

## Time, What Is Time?

The usual answer is that there is no time. It is a fallacy. We perceive the passing of time because everything and everyone around us and in nature wears out, looks old, and so on. Step by step this gradual demise advances to a more disordered appearance, and such decay gives rise to the illusion that time passes. Suppose you break a glass plate; its pieces would not go back and reconstruct themselves, because of the incessant increase in the entropy of the Universe. This is a process dictated by the Second Law of Thermodynamics that gives rise to the concept of thermodynamic arrow of time, pointing towards the future only.

## The Block Universe and Spacetime

The ideas above may be conjoined with the Minkowski concepts of a block universe and spacetime, concepts derived from Einstein's theory of special relativity. In general terms, these are obtained as a result of what are called the Lorentz transformations, which are outside the scope of this text.

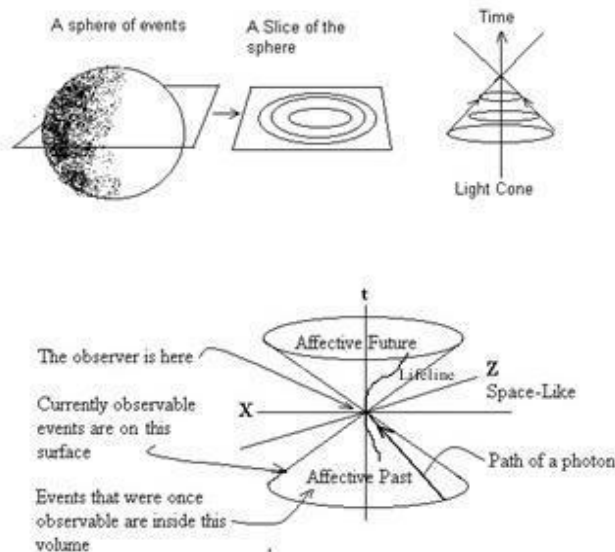


Figure 3. Light Cone

I shall attempt to explain this in the following simple example referring to Figure 3.

Assume that you switch on a flashlight in the dark. The light waves in three-dimensional space would spread out in what is referred to as an event sphere. The

concentric circles as shown in Figure 3 are considered to be slices of this sphere. To simplify the picture and represent it in two dimensions, we stack up the slices along a vertical axis which we may refer to as time. The result is a cone called a light cone. The flat plane in the middle of the image shows space at the actual present time – how everything is at a given moment. An observer may be situated there.

The line that goes up or down directly through the center of the graph, is labeled "time,  $t$ ," and represents locations at different points in time; points horizontally off of that line represent other locations at that same point in time. Thus, the past as well as the future is in the light cone. What this means is that the observer actually sees everything close to him  $X$  units of time ago, then everything a bit farther  $2X$  units of time ago, then everything even farther  $3X$  units ago, etc. If one connects these coordinates by a line, one would obtain a history of this observation. This is referred to as a lifeline. Essentially, this means that the whole spacetime cone shown above exists as an unchanging structure.