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The Hubble constant and its value calculation

The Hubble constant H_0 is intended to indicate the velocity v in *km/s* of a cosmic object moving away from the observer at a given distance r in *Mpc*.

Many measurements performed with the aim of obtaining a Hubble constant have yielded significantly different values for the supposed constant:

- Observations with the Hubble Space Telescope yielded
  $H_0 = 74.2 \pm 3.6$ *km/s/Mpc*
- Measurements over a period of 5 years with the WMAP5 spacecraft yielded
  $H_0 = 70.5 \pm 1.3$ *km/s/Mpc*
- Analysis of Hubble images using the gravitational lensing method yielded
  $H_0 = 69.7 \pm 4.9$ *km/s/Mpc*

A constant value for H_0 was not observed.

It can be ruled out that the ratio of a cosmic body's radial velocity to its distance is a constant. This conclusion arises from the knowledge that absolutely empty space does not exist, so radiation is always subject to the absorption law.

The energy loss of any radiation over its propagation distance is

$$\frac{dI}{dr} = -\mu \cdot I(r)$$

The solution of the differential equation is

$I(r) = I(0) \cdot e^{-\mu r}$ – the absorption law.

Herein is

$I(0)$ – the radiation intensity prevailing at the radiation point,

$I(r)$ – the radiation intensity at a distance r from the radiation point,

μ – the absorption coefficient of the medium.

This distance-dependent reduction in radiation intensity is a measure of the energy loss ΔE that occurs when crossing space. Although the value μ in this equation is very small due to the almost empty space, the exponent $-\mu \cdot r$ is not negligible due to the large distances r. The energy loss leads to a reduction in the radiation frequency because

$$\Delta E = h \cdot \Delta f$$

Here, h is Planck's constant.

Δf is the frequency reduction equivalent to the energy loss ΔE, which shifts the spectrum toward the red.

Conclusion: The redshift of the spectra of distant cosmic objects is a function of their distance. There is no constant relationship between redshift and the radial velocity of the objects. Radial velocities of cosmic objects are random; they correlate with the chaotic motion of cosmic matter. They do not depend on distance.