

Photons Remain Stationary in the Fourth Expanding Dimension

Note that in his *1912 Manuscript*, Einstein never says that time is the fourth dimension. Rather he states that $x_4 = u = ict$. Let us write the following:

$$x^2 + y^2 + z^2 + u^2 = x_1^2 + x_2^2 + x_3^2 + x_4^2 = s^2$$

Where s is the invariant interval. Then

$$\Delta x_1^2 + \Delta x_2^2 + \Delta x_3^2 + \Delta x_4^2 = \Delta s^2$$

If we take the distance in space as:

$$\Delta x_1^2 + \Delta x_2^2 + \Delta x_3^2 = \Delta r^2$$

Then

$$\Delta r^2 + \Delta x_4^2 = \Delta s^2$$

We know that a photon does not age. When a photon has traveled a distance Δr , then $\Delta s = \Delta r$, or

$$\Delta r^2 + \Delta x_4^2 = \Delta r^2$$

Ergo $\Delta x_4 = 0$.

In other words, the photon has not moved at all in the fourth dimension. Anything that travels the speed of light remains stationary in the fourth dimension, as $\Delta s = \Delta r$. Ergo, the fourth dimension is expanding relative to the three spatial dimensions. An object can travel the velocity of light through space in the x direction, the y direction, or z direction; or some combination thereof, but the only way it can ever travel the velocity of light in the x_4 dimension is to remain completely still in the three spatial dimensions. It is possible to remain at rest relative to the expanding time dimension, but it is difficult to measure this, due to the principle of relativity which rests upon a tautological relationship between the measurement of time and velocity of light. This principle of relativity arises from a deeper universal invariant—the fourth dimension is expanding relative to the three spatial dimensions at the velocity of c , or $dx_4/dt=ic$, providing a *physical* model for time and all its arrows and asymmetries across all realms, nonlocality, entanglement, entropy, dark energy, Huygens' pervasive principle, and Heisenberg's Uncertainty Principle, while setting both c —the velocity of light, and h —Planck's constant, as the fundamental wavelength of x_4 's expansion is the Planck length.

An inertial frame is a frame that is defined by an object keeping its velocity components through space and time constant. An object which accelerates in the three spatial dimensions slows down in the expanding fourth dimension. And vice versa.