant force only concentrated on the displacement of the object and ignored the effect on the object itself. This led us to ignore one of the important entity in the interactions between objects, i.e. energy.

I wonder how Newton would have incorporated the energy into his equations if it is known in his period. The concepts of work and energy remained as a patch work over the concepts of force and resultant force. They all never merged seamlessly into each other.

Gravity is nothing but energy. As more and more moons revolve around an object, the central object goes under tremendous amount of stress and releases energy in keeping the objects in orbit. The recent discovery of Jupiter releasing energy in infrared radiation [1, 2] is due to fact that there are more number of moons revolving around that object. Just like Jupiter, all other planets with moons orbiting around them will release energy. Our star, the sun is no exception. The cause for the brightness of sun is the gravity between the layer of plasma and the core both of which are physically separated.

The iron sphere kept at the center of the earth will stretch and melt, eventually attaching to the inner side of the hollow earth due to the enormous amount of gravity exerted by the rest of material in the earth from all directions. If we keep more massive object in place of iron sphere at the center of the earth then the earth itself will collapse onto that object.

From these observations, the standard concepts of mass and force make us to wonder whether we made any mistake in conceiving these concepts. And it does appear to be true.

## References

1. Jet-Mounted Telescope Sees First Light, (Available at <http://www.wired.com/wiredscience/2010/06/sofia-first-light/>, June 1, 2010)
2. Infrared image of the Jupiter taken from SOFIA, (Available at [http://www.nasa.gov/centers/dryden/multimedia/imagegallery/SOFIA/JupiterComposite\\_label.html](http://www.nasa.gov/centers/dryden/multimedia/imagegallery/SOFIA/JupiterComposite_label.html), May 26, 2010)

(Note: This article is a brief summary of my work presented in the book - *Gravity from a New Angle*, August, 2009 - ISBN: 9780981976877. Further details can be found at [www.kmarasakatla.com](http://www.kmarasakatla.com))