II.3 Cosmology

This supplement contains a new interpretation of HUBBLE's discovery on which our vision of contemporary cosmology is based.

HUBBLE's discovery : (see A.2.2)

The ratio (A.1) can be written : $z = H_o t$ (II.10)

where t is the time distance that separates us from the galaxy being observed.

This formula reveals two fundamental properties of extragalactic radiation :

The shift property : *every electromagnetic (or gravitational) wave doubles its period (loses half its radiation intensity) over* $\frac{1}{H_o}$ *time.*

In fact, for $f_e = 2 f_r$ one has : $z = 1$ and $t = \frac{1}{H_o}$.

This property that prevents the passage from a period $> \frac{1}{H_o}$ to a time $\leq \frac{1}{H_o}$, evokes the second property :

The minimal frequency property : *the maximum period of an electromagnetic wave is* $\frac{1}{H_o}$ [s].

Corollaries :

1) Since Δt is the minimum possible period of radiation, it derives from :

   ∗ the extreme frequencies of a wave :

$$f_{max} = \frac{1}{\Delta t} \simeq 1.855 \times 10^{43} \text{ [Hz] ;}$$

$$f_{min} = H_o \simeq 2.43 \times 10^{-18} \text{ [Hz] .}$$

∗ the maximum spectral shift :

$$z_{max} = \frac{f_{max}}{f_{min}} - 1 \simeq \frac{f_{max}}{H_o} \simeq 7.635 \times 10^{60}$$

∗ the maximum causal time :

$$t_{max} = \frac{z_{max}}{H_o} \simeq \pi \times 10^{78} \text{ [s]} \qquad \text{(II.11)}$$

2) The frequency limit (H_o) characterises the minimum intensity of the energy and the temperature(1) of the vacuum :

$$\mathscr{I}_{min} = \mathbb{h}H_o \simeq 1.61 \times 10^{-51} \text{ [j/s]} \Rightarrow \theta_{min} \simeq 1.164872 \times 10^{-28} \text{ [°K]}$$

3) The frequency f_{max} radiates the maximum intensity of the energy and the temperature extreme :

$$\mathscr{I}_{max} = b \simeq 1.23 \times 10^{10} \text{ [j/s]} \Rightarrow \theta_{max} \simeq 8.9 \times 10^{32} \text{ [°K]}$$

Interpretation of the discovery :

EINSTEIN predicted that light is distorted when it passes close to a celestial body. This distortion depends on the intensity and orientation of the fields (gravitational, electrical and magnetic) through which it passes. In other words, the line of light bends in a manner that depends on the mass with which it comes into contact and its electrical charge. As we understand it, the shift measured by HUBBLE is the result of this curve. Consequently, this phenomenon is now referred to as the "curve effect". It is appropriate to indicate that the line of light only coincides with the spatial geodesic in a vacuum.

This interpretation irrevocably invalidates the expansion theory(2) and signifies the following :

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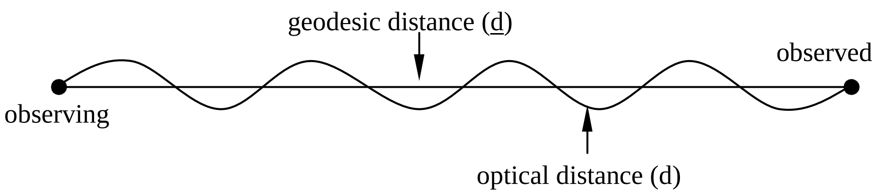
(1) The radiation from a heat source satisfies the equality of the formulae (I.8) : $\mathbb{h}\, f = \mathbb{k}\, \theta$.

(2) Whereby the density of galactic matter decreases over time, the curve of the light trajectory lessens and the shift is reduced. This does not actually accord with the experiments.

- The shift/distance proportionality (HUBBLE's observation) demonstrates the regularity of the curve along the whole length of the path of light. It is a fact that, on a very large scale, the spatio-temporal distribution of galactic matter is uniform.
- The question concerning the formation of matter and the electrical charge remains unanswered.

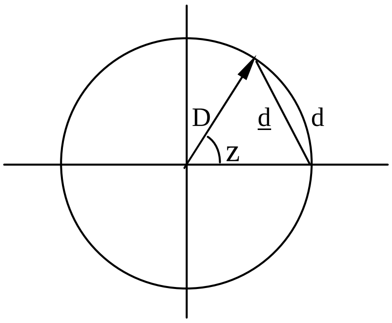
It should be mentioned that EINSTEIN's shift depreciates with every approaching/receding celestial body. It has therefore been omitted.

In any case, the curve of the optical line is virtually constant. It is manifested between two galaxies as follows :



(Fig. II.5)

The overall curvature of this line is indicated in the following circle :



(Fig. II.6)

where : z denotes the shift ;

$D \triangleq \dfrac{c}{H_o}$ is the radius of the curve of the trajectory ;

$\underline{d} = D\sqrt{2(1 - \cos z)}$ for $z \in [0, \pi]$;

$$\text{for all } z : \ \underline{d} = 2D\left[n + \sqrt{\frac{1-\cos(z - n\pi)}{2}}\right] \ ; \ n = \left.\frac{z}{\pi}\right|_{int} \qquad \text{(II.12)}$$

Breakdown of the shift :

The imprecision of the HUBBLE constant conceals the linkage of two effects: the curvature effect and that of the incommensurable movement of the galaxies. Since the first is linear, the second is pseudo-random since the study of galactic movements over the course of history has probably been inaccurate. On the other hand, an average value for this effect can be calculated experimentally and on the basis of probability.

This being the case, the shift measured can be broken down into two quantities :

$$z = z_c + z_m \ ;$$

c and m for the curve and the movement respectively(1).

Implications :

In this vein, certain limitative values(2) of a universal nature can be detected.

Cosmic units :

By analogy with PLANCK's quantum units, HUBBLE's "cosmic units" can be defined as the maximum period and its spatial and energetic counterparts :

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(1) By denoting in passing by $\underline{H}_o$ the precise value (in relation to the curve) of H_o, the formula (II.10) is transcribed as : $z - z_m = \underline{H}_o\, t$. This having been done, HUBBLE can be said to be responsible for the ratio : $dz = \underline{H}_o\, dt \Rightarrow z = \underline{H}_o\, t + z_m$

(2) The accuracy of these values depends on that of H_o .

$$\Delta T \triangleq \frac{1}{H_o} \simeq 4.12 \times 10^{17} \text{ [s]} \simeq 1.30555 \times 10^{10} \text{ years ;}$$

$$\Delta S = c\,\Delta T \simeq 1.236 \times 10^{26} \text{ [m] ;}$$

$$\Delta E = b\,\Delta T \simeq 5.0649 \times 10^{27} \text{ [j].}$$

Range of a wave :

A wave emitted at the frequency f_e travels through space for :

$$t = \frac{z}{H_o} = \frac{\frac{f_e}{H_o} - 1}{H_o} \text{ [s] hence the range : } d = ct \text{ [m] .}$$

For $f_e >> H_o$ the result is : $d = \dfrac{cf_e}{H_o^2}$.

Great circles :

As we understand it, the only indication that reveals the curve of space (the finite nature of the universe) is causal time (t_{max}) produced by the ratio (II.11). The geodesic length of this time is calculated on the basis of (II.12) :

$$\underline{t}_{max} \simeq 2\frac{n}{H_o} \simeq 2\frac{z_{max}}{\pi H_o} .$$

The ratio between the two time periods amounts to :

$$t_{max} = \frac{\pi}{2}\,\underline{t}_{max} .$$

This consists of a circle with $\underline{t}_{max}$ and t_{max} as the radius and the horizon respectively.

"Grand temporal" of the universe refers to its age :

$$\mathbf{T} \simeq 4\,t_{max} = 4\pi \times 10^{78} \text{ [s]} \simeq 3.982 \times 10^{71} \text{ years.}$$

The visual and energy equivalents of this circle are thus written as :

$$\mathbf{S} = c\mathbf{T} \simeq 12\pi \times 10^{86} \text{ [m] ; } \mathbf{E} = b\mathbf{T} \simeq 1.54481992 \times 10^{89} \text{ [j] .}$$

Consequently, the hypothetical radius (in the order of 6) of the cosmos is represented as :

$$\mathbf{R} \simeq 6 \times 10^{86} \text{ [m]} \simeq 6.33762 \times 10^{70} \text{ [al] .}$$