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# Understanding Space and Space Warps

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## Abstract

**Background:** Space is a consideration, which is implicit but actually not embraced in the science of physics or astrophysics since it is one step behind the existence of matter and energy and needs to exist first, before matter and energy can exist.

The study of the existence of matter and energy as done in physics, presupposes the existence of a linear created space in which we are placing these entities in. Linear space is the first consideration behind the science of physics, which is implicitly alluded to but not directly addressed. Thus it is essential that we regress one step back of energy and matter and examine space in order to build the science of physics from ground up--metaphorically speaking!

**Keywords:** Space • Linear space • Space warps

## Introduction

### The concept of space

Space (also called mechanical space) *is the delineated and designated region within a closed boundary line (2-dimensional space) or a closed and bounded surface (3-dimensional space), within which all things under consideration can be placed.*

Using this definition we can see that mechanical space, in simple terms, is the continuous expanse extending in all directions within which all things "*under consideration*" exist, The scope of what is considered or how it is considered is purely dictated by the existence of a viewpoint [1,2].

### Mechanical space

We loosely refer to "mechanical space" as "space" in most of the scientific texts and in all of physics textbooks. However, by using the chief principle concerning "The Mechanics of Creation of Any Universe", the source of space lies with the "viewpoint". It is the viewpoint that delineates a "boundary line or boundary surface" and within it designates a region called "space". Once this has taken place, then the resultant space is usually referred to as "mechanical space".

Moreover, there can exist an infinite number of lines extending from the exact location of the viewpoint to the boundary line or surface of the mechanical space, where each such line is called "a dimension." In the physical universe, these dimensions are not all linearly independent from each other. There exists an exact set of three linearly independent dimensions, which can describe any other dimension uniquely.

### Reference frames

In physical sciences, through the use of a reference point and a set of three graduated axes for each of the principal dimensions (length, width, and depth) a "coordinate system of measurement" has been constructed.

Utilizing orthogonal coordinate systems (such as Cartesian, Cylindrical, or Spherical) in the analysis of engineering problems, we find that it is only necessary to select three main dimensions out of infinity of dimensions to identify any given point in space uniquely. Thus, the use of the uniqueness axiom has been instrumental in developing the present workable reference systems.

Reference frames are essentially an organizing tool set up to measure a created space. Reference frames organize the created space and through the measurement system that they employ, one may consider them a method of bookkeeping of that space. Their main functions are:

a) To provide orientation.

b) To designate a reference point and

c) To identify each point uniquely in the three-dimensional created space.

The use of a coordinate system as a standard and indispensable tool in all of scientific analysis is based upon the fact that any observation point can be uniquely located in space once all of the three coordinates of that point are specified.

The concept of a coordinate system exists in all aspects of physical sciences and mathematics. Mathematics attempts to provide ideal solutions to abstract or idealized problems posed by a science. These problems involve space and other variables, to which mathematics is providing answers, through abstraction and symbolization of physical entities.

The use of a coordinate system interwoven throughout the physical and engineering sciences has been made to be so inevitable and essential to the understanding and analysis of problems and design of new structures that without it most "sciences" become unworkable and highly speculative.

Thus as can be seen from the above observations, space assumes a senior position in construction of any universe, particularly the physical universe, since it must exist first before other entities such as matter and energy can be located within it [3-5].

### Curved space *vs.* linear space

It should be noted that under heavy force fields (such as strong gravitational fields, electric or magnetic fields), space can appear to be curvilinear, which means that the shortest path between two points is along a curved line and not a straight line. The notion of curved or nonlinear space is an apparency and not an actuality.

Curved space often refers to a spatial geometry which is not "flat". A

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flat space can be described by the Euclidean geometry. Curved spaces can generally be described by the Riemannian geometry, which deals with a broad range of geometries whose metric properties vary from point to point, including the standard types of non-Euclidean geometry. Curved space plays an essential role in general relativity, where gravity is often visualized as the main cause of the curvature of space.

The actuality of curved space is that the strong fields within it bend the flow lines and give the illusion of nonlinear space. For example, light from a heavy gravity star (such as our sun) reaching a planet with a relatively high degree of gravitational field (such as earth) will bend while leaving the star and bend again arriving on the planet. This will give the illusion that the space, at these speeds, is curved.

Another example is the light reaching earth from very far away stars, where their emitted light to reach earth must pass by a nearby galaxy. In such a case light reaching earth gives an apparent source, which is a false location for the star due to the bending of light as it passes by the heavy-gravity galaxy. Figure below shows the bending of light as it passes by a heavy-gravity galaxy, giving a false illusion of the location of the source of light.

Gravity of massive bodies causes the curvature of the universe, which determines the path that objects travel on a large scale. The curvature of space is dynamical and changes constantly as the massive bodies move in space. In Einstein's view of the world, gravity is the curvature of spacetime caused by massive bodies existing in many shapes and forms. For example, black holes are massive pits of gravity that bend space-time because of their incredibly dense centers, called singularities.

The mechanical space remains linear; it is just curved field lines under heavy forces that give it a curved quality or characteristic. In such a case, the shortest path between two points is no longer a straight line but a curved path.

As a further proof of the linearity and non-curved-ness of space itself, let us consider our earth in its present condition. We know that the Milky Way Galaxy containing billions of stars, planets, black holes, etc. is rotating around its axis. Therefore, it is highly probable that the linear space that earth is currently occupying, has belonged to an extremely dense star such as a black hole millions of years ago. According to the “curved-space theory”, the space near a black hole is highly nonlinear, thus we can see that at the present moment the nonlinearity has abruptly disappeared.

In other words, the apparent nonlinearity and “curved-ness” of space has turned into a “non-curved-ness”, which makes us ask a very fundamental question: “Is it the space that is curved or is it the fields and condensed energy forms occupying that space, which give it a nonlinear or curved quality?” With the above preamble, the answer is very clear-cut.

To understand this illusion further, one needs to visualize oneself exterior to the interplanetary space and observe the whole event of “light travel” from this outside vantage point. From this exterior point one shall see a mechanical space spanning billions of light years filled with energy particles and under the influence of many force fields. It is not the space but what is in it that makes it behave in a nonlinear fashion. The illusion will cease and the linearity of the space will be revealed.

This is the core of Einstein's theory of general relativity, which can be summed up by stating that massive-sized matter in the universe dictates spacetime how to curve, and curved spacetime in turn dictates how matter would move under certain initial conditions [6-8].

### Space warps

Due to the fact that mechanical space (without matter and energy) is linear, concepts such as space warps and other space anomalies seem to be impossible unless gignatic masses and large energy forms are included in that space.

Space warp as a concept can be easily expressed mathematically and thus one can work out all of its properties in terms of the characteristics of the warp. For example one can set up a logarithmic space wherein successive equal distances in a created space have a value ten times of the previous equidistance marking. This space appears to start on a small scale and

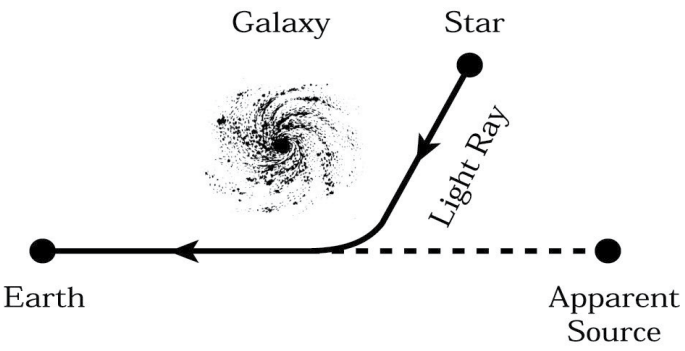


**Figure 1.** The bending of light as it passes by a heavy-gravity galaxy, giving a false illusion of the location of the source of light.

gradually rises by powers of ten to have a large value as higher demarcation marks are encountered. This means that for instance if one travels 10 miles in the first interval of space, in the second equal interval he would travel 100 miles and in the third interval 1000 miles and so on-highly nonlinear space.

One could also set up a discontinuity in space, where half of a created space is linear and the other half logarithmic space. The interface between the two half regions is the location of the discontinuity or singularity as it is called in mathematics.

These are workable concepts in mathematics, which is a highly abstract and idealized subject. The actuality of pure space is in agreement with the principles of Euclidean geometry, whereas the physical universe space filled with gigantic masses is more in line with the Riemannian geometry.

Truth be told even if such a thing as space warp exists, it is not the property of space but of the energy fields occupying that space. It is the lines of force of energy in that space that color that region of space and make it behave nonlinearly! So let us recognize the source of the nonlinearity!

## Discussion

This fact makes us realize that it is not the innate property of space itself but of what energy field occupies that space that would create a particular space anomaly. It is an apparency and not an actuality!

The proof is when the energy fields have been removed from a region of created space, it acts once again linearly as it was originally set up to be. As a valid proof in support of the concept of linearity of space, we can make a few observations as follows:

**a)** From intimate contact with the immediate space surrounding one on earth, one can conclude that created space acts linearly and no space warp or nonlinearity exists on earth today.

**b)** From deep space observation, it is a well-documented fact that the solar system as well as the Milky Way galaxy as a whole is rotating about its axis completing one revolution once every 200 million years (i.e., the time period of rotation is $T=2 \times 10^8$ years). Therefore, the space that the earth currently occupies could have been easily occupied by another star or a black hole of enormous density and extremely large gravitational field, millions of years ago. Such a large gravitational field causes a highly nonlinear type of space to be set up, where light bends and completely travels back to the planet and thus does not escape the surface.

**c)** Now if space was nonlinear innately, then when earth would occupy such a highly nonlinear created space, we would have nonlinear space in our midst. In such a space, light no longer would travel on a straight line as we observe it on earth today.

**d)** Moreover, the fact that earth is occupying these once nonlinear spaces at this moment and our first-hand observation tells us that they no longer behave nonlinearly makes us examine the concept of space more closely and make a basic conclusion about the nature of space.

Mechanical space is innately linear but can be made to appear or behave nonlinearly by strong energy fields or large masses [9 -11].

## Conclusion

In conclusion, space is a consideration, which is implicit but actually not embraced in the science of physics, since it is one step behind the existence of matter and energy and needs to exist first, before matter, energy or time can exist.

Moreover, mechanical space, curved space and space warps are space anamolies, and are directly the byproducts of the force fields occupying that space. To measure and observe accurately such a space, we need to set up a reference frame to view the universe, and then utilize the Riemannian geometry to analyze the properties of the resulting space. The degree and intensity of the existence of energy forms and matter particles, which are included in that space directly detemine the nonlinearity associated with that space.

The introduction of energy forms and matter particles introduce the concept of time, which together with space, lead to the space-time continuum as a basic theory in physics. However, in order to have time we need to have space as a first requirement, therefore space has seniority over energy and matter and their byproduct of interaction, which is called time.

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