Hubble Redshift Re-examined

W.Q. Sumner[1] June 25, 2020

Abstract: A collapsing Friedmann universe explains modern Hubble redshift.

In the 1920's the astronomer Edwin Hubble used the 100" Hooker telescope on Mt. Wilson to study galaxies and the light they emit. Hubble discovered that the light emitted from galaxies was redder than light emitted by similar atoms on earth. Hubble also discovered that the further away the galaxies were, the redder the light was. This redshift is named for him.

To explain this systematic shift to the red, Hubble assumed that the universe is expanding. Galaxies further from his telescope are receding faster, increasing the redshift of their light, a classic doppler shift.

This expansion was consistent with mathematical solutions to Albert Einstein's general theory of relativity published about the same time by Alexander Friedmann. Friedmann showed by making reasonable physical assumptions there are two mathematical solutions for our universe. Each begins with an universe violently expanding from a singularity in a Big Bang. One solution continues to expand forever. The other expands to a maximum size before collapsing back to a singularity.

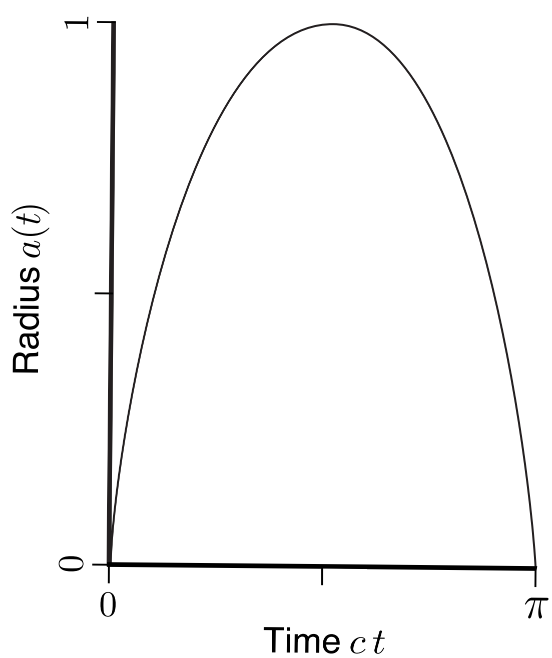

Figure 1: Friedmann's solution for a closed universe

This Hubble redshift explanation is based on two critical assumptions:
A) Distant atoms long ago <u>emitted the same wavelength photons</u> that similar atoms on earth emit today.
B) The Friedmann universe is <u>currently expanding</u>.

There are persuasive theoretical reasons, confirmed by recent Hubble redshift measurements, that instead these assumptions should be:
A) Distant atoms long ago <u>emitted different wavelength photons</u> than similar atoms emit today.
B) The Friedmann universe is closed and is <u>currently contracting</u>.

In the hundred years since the discovery of Hubble redshift, there have been major technological advances in observations and analyses. Modern Hubble redshift measurements still show an increase in redshift with distance but they no longer can be explained by general relativity without introducing a new non-gravitational interaction or ”dark energy”.

Here are two theoretical explanations for Hubble redshifts that explain current observations without assuming ”dark energy”. Each assumes the Friedmann closed solution to general relativity and each gives the same answer. The universe is collapsing.

Using relativistic quantum mechanics, Erwin Schrödinger[2] showed that quantum wave functions change as the spacetime curvature of a closed Friedmann universe changes. When a Friedmann closed universe is expanding, quantum wave functions expand. When a closed universe is contracting, quantum wave functions contract. There is a one to one relationship between the Friedmann radius and the wavelengths of quantum solutions.

Using general relativity, Maxwell electrodynamics, and non-relativistic quantum mechanics, William Sumner[3] showed that in a closed Friedmann universe all atoms and photons change with the spacetime curvature. When a Friedmann closed universe is expanding, atoms and photons expand. When a closed universe is contracting, atoms and photons contract. There is a one to one relationship between the Friedmann radius and the sizes of atoms and photons.

While the wavelengths λ of both photons and atoms are proportional to the Friedmann radius, their energies are not. For photons, energy is proportional to λ^{-1}. For atoms, energy is proportional to λ^{-2}. In an expanding universe atomic emissions out redshift photons. With respect to atomic emissions, photons are blueshifted. In a collapsing universe, atomic emissions out blueshift photons, giving the relative redshift that is observed.

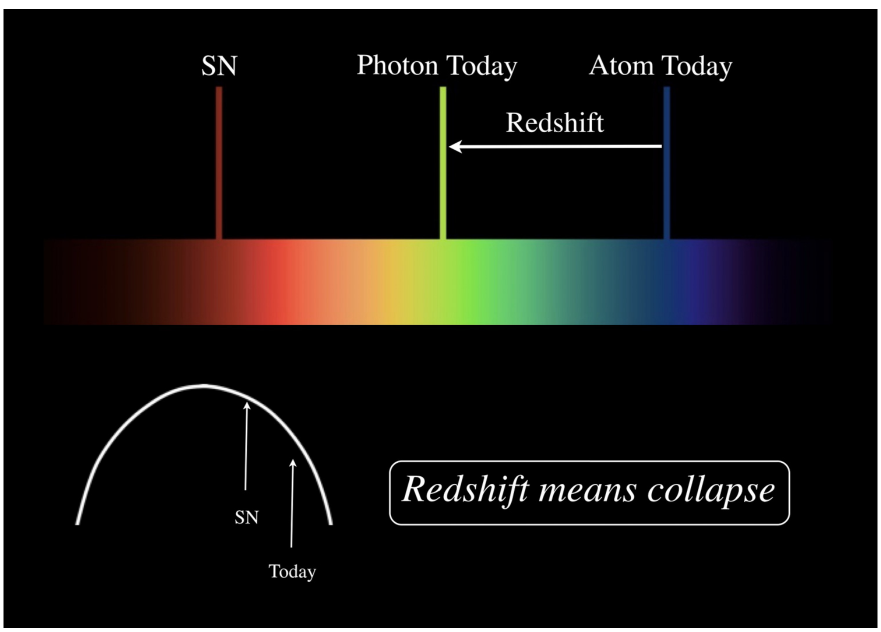

Figure 2: Photons blueshift in a collapsing Friedmann universe. Atomic spectra blueshift more. Hubble redshifts of the photons from the supernova (SN) are observed.

Schrödinger’s and Sumner’s reasoning is dramatically confirmed by modern Hubble redshift measurements of light from supernovae.

Here is a theoretical fit to the recent Pantheon compilation of 1048 supernova redshift measurements. Distance Modulus is a measure of distance. H_o = -72.10 $\pm$ 0.75 km s^{-1} Mpc^{-1} is the Hubble constant, negative since the universe is collapsing. $q_o = 1/2 < q_o < 0.51$, the deceleration parameter, implies that the universe is nearly flat ($q_o = 1/2$ is exactly flat). H_o and q_o were the only variable parameters used to fit these supernovae data.

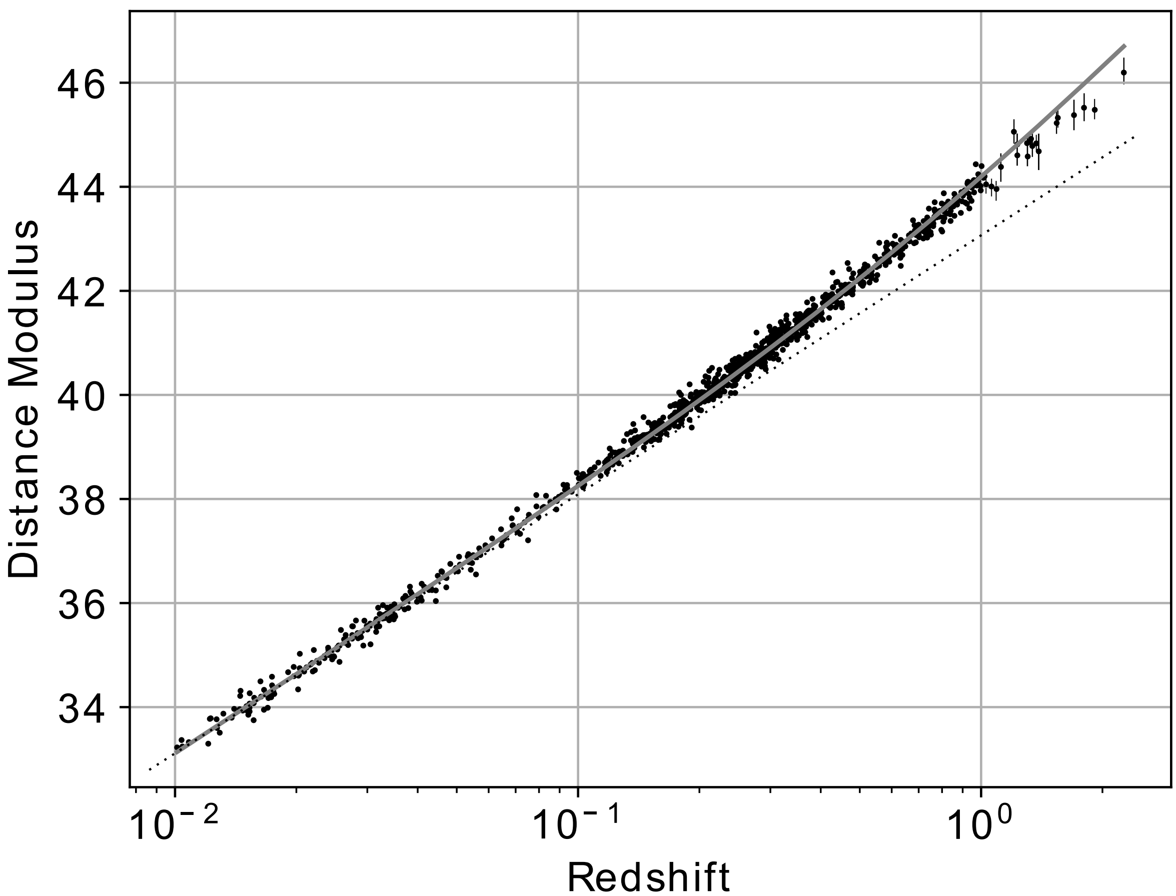

Figure 3: The solid line is the fit to the Pantheon redshift data set with the parameters H_o = -72.10 $\pm$ 0.75 km s^{-1} Mpc^{-1} and $q_o = 1/2 < q_o < 0.51$. The dotted straight line is included to visually clarify the upward curve (or "acceleration") of the data and fit. The average data error is 0.1418. The standard deviation for this fit is 0.1515.

[1] wqsumner@gmail.com
[2] Schrödinger, E. 1939, Physica, 6, 899
[3] Sumner, W. 1994, ApJ, 429, 491

Thank you for reading!

https://www.katoon.org/redshift/Sumner2020.pdf
has the details

Click here to download it