

PHYS304 HW0

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1. MY FAVOURITE EQUATION

1.1. Hubble's Law Formula

The Hubble's law formula is given in the following as

$$v = H_0 d \quad (1)$$

where, v is the velocity of the galaxy in km/s, H_0 is the Hubble constant of around 69.8 in km/s/Mpc, and d is the distance of the galaxy in Mpc (Mpc = megaparsec ≈ 3.26 million light years).

Hubble's law, also known as the Hubble–Lemaître law, named after American astronomer Edwin Hubble and Belgian astronomer Georges Lemaître to acknowledge the scientific contributions to the theory of the expansion of the Universe. It states that the velocity of the galaxy, called the redshift, is directly proportional to its distance. If the universe is static and unchanging, there should be no correlation between distance and velocity. However, according to the the Hubble–Lemaître law, a correlation between distance and velocity is expected, therefore, the state of the universe is expanding.

In Hubble's publication in 1929, he plotted the distance to a galaxy, measured from Cepheid variables, and the velocity of the galaxy, measured by the shift in the spectral lines, showing that the two quantities are directly correlated [1].

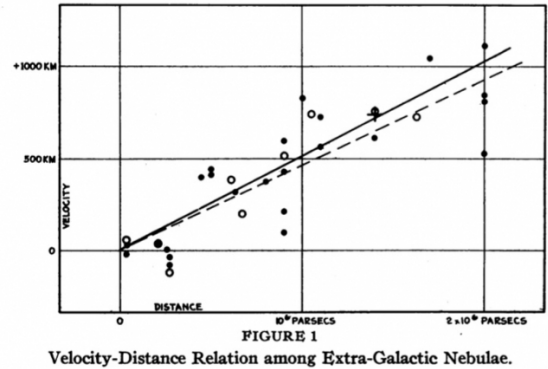


FIG. 1: Edwin Hubble's plot of the Velocity-Distance relationship for galaxies

[1] E. Hubble, in *The Early Universe: Reprints*, edited by E. W. Kolb and M. S. Turner (1988), p. 9.