SYNOPSIS

One of the requirements of a theory is that it defines its range. In Photon Decay theory, the range is extremely great because it is a theory required by the observation first reported by Edwin Hubble, that light from distant galaxies gradually shifts toward longer wavelengths in proportion to the apparent distance of the galaxies from which the light emitted. The shift is apparently universal and comes from the farthest galaxies that have been observed. It is appropriate to see if the theory is consistent. If the equation is correct it should be possible to derive the relationship between its constants and the equation itself. Indeed, this is so. The equation can be solved for three important factors:

1. The rate of decay, $\frac{\partial \phi}{\partial t}$
2. The action quantum h; and
3. The speed of light.

These are derived as follows: from the original equation

$$c^2 \nabla^2 \phi = \frac{1}{c^2}\left(\frac{1}{h}\frac{\partial \phi}{\partial t} + \frac{\partial^2 \phi}{\partial t^2}\right)$$

Figure 1

$$c^2 \nabla^2 \phi = \frac{1}{h}\frac{\partial \phi}{\partial t} + \frac{\partial^2 \phi}{\partial t^2}$$

Figure 2

$$\frac{1}{h}\frac{\partial \phi}{\partial t} = c^2 \nabla^2 \phi - \frac{\partial^2 \phi}{\partial t^2}$$

Figure 3

$$\frac{\partial\phi}{\partial t} = h\left(c^2\nabla^2\phi - \frac{\partial^2\phi}{\partial t^2}\right)$$
Figure 4

This is the rate of decay. To solve for the speed of light c, start with Figure 1 above to get:

$$c^2 = \frac{\frac{1}{h}\frac{\partial^\phi}{\partial^t} + \frac{\partial^2\phi}{\partial t^2}}{\nabla^2\phi}$$
Figure 5

$$c = \sqrt{\frac{\frac{1}{h}\frac{\partial^\phi}{\partial^t} + \frac{\partial^2\phi}{\partial t^2}}{\nabla^2\phi}}$$
Figure 6

which is the speed of light. The solution for h is begun with the equation in Figure 4 above. Divide both sides by the term in parenthesis and swap sides:

$$h = \frac{\frac{\partial\phi}{\partial t}}{\left(c^2\nabla^2\phi - \frac{\partial^2\phi}{\partial t^2}\right)}$$
Figure 7

This is the action in the Hubble Red Shift, as interpreted from photon decay theory.

Here is what happens. The field of mathematics closes a theory of an observable phenomenon before we understand the nature of the universe as a whole. In this case, the range is so great that the closure occurs in relation to a phenomenon that extends to the limits of most kinds of observation. Quantum mechanics deciphers or decodes the phenomena we observe. These are things like

> covariant relativistic space-time (four-space);
> the Schwarzchild equation of the Sun's effect on space and time;
> general and special relativity and the finite speed of light;
> quantum mechanics and the finite nonzero minimum action quantum;
> the observed Hubble Red Shift.

These observable phenomena and principles close our understanding of this theory in a self-consistent way which does not reveal the extent and duration of the universe. The original statement (to me, in 1957) was that the red shift might have been caused by decay but no mechanism could be discovered that might cause it. The goal then was to identify a human-constructed machine like a steam engine, drill, internal combustion engine, or electric motor that would serve as a model for a decay process and provide predictable forces. But that was not to happen.

For the ‘mechanism’ it is necessary to back down to extremely fundamental processes that are by modern standards utterly primordial, like the decay of water waves. No identical details are necessarily the cause; instead the cause is associated purely with randomness; stochastic activity; the topology of space-time; the dimensions involved in wave activity, and other entropic factors. That is why a zero force approach is appropriate. The zero force approach is justified empirically because it is used in computer processor sockets which have numerous delicate connections to make from a fragile chip. This is a refreshing development in industrial market societies which have been dominated by force concepts since the first great successes of the industrial revolution – mainly, the steam engine and its role in freeing human beings from toil.

The mechanism is stochastic, in which the action diffuses from the domain where it is densest to that where it is scarcest. The domains are topologically defined in the state space of all the manifold variables in waves -- wavelength, wavenumber, frequency, wavetime, energy and momentum. The only things that don't change are the speed of light and the action quantum itself. c is the ratio of distance and time, h is the ratio of energy and frequency. So that mechanism is probabilistic. The word ‘mechanism’ may not be well translated from German.