Divergence between Doppler and Hubble Shifts

Hubble Red Shift, which I will here abbreviate HRS, is a gradual shift toward longer wavelengths in light from distant galaxies. The more distant they are, the longer are waves that arrive at the Solar System.

That human beings are on Earth and not at other star systems is an essential of understanding. Not for a long, long time is anyone we know observing anything in the sky soon from another star system. A few images of stars have been made from Mars, Jupiter, Saturn by space probes. No planet in the solar system is far enough away to affect measurements or perceptions of the HRS. Fairly accurate views of the solar system or other stars can be calculated with computers, as if one were at other stars. But little data exists in them and most stars are depicted as white points. For a long time everyone from this planet will be on this planet.

HRS is faint, so slight that it can only be observed in light (including infrared and ultraviolet and other wavelengths) from galaxies more distant than about ten million light years. It is difficult to measure. Even so, it has big implications.

HRS cannot be measured by light from stars in galaxies mere millions of light years away, such as those in the Andromeda Galaxy. That galaxy is near, "only" two or three million light years distant. It is moving, as it happens toward the Milky Way, and in its journey to Earth its light is affected by both Doppler and Hubble shifts. In light from Andromeda, Doppler shift is greater than HRS.

This is an example of an uncertainty relation that appears in relativistic phenomena. Over a very large range it is not possible know exactly both distance and velocity of objects in space on the basis of wavelength shift alone, even when both Doppler shift and Hubble shift may be present.

Where the distance is small Hubble's distance shift to longer wavelengths is negligible and Doppler shift prevails, so the relative radial velocity of nearby stars and galaxies is measurable with considerable accuracy. Accuracy is high because the speed of light is known accurately.

Where the distance is very great, such as in galaxies more than ten million light years away, it is Doppler shift that becomes negligible, and the distance can be presented on a linear scale. In that case, HRS must be correlated with estimates of data based on light from variable stars, as Cepheid variables have a fairly stable pattern of luminosity in relation to their frequency of their variation.

Hubble and other astronomers knew by 1910 that the Red Shift he discovered was probably a process that could be called decay. This was immediately an unpopular term, like spooky, It reminded sensitive persons of rot and the grave where the worms crawl in and the worms crawl out. It was reviled as "tired light" and put off as not worth dealing with; better was to be sought. The author has yielded and will use the word "evolution" to describe the way light changes during its travels in the HRS. Various terms such as photon evolution and quantum evolution are appropriate, and the inferior word gradually winnowed from these documents for the sake of civility. Evolution is okay with me ever since dinosaurs and monkeys. Besides, HRS deals in distances of millions to billions of light years, and that covers the geological history of the Earth quite nicely. Hubble Red Shift nicely spans the time since single celled life began to form multicelled life. With galactic rotation correlating to geological history, the Earth's timeline is becoming solid.

In addition, the burden of supporting wartime defense in that period was of surpassing importance. At the very least, funds were not available for more definitive research into something so obscure, faraway and other- worldly. The Red Shift's "mechanism" had not been discovered. Many hope that all the phenomena in the universe can be understood in terms of machines, such as those found in cars or weapons.

This is not quite true. For instance, quantum electrodynamics has something to say about thin fragile patinae of life that, from distant space, are mere shades of color on huge planets that lumber and collide, erupt and flood and are bathed in Cosmic, X, Gamma and ultraviolet radiation from space and pounded by the falling rocks called meteorites. It's not known yet just how galactic rotation couples to Earth's evolution like a pizza cutter. Yet it does, and species are winnowed to a fine and eventually, if they do not adapt properly, disappearing point.

Moreover, that astronomical discovery was politically and scientifically sensitive. Austria was hoping it was caused by the velocity shift in wavelength, which had been discovered in the wavelength shift of light from stars within the galaxy around which the Sun and Solar System move. That had been discovered by Charles Doppler, an eminent Austrian astronomer, before 1870.

Wartime developments meant that any work on wavelength shift whether Doppler or not was classified by national security among the Allies. It was more than indiscreet to be blab. Even astronomers like Hubble served in military units, often on front-line duty in the European theater of World War I. Allies like Britain were working even then to detect vessels and aircraft with radar. It was no disgrace comply with security requirements, and classification of astronomy was a reasonable action even in the emerging hopes of an international world at that time.

By now, with human beings orbiting the Earth, and a second series of expeditions to the moon in preparation, classification of astronomical data, measurements, theories and conjectures is no longer generally enforced, and is applied only in the case of much greater sweeps of understanding when they are so new that their relationship to, for instance, Universal Human Rights, is not yet clear.

By now it is understood that security issues are more quickly resolved when there is as little basis for suspecting deceit as possible. Optimally, no unknowns would face parties or nations that might conflict. Moreover, whatever the HRS is, it arrives shifted the same amount from each exterior galactic source, everywhere on Earth. Though visible positions of the stars and galaxies in the sky are vital in military action, their distance and exact spectra are not particularly useful. To military officers the stars are regarded as having only occasional color, such as red Betelgeuse. To anybody on Earth, the colors of galaxies are not observable without time consuming observation at remote observatories, and they are not of significant value to defense in battle. At least one observatory was lost in military action. The implications of that are ominous and as yet incompletely assessed.