Interstellar matter is the main cause of Hubble redshift and the testing method of Hubble's Law

Author: Xiaotao Peng

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[Abstract]: The article "Eight Magnifiers Relay to Take a Picture of Dark Matter Halo" published by science and technology hall, China on September 3, 2020 introduced the situation of taking pictures of dark matter, and posted relevant photos. So what is the so-called dark matter halo in these photos made of? What are their physical meanings? These so-called dark matter should only be normal matter with low temperature and little visible light, which we can call interstellar matter.

The existence of interstellar matter directly excludes the possibility that Hubble redshift is Doppler effect, and at the same time, the existence of interstellar matter will cause astronomical observers on earth to actually observe only the secondary light produced by interstellar matter, rather than the primary light produced by celestial bodies. In the process of producing secondary light, the frequency of interstellar matter will decrease slightly every time it is regenerated. Therefore, when interstellar matter is regarded as macroscopic isotropic and basically uniform, the frequency of starlight will decrease in direct proportion to the distance, which is called Hubble redshift. This is the mechanism and truth of Hubble redshift.

Since Hubble discovered in 1929 that the redshift of celestial bodies is proportional to the distance between celestial bodies and the earth, it is believed that the redshift of celestial bodies is the Doppler effect caused by the retrogression of celestial bodies, and then the redshift of celestial bodies is directly converted into the retrogressive velocity of celestial bodies and Hubble's law is deduced, in which the coefficient is called Hubble constant. But up to now, the values of Hubble constant measured by different methods are not completely the same. The emergence of this phenomenon may indicate that there is a fundamental error in Hubble's law: the fact that the redshift of celestial bodies is proportional to the distance is not the Doppler effect caused by the retrogression of celestial bodies, but the result of interstellar matter. This paper puts forward some analysis and discussion on this, which can be used for reference by interested friends.

Chapter one

The true physical meaning of the relay of eight magnifying glasses to "take a picture" of dark matter halo

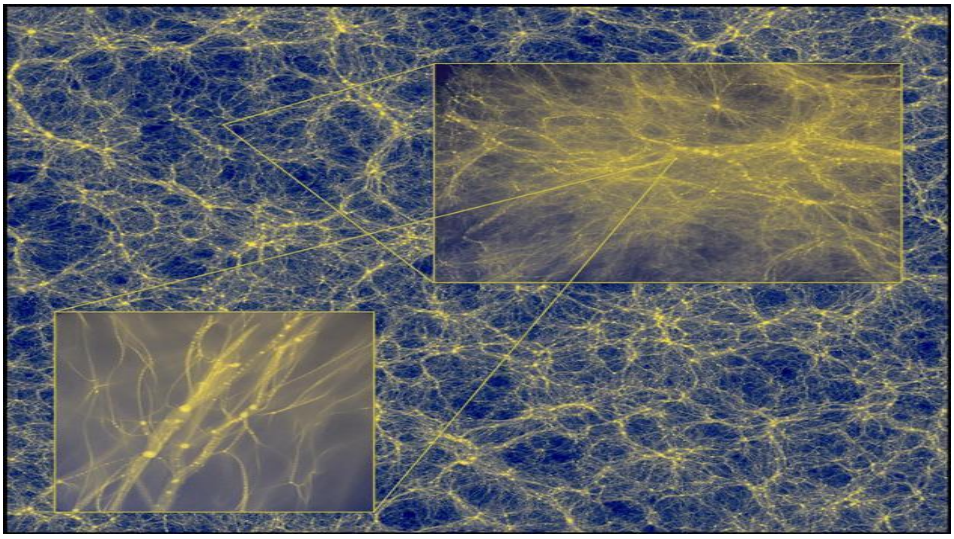
First, brief introduction

Researchers from the National Astronomical Observatory of the Chinese Academy of Sciences and other domestic and foreign units, using supercomputers in China and Europe, using a new multiple magnification simulation technology, under the current standard cosmological model, a clear image of the internal structure of the full-scale dark halo in the universe is obtained for the first time. The relevant research results were published online in the journal Nature on September 2.

The most massive dark halo in the universe is a giant galaxy cluster containing hundreds of bright galaxies, whose mass is about ten billion times that of the sun, and their properties have been widely studied by astronomers. However, a small mass of dark halo is not so lucky. Although they are numerous, human beings know little about them. "Because they have remained' dark' throughout the evolutionary history of the universe, we can only rely on supercomputers to study these dark ultramicro halos by simulating the evolution of the universe." Gao Liang, one of the authors of the paper and a researcher at the National Astronomical Observatory of the Chinese Academy of Sciences, said, "In order to study the internal structure of dark halos only the size of the solar system under the background framework of the whole universe, we have developed a brand-new technology."

The researchers spent five years developing and testing simulation programs with the help of supercomputers, and using multiple magnification techniques, successfully increased the magnification of small mass halos by more than 30 orders of magnitude. "this super-magnification simulation in a typical region of the universe requires the use of eight 'magnifying glass' relays to zoom in. It is as magnified as finding a flea on a picture of the surface of the moon. " Wang Jie, the first author and co-author of the paper and a researcher at the National Astronomical Observatory of the Chinese Academy of Sciences, made an analogy.

These super-magnified simulations allow researchers to reliably and thoroughly study the formation, evolution and internal structure of the mass halo from Earth to the supercluster. Extracted from http://baijiahao.baidu.com/s?id=1676800144806475051&wfr=spider&for=pc。



Second, the luminescence mechanism of substances and the analysis of visible substances

According to Planck's blackbody radiation formula, the relationship between frequency and intensity and peak value of light emitted by objects at different temperatures can be calculated, as shown in the table below:

Calculation table of blackbody radiation intensity at different temperatures

Planck constant h (J·s)	Boltzmann constant k (J/K)	Radiation frequency v (Hz)	Background temperature T (K)	Background radiation intensity E (J/(Hz*m3))	Edge temperature of solar system T(K)	Solar system edge radiation intensity E (J/(Hz*m3))	Sun temperature T (K)	Solar radiation intensity E (J/(Hz*m3))	Solar / background radiation intensity ratio
6.62607E-34	1.38065E-23	1.88E+09	2.7	9.06E-21	30.0	1.02E-19	6353	2.17E-17	2.39E+03
6.62607E-34	1.38065E-23	3.76E+09	2.7	3.56E-20	30.0	4.08E-19	6353	8.67E-17	2.43E+03
6.62607E-34	1.38065E-23	7.53E+09	2.7	1.38E-19	30.0	1.63E-18	6353	3.47E-16	2.52E+03
6.62607E-34	1.38065E-23	1.51E+10	2.7	5.14E-19	30.0	6.47E-18	6353	1.39E-15	2.70E+03
6.62607E-34	1.38065E-23	3.01E+10	2.7	1.78E-18	30.0	2.56E-17	6353	5.55E-15	3.11E+03
6.62607E-34	1.38065E-23	6.02E+10	2.7	5.27E-18	30.0	9.98E-17	6353	2.22E-14	4.21E+03
6.62607E-34	1.38065E-23	9.03E+10	2.7	8.56E-18	30.0	2.19E-16	6353	4.99E-14	5.83E+03
6.62607E-34	1.38065E-23	1.20E+11	2.7	1.08E-17	30.0	3.80E-16	6353	8.87E-14	8.24E+03
6.62607E-34	1.38065E-23	1.81E+11	2.7	1.15E-17	30.0	8.13E-16	6353	2.00E-13	1.74E+04
6.62607E-34	1.38065E-23	2.41E+11	2.7	9.06E-18	30.0	1.37E-15	6353	3.55E-13	3.91E+04
6.62607E-34	1.38065E-23	4.82E+11	2.7	9.90E-19	30.0	4.45E-15	6353	1.42E-12	1.43E+06
6.62607E-34	1.38065E-23	9.63E+11	2.7	1.52E-21	30.0	1.13E-14	6353	5.66E-12	3.73E+09
6.62607E-34	1.38065E-23	1.93E+12	2.7	4.45E-28	30.0	1.59E-14	6353	2.26E-11	5.07E+16
6.62607E-34	1.38065E-23	3.85E+12	2.7	4.79E-42	30.0	5.58E-15	6353	8.96E-11	1.87E+31
6.62607E-34	1.38065E-23	7.71E+12	2.7	6.94E-71	30.0	9.38E-17	6353	3.53E-10	5.08E+60
6.62607E-34	1.38065E-23	1.54E+13	2.7	1.82E-129	30.0	3.32E-21	6353	1.37E-09	7.52E+119
6.62607E-34	1.38065E-23	3.08E+13	2.7	1.57E-247	30.0	5.22E-31	6353	5.17E-09	3.29E+238
6.62607E-34	1.38065E-23	6.16E+13	2.7	#NUM!	30.0	1.61E-51	6353	1.83E-08	#NUM!
6.62607E-34	1.38065E-23	1.23E+14	2.7	#NUM!	30.0	1.91E-93	6353	5.64E-08	#NUM!
6.62607E-34	1.38065E-23	2.47E+14	2.7	#NUM!	30.0	3.37E-178	6353	1.27E-07	#NUM!
6.62607E-34	1.38065E-23	4.20E+14	2.7	#NUM!	30.0	5.43E-298	6353	1.50E-07	#NUM!
6.62607E-34	1.38065E-23	4.93E+14	2.7	#NUM!	30.0	#NUM!	6353	1.37E-07	#NUM!
6.62607E-34	1.38065E-23	7.80E+14	2.7	#NUM!	30.0	#NUM!	6353	6.08E-08	#NUM!

As can be seen from the above table, when the temperature of the object is 2.7K, the radiation intensity in the visible light band (orange area in the table) is less than$1.57*10^{-247}$（J/Hz*m^3）（Due to the limitation of Excel's computing power, it may actually be10^{-800}（J/Hz*m^3） below）; At 30K, the radiation intensity in the visible light band is less than$5.43*10^{-298}$（J/Hz*m^3）, The visible light intensity of the sun (6353K) is$6.08*10^{-8}$ above。It can be seen that with the decrease of the temperature of the object, the intensity of visible light generated by it decreases rapidly. The radiation intensity of 30K solar system edge material is more than 10^{290} times different from that of the sun in the visible light range, but compared with the so-called cosmic background radiation source of 2.7K, the radiation intensity of the sun in the visible light range may be more than 10^{800} times！ When people use visible light to measure whether matter is visible or not, these cryogenic substances are naturally what we call invisible matter, or so-called dark matter. If we can observe it with the peak frequency $1.5*10^{11}$Hz corresponding to the temperature of 2.7K, there will be normal matter with visible matter everywhere in the universe, and the so-called dark matter will not exist.

Third, the mechanism and physical significance of cosmic background radiation

The so-called cosmic background radiation is blackbody radiation with a temperature similar to 2.7K, which is isotropic when observed on the earth, that is, the intensity in all directions is basically the same, and it is much greater than that in other temperatures, so that no measures can be taken to suppress and eliminate it.

As can be seen from the above table, the frequency corresponding to the peak of blackbody radiation intensity at 2.7K (referred to as "peak frequency" for short) is about $1.5*10^{11}$Hz, and its radiation intensity is four orders of magnitude smaller than the solar radiation intensity at the same frequency, that is, the peak radiation intensity of the cosmic background is only one ten thousandth of the solar radiation intensity at the same frequency! But the objective fact is that the cosmic background radiation intensity is much greater than the solar radiation intensity of the same frequency! Why is this happening? This is because Planck's blackbody radiation formula is based on surface radiation source, while the so-called cosmic background radiation is volume type. That is to say, there are low-temperature substances with an average temperature of about 2.7K everywhere in space, which together produce the so-called cosmic background radiation. Based on the cosmic background radiation more than two years ago, I speculated that there are low-temperature substances with an average temperature of about 2.7K in space, especially in the vast airspace between galaxies, which do not produce visible light! In fact, the detection results only confirmed my inference.

Fourth, the physical significance of this achievement

1. Dark matter is just a normal substance with low temperature and little visible light

From the above analysis, we can see that the so-called dark matter or invisible matter is only a matter with low temperature that can not or hardly produce visible light, but they are all normal matter, not the so-called dark matter that does not participate in electromagnetic interaction but only participates in gravity！

2. Hubble's law will not apply

Because the universe is not the ideal vacuum envisioned by Hubble, the transmission of starlight in interstellar space will be affected by the ubiquitous low-temperature substances in the universe and become refracted light. Its frequency decreases with the moving distance in the medium, just like the dispersion phenomenon in optical fiber communication, which is the result of the action of the medium, not the Doppler effect! Therefore, Hubble's law naturally no longer applies.

3. The foundation of relativistic light speed remains unchanged

Due to the action of the ubiquitous medium in space, the speed of light cannot be constant in any frame of reference, but at most it can only be constant in the frame of reference in which the relatively uniform medium is static. Therefore, even if the theory of relativity is theoretically correct, it is no longer applicable！

chapter two

Analysis of essential factors of different Hubble constants measured by different methods

First, the origin of Hubble constant and its actual measurement are briefly introduced

1. The origin of Hubble law and Hubble constant

Hubble's law ： Vf = Hc x D

Parameter description：

Vf：Velocity (Far Away) , unit：km / s

Hc：Hubble's Constant , unit：km / (s • Mpc)

D：Distance (Distance from the earth), unit：Mpc

Hubble's Law: Speed and distance are both indirectly observed quantities. The velocity-distance relationship and velocity-apparent magnitude relationship are based on the observation of redshift-apparent magnitude relationship and some theoretical assumptions. Hubble's law was originally observed in normal galaxies, but now it has been applied to quasars or other special galaxies. Hubble's law is usually used to calculate the distance of distant galaxies.

Hubble's law is a physical cosmological statement: the redshift of light from distant galaxies is proportional to their distance. This law was first formulated by Hubble and Milton Summerson in 1929 after nearly a decade of observation. It is considered to be the first observation basis in the extended space paradigm and is often cited today as an important evidence in support of the Big Bang cosmology. The optimal value of this constant was measured in 2003 using the Wilkinson Microwave Anisotropy detector (WMAP), which is 71 ±4 km/s/Mpc. In 2006, the figure corresponds to 77 km/s/Mpc.[Excerpted from Baidu Encyclopedia]

According to the relevant data, the Hubble constant initially measured by Hubble is 500 km/s/Mpc;. The distance between the Cepheid variable and the standard cosmic candlelight method is calculated by Hubble telescope, the Hubble constant calculated by the redshift of the combined galaxy is 74km, and the Hubble constant obtained by the cosmic background radiation observation data and the cosmic standard model method is 67.8Km/s/Mpc. The Hubble constant calculated by the red giant instead of the standard candlelight paternal variable is 69.8Km/s/Mpc.

Second, the analysis of the possible reasons for the difference of Hubble constant

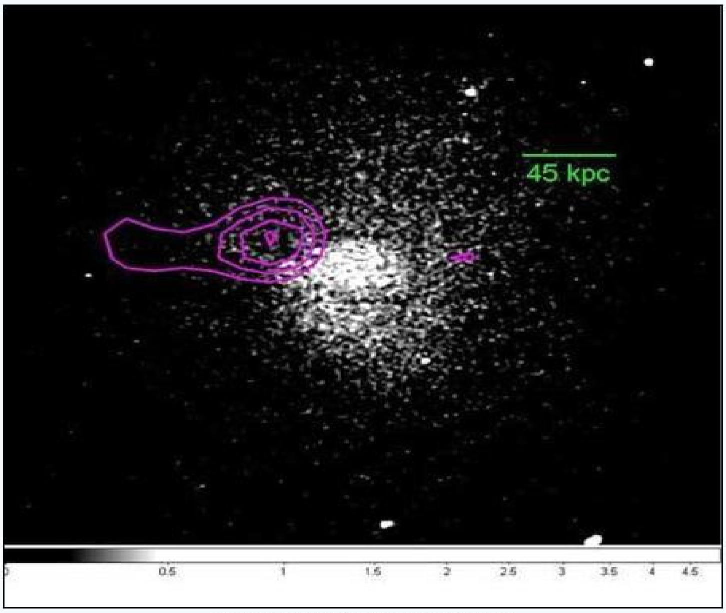
1. There are fundamental primary errors in Hubble's law

At present, there are many pictures of galaxies colliding with each other taken by Hubble telescope (as shown in the following picture) and several groups of absorption line clusters with different red shifts in quasars. These evidences show that the distance between celestial bodies does not always increase with time; The frequency of starlight is constantly changing and decreasing on the way to the earth. This fundamentally denies that the amount of starlight redshift is caused by the regression of celestial bodies relative to the earth, which also denies Hubble's law。

At the same time, from the existing interaction law between light and medium: incident light polarizes atoms and molecules in the medium and produces secondary light, the so-called reflection, scattering, refraction and transmission light is only part of the secondary light produced by the medium. Therefore, the starlight observed by the earth is refracted by interstellar matter, and its direction, velocity, amplitude, phase and frequency are different from the original starlight, and may change with the distance of starlight in interstellar space. Therefore, the decrease of starlight frequency with distance should be the result of the action of interstellar matter, not the retrogression of celestial bodies.

Us astronomers have observed collisions at speeds of tens of millions of kilometers per hour above the galaxy cluster

http://www.sina.com.cn 2007年07月20日 07:41 新浪科技



Abell 576实际上由两个星系群构成

American astronomers have observed that Four galaxies will merge into a super-large galaxy

http://www.sina.com.cn 2007年08月08日 07:48 新浪科技

美天文学家观测到四星系大碰撞壮观景象

NASA photographed a spectacle: galaxies collide like ball masks

http://www.sina.com.cn 2006年04月28日 09:43 信息时报

冰蓝的“眼睛”，绚丽的“面具”，银河系像是在开一个热闹的化装舞会

Two spiral galaxies collide with each other

http://www.sina.com.cn 2006年11月27日13:37 中国日报网站

第九名是两个螺旋形星系相互碰撞

2. Problems of Hubble constant measured by Hubble

Hubble only measured the redshifts of dozens of galaxies close to Earth, and the measurement techniques and methods for determining the distances of celestial bodies at that time were not perfect. Therefore, the Hubble constant obtained is naturally not accurate enough, and it will naturally be very different from the results measured by advanced equipment and methods such as the Hubble Telescope.

3. The reasons for the different values of Hubble constant obtained by the three measurement methods

From the analysis of the receiving starlight frequency bands used by the three measurement methods and the measured data, it can be seen that the Hubble constant increases with the increase of the frequency used. That is, the cosmic background radiation method with the lowest frequency is 67.8km hand MPC, the red giant method with the highest frequency is 69.8km hand MPC, and the

Cepheid method with the highest frequency is 74Km/s/Mpc. This law may precisely indicate that the redshift of celestial bodies is the result of the action of interstellar matter: the higher the frequency, the greater the rate at which the frequency of starlight decreases in interstellar matter.

Third, the method to verify whether Hubble's law is correct or not

1. The theoretical basis and basis of the scheme

1.1. Astronomical observations more than a hundred years ago have measured that the redshift of celestial bodies is proportional to the distance between celestial bodies and the earth.

1.2. The redshift of celestial bodies is mainly caused by Doppler effect (motion of celestial bodies far from the earth), cosmological redshift, gravitational redshift and interstellar matter action (medium action or Compton effect of charged bodies), etc.

1.3. assuming that the apparent velocity of the celestial body away from the earth is u (far away from the positive value, moving toward the celestial body is negative), then the Doppler redshift component is $H_{多}$ = (u / (Cmuru)), and assuming that the cosmological redshift coefficient is j, then the cosmological redshift component is $H_{宇}$ = jS_0 (S_0 is the distance between the celestial body and the earth when the starlight starts from the celestial body. Because the proportion of the gravitational redshift component is very small when the celestial body is far from the earth, it is temporarily ignored here; assuming that the redshift coefficient caused by the interaction of interstellar matter is k, then the medium redshift component is $H_{介}$ = ks (k is a constant or a single-valued function related to distance, s is the distance from the celestial body to the earth). There are：

$$H_{总}=H_{多}+H_{宇}+H_{介}=u/(C-u)+jS_0+ks \quad \text{(Formula 1)}$$

Because of the relationship between the total distance s of the actual motion of the starlight and the original distance S_0, there is a relationship as follows: S_0=s/ (1j). Substituting it into the above formula has：

$$H_{总}=H_{多}+H_{宇}+H_{介}=u/(C-u)+js/(1+j)+ks \quad \text{(Formula 1-1)}$$

1.4、 Based on the measurement of the redshift of the celestial bodies with the same known distance but different relative velocity and the known apparent velocity but different distance, the total redshift is obtained respectively. Then the Doppler redshift component, cosmological redshift component and medium redshift component are calculated by mathematical operation. As shown in figure 2-1 below：

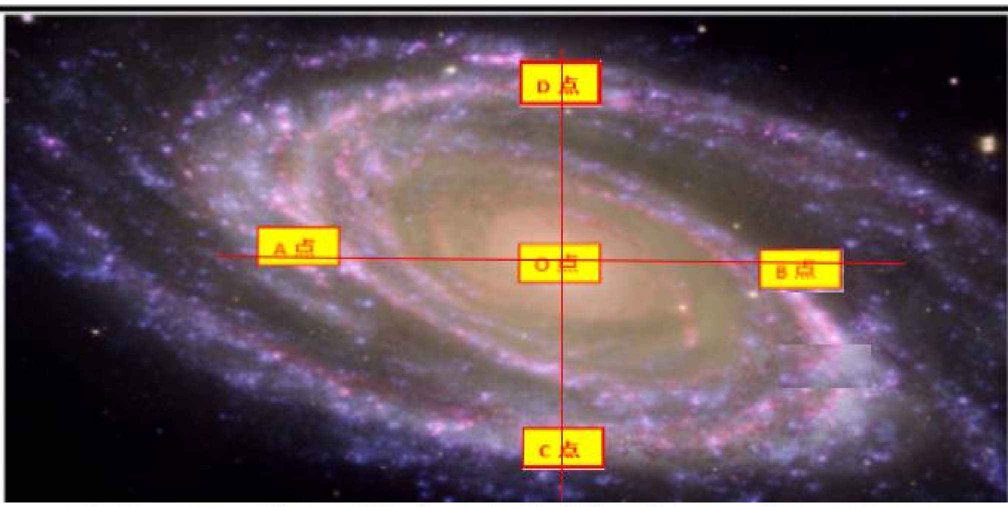


Figure 2-1: schematic diagram of the observation scheme of celestial redshift at the same visual distance / apparent velocity

1.4.1、Suppose: when the time is T_0, the points A, B, C, D and O in Fig. 2-1 are measured, and the total redshifts are obtained as H (A, T_0), H (B, T_0), H (C, T_0), H (D, T_0) and H (O, T_0), respectively. The apparent velocity of the O point away from the earth is u, An and B, and the apparent velocity of the counterclockwise rotation around the O point is-v and + v, respectively, then the apparent velocity relative to the earth is (u-v) and (u+v), respectively. The apparent velocity of C and D relative to the earth is the same as that of the O point, and the distance from the earth to the point A, B and O is equal to S (T_0). The distances between C and D to the earth are (S (T_0)-L) and (S (T_0) + L), respectively. There are

$H(O, T_0) = H_{\text{多}} + H_{\text{宇}} + H_{\text{介}} = u/(C-u) + jS(T_0)/(1+j) + kS(T_0)$ （Formula 2）

$H(A, T_0) = H_{\text{多}} + H_{\text{宇}} + H_{\text{介}} = (u-v)/(C-u+v) + jS(T_0)/(1+j) + kS(T_0)$ （Formula 3）

$H(B, T_0) = H_{\text{多}} + H_{\text{宇}} + H_{\text{介}} = (u+v)/(C-u-v) + jS(T_0)/(1+j) + kS(T_0)$ （Formula 4）

$H(C, T_0) = H_{\text{多}} + H_{\text{宇}} + H_{\text{介}} = u/(C-u) + j(S(T_0)-L)/(1+j) + k(S(T_0)-L)$ （Formula 5）

$H(D, T_0) = H_{\text{多}} + H_{\text{宇}} + H_{\text{介}} = u/(C-u) + j(S(T_0)+L)/(1+j) + k(S(T_0)+L)$ （Formula 6）

（Formula 2）-（Formula 3）available：

$H(O, T_0) - H(A, T_0) = Cv/(C-u)(C-u+v)$ （Formula 7）

When the geometric dimensions and rotation velocities of celestial bodies are known, the apparent velocities of points An and B relative to point O are known, and the apparent velocity difference v relative to the earth is also known. It can be obtained according to (formula 7)：

$u^2-(2C+v)u+C^2+Cv-Cv/(H(O, T_0)-H(A, T_0))=0$ （Formula 8）

Furthermore, the value of u (the solution of univariate quadratic equation) can be obtained：

$$u = \frac{2C + v \pm \sqrt{(2C+v)^2 - 4\left(C^2 + Cv - \dfrac{Cv}{H(O,T_0) - H(A,T_0)}\right)}}{2} \quad \text{(Formula 9)}$$

It can also be obtained by using (Formula 4)- (Formula 3)：

$H(B, T_0) - H(A, T_0) = 2Cv/(C-u-v)(C-u+v)$ （Formula 10）

To solve the value of u。

Substitute the obtained u values into (Formulas 2, 3, 4, 5 and 6) respectively, and you can get：

$(j/(1+j)+k)S(T_0) = u/(C-u) - H(O, T_0)$ （Formula 11）

$(j/(1+j)+k)S(T_0) = (u-v)/(C-u+v) - H(A, T_0)$ （Formula 12）

$(j/(1+j)+k)S(T_0) = (u+v)/(C-u-v) - H(B, T_0)$ （Formula 13）

$(j/(1+j)+k)(S(T_0)-L) = u/(C-u) - H(C, T_0)$ （Formula 14）

$(j/(1+j)+k)(S(T_0)+L) = u/(C-u) - H(D, T_0)$ （Formula 15）

When the distance from the body to the earth s and L is known, it can be obtained：

$$\frac{j}{1+j}-k=\frac{u}{S(T_0)(C-u)}-\frac{H(O,T_0)}{S(T_0)} \quad \text{(Formula 16)}$$

$$\frac{j}{1+j}-k=\frac{u-v}{S(T_0)(C-u+v)}-\frac{H(A,T_0)}{S(T_0)} \quad \text{(Formula 17)}$$

$$\frac{j}{1+j}-k=\frac{u+v}{S(T_0)(C-u-v)}-\frac{H(B,T_0)}{S(T_0)} \quad \text{(Formula 18)}$$

$$\frac{j}{1+j}-k=\frac{u}{(S(T_0)-L)(C-u)}-\frac{H(C,T_0)}{S(T_0)-L} \quad \text{(Formula 19)}$$

$$\frac{j}{1+j}-k=\frac{u}{(S(T_0)+L)(C-u)}-\frac{H(D,T_0)}{S(T_0)+L} \quad \text{(Formula 20)}$$

We can also use (formula 6)-(formula 5) to get:

$H(D, T_0)-H(C, T_0)=2(j/(1+j)+k)L$

$(j/(1+j)+k) = (H(D, T_0)-H(C, T_0))/2L$ (Formula 21)

1.4.2. Similarly, when time $T_1 = t_0+\Delta t$, the points A, B, C, D and O in Figure 2-1 are measured, and the total red shifts obtained are H (A, T_1), H (B, T_1), H (C, T_1), H (D, T_1) and H (O, T_1). The apparent velocity of point O away from the earth is still u, and the apparent velocities of point A and point B rotating counterclockwise around point O are still -v and +v, so the apparent velocities relative to the earth are still (u-v) and (u+v) respectively. The apparent velocities of points C and D relative to the earth are the same as those of point O, both of which are still U; The distances from points A, B and O to the earth are still equal, all of which are S (T_1); The distances from C and D to the earth are (S (T_1)-L) and (S (T_1)+L) respectively. However, the value of S (t_1) is different when considering the expansion and non-expansion of space: therefore, let the distance of space expansion with time be S (T_1,1) = S (t_0)+(u Δ t+s (T_0)) j/(1+j); Let's assume that the distance of space expansion with time is S (T_1,2) = S (T_0)+u Δ t. Then there is:

$H(O, T_1)=u/(C-u)+jS(T_0)/(1+j)+(u\Delta t+S(T_0))j^2/(1+j)^2)+kS(T_0)+ku\Delta t$ (Formula 22)

$H(A, T_1)=(u-v)/(C-u+v)+jS(T_0)/(1+j)+(u\Delta t+S(T_0))j^2/(1+j)^2)+kS(T_0)+ku\Delta t$ (Formula 23)

$H(B, T_1)=(u+v)/(C-u-v)+jS(T_0)/(1+j)+(u\Delta t+S(T_0))j^2/(1+j)^2)+kS(T_0)+ku\Delta t$ (Formula 24)

$H(C, T_1)=u/(C-u)+j(S(T_0)-L)/(1+j)+(u\Delta t+(S(T_0)-L))j^2/(1+j)^2)+k(S(T_0)-L)+ku\Delta t$ (Formula 25)

$H(D, T_1)=u/(C-u)+j(S(T_0)+L)/(1+j)+(u\Delta t+(S(T_0)+L))j^2/(1+j)^2)+k(S(T_0)+L)+ku\Delta t$ (Formula 26)

(formula 26)-(formula 25) and can be obtained after finishing:

$H(D, T_1)-H(C, T_1)=2Lj/(1+j)+2L(j/(1+j))^2+2kL=2L(j/(1+j)+(j/(1+j))^2+k)$ (Formula 27)

So there is:

$(j/(1+j))^2+j/(1+j)+k=(H(D, T_1)-H(C, T_1))/2L$ (Formula 28)

Replace (formula 21) into (formula 28):

$(j/(1+j))^2= (H(D, T_1)-H(D, T_0)-H(C, T_1)+H(C, T_0))/2L$ (Formula 29)

Let ΔH_D = H (D, T_1)-H (D, T_0); ΔH_C = H (C, T_1)-H (C, T_0), then (Formula 29) can be simplified as follows：

$$(j/(1+j))^2 = (\Delta H_D - \Delta H_C)/2L \qquad \text{(Formula 30)}$$

By solving (Formula 30), we can get：

$$j = \frac{\sqrt{\frac{\Delta H_D - \Delta H_C}{2L}}}{1 - \sqrt{\frac{\Delta H_D - \Delta H_C}{2L}}} \qquad \text{(Formula 31)}$$

The k value can be obtained by substituting the value obtained by (formula 31) into (formula 21)：

$$k = (H(D, T_0) - H(C, T_0))/2L - j/(1+j) \qquad \text{(Formula 32)}$$

Through the above derivation, we can use the observation data of the redshift at the specific position of the same galaxy at different times to obtain the velocity u of the galaxy center, the cosmic expansion coefficient j and the redshift coefficient k of interstellar matter. Furthermore, the correctness of Hubble's law can be verified！

2. Verification scheme

By observing the redshifts of two colliding galaxies or different parts of the same inclined galaxy, the measured redshifts of different parts can be obtained. At the same time, the relative velocity v or relative distance L between colliding galaxies or different parts of the same inclined galaxy are measured, and the actual motion velocity u of celestial bodies can be obtained by using the same distance but obvious difference in the apparent velocity of the earth. Furthermore, the cosmological redshift coefficient j and the interstellar space medium interaction coefficient k are calculated by using the distance of known celestial bodies.

3. Prediction of experimental results

3.1. By using the measured distance-dependent medium interaction coefficient k and cosmological redshift coefficient j, the distance-related redshift component in the total redshift of celestial bodies can be eliminated, and the resulting residual redshift is mainly Doppler redshift.

3.2. Hubble's law can be proved or proved by testing Hubble's law by using the modified celestial Doppler redshift value. That is, when k is equal to 0, Hubble's law can be established.

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Due to my lack of English ability, the Chinese to English translation was achieved through common software. Therefore, the English version is likely to have more inaccurate and not easily understood parts. In order to facilitate the review of the manuscript by experts, the original Chinese version is attached. Please accept my apologies for any inconvenience.

星际物质是产生哈勃红移的主因及哈勃定律的检验方法探讨

作者：彭晓韬

日期：2023.07.24

【文章摘要】：中国科学技术馆于 2020 年 09 月 03 日发表的《八个“放大镜”接力给暗物质晕“拍个照”》文介绍了有关给暗物质拍照的情况，并贴出了相关的照片。那么这些照片中的所谓暗物质晕到底是什么物质构成的呢？它们又有哪些物理意义呢？这些所谓的暗物质应该只是温度较低而不怎么能产生可见光的正常物质，我们可以称其为星际物质。

星际物质的存在直接排除了哈勃红移为多普勒效应的可能性，同时将导致地球上的天文观测者实际观测到的只是星际物质所产生的次生光，而非天体产生的原生光。星际物质在产生次生光的过程中，每再生一次就会现频率的稍微降低。因此，当将星际物质视为宏观上各向同性和基本均匀时，则星光的频率将随距离成正比降低，即所谓的哈勃红移。这才是哈勃红移产生的机理与真相。

自从哈勃于 1929 年发现天体的红移量与天体到地球的距离成正比的现象，并认为天体红移量是由天体退行导致的多普勒效应，进而将天体红移量直接转换成天体退行速度并推导出哈勃定律，其中的系数被称作哈勃常数。但时至今日，用不同方法测量得到的哈勃常数值并不完全一致。这种现象的出现可能预示着哈勃定律存在根本性的错误：天体红移量与距离成正比部分不是天体退行导致的多普勒效应，而是星际物质作用的结果。本文就此提出一些分析与探讨，供有兴趣的朋友们参考。

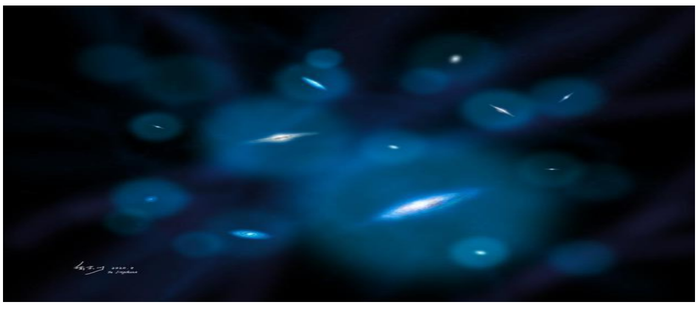
第一章

八个“放大镜”接力给暗物质晕“拍个照”的真实物理意义

一、情况简介

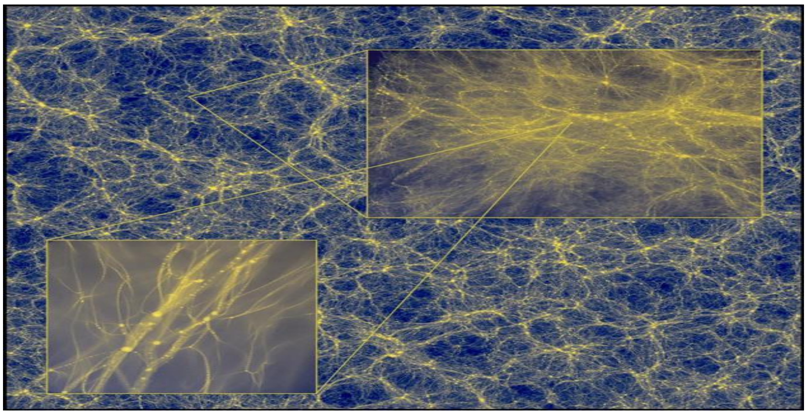
来自中国科学院国家天文台等国内外单位的研究人员，利用中国和欧洲的超级计算机，采用一项全新的多重放大模拟技术，在当前标准宇宙学模型下，首次获得了宇宙中全尺度暗晕内部结构的清晰图像。相关研究成果 9 月 2 日在线发表于《自然》杂志上。

宇宙中最大质量的暗晕是包含数百个亮星系的巨型星系团，其质量大约是太阳的百万亿倍，它们的属性已经被天文学家广泛研究。然而，小质量的暗晕却没有那么幸运。它们虽然数量极多，但是人类却对其知之甚少。“因为它们在整个宇宙演化历史里一直保持‘黑暗’， 我们只能依赖超级计算机通过模拟宇宙的演化来研究这些黑暗的超微暗晕。”论文作者之一、中国科学院国家天文台研究员高亮说，“为了在整个宇宙的背景框架下研究只有太阳系大小的暗晕的内部结构，我们开发了一种全新的技术。”



研究人员耗时 5 年，借助超级计算机，开发、测试模拟程序，并利用多重放大技术，成功将小质量暗晕的放大倍数跨越 30 个数量级。“在宇宙中一个典型区域进行的这一超级放大模拟，需要利用八个‘放大镜’接力去放大。其放大程度相当于在一张月球表面的图片上找到一只跳蚤。”论文第一作者兼共同通讯作者、中国科学院国家天文台研究员王杰打了个比方。

这些超级放大的模拟使研究人员得以可靠并详尽地研究从地球到超级星系团质量暗晕的形成、演化以及内部结构。摘自 http://baijiahao.baidu.com/s?id=1676800144806475051&wfr=spider&for=pc。



二、物质发光机理及可见物质分析

根据普朗克黑体辐射公式，可以计算出不同温度的物体所发光的频率与强度关系以及峰值等情况，详见下表所示：

不同温度的黑体辐射强度计算表

普朗克常数h（J·s）	玻耳兹曼常数k（J/K）	辐射频率v（Hz）	背景温度T（K）	背景辐射强度E（J/(Hz*m3)）	太阳边缘温度T（K）	太阳边缘辐射强度E（J/(Hz*m3)）	太阳温度T（K）	太阳辐射强度E（J/(Hz*m3)）	太阳/背景辐射强度比
6.62607E-34	1.38065E-23	1.88E+09	2.7	9.06E-21	30.0	1.02E-19	6353	2.17E-17	2.39E+03
6.62607E-34	1.38065E-23	3.76E+09	2.7	3.56E-20	30.0	4.08E-19	6353	8.67E-17	2.43E+03
6.62607E-34	1.38065E-23	7.53E+09	2.7	1.38E-19	30.0	1.63E-18	6353	3.47E-16	2.52E+03
6.62607E-34	1.38065E-23	1.51E+10	2.7	5.14E-19	30.0	6.47E-18	6353	1.39E-15	2.70E+03
6.62607E-34	1.38065E-23	3.01E+10	2.7	1.78E-18	30.0	2.56E-17	6353	5.55E-15	3.11E+03
6.62607E-34	1.38065E-23	6.02E+10	2.7	5.27E-18	30.0	9.98E-17	6353	2.22E-14	4.21E+03
6.62607E-34	1.38065E-23	9.03E+10	2.7	8.56E-18	30.0	2.19E-16	6353	4.99E-14	5.83E+03
6.62607E-34	1.38065E-23	1.20E+11	2.7	1.08E-17	30.0	3.80E-16	6353	8.87E-14	8.24E+03
6.62607E-34	1.38065E-23	1.81E+11	2.7	1.15E-17	30.0	8.13E-16	6353	2.00E-13	1.74E+04
6.62607E-34	1.38065E-23	2.41E+11	2.7	9.06E-18	30.0	1.37E-15	6353	3.55E-13	3.91E+04
6.62607E-34	1.38065E-23	4.82E+11	2.7	9.90E-19	30.0	4.45E-15	6353	1.42E-12	1.43E+06
6.62607E-34	1.38065E-23	9.63E+11	2.7	1.52E-21	30.0	1.13E-14	6353	5.66E-12	3.73E+09
6.62607E-34	1.38065E-23	1.93E+12	2.7	4.45E-28	30.0	1.59E-14	6353	2.26E-11	5.07E+16
6.62607E-34	1.38065E-23	3.85E+12	2.7	4.79E-42	30.0	5.58E-15	6353	8.96E-11	1.87E+31
6.62607E-34	1.38065E-23	7.71E+12	2.7	6.94E-71	30.0	9.38E-17	6353	3.53E-10	5.08E+60
6.62607E-34	1.38065E-23	1.54E+13	2.7	1.82E-129	30.0	3.32E-21	6353	1.37E-09	7.52E+119
6.62607E-34	1.38065E-23	3.08E+13	2.7	1.57E-247	30.0	5.22E-31	6353	5.17E-09	3.29E+238
6.62607E-34	1.38065E-23	6.16E+13	2.7	#NUM!	30.0	1.61E-51	6353	1.83E-08	#NUM!
6.62607E-34	1.38065E-23	1.23E+14	2.7	#NUM!	30.0	1.91E-93	6353	5.64E-08	#NUM!
6.62607E-34	1.38065E-23	2.47E+14	2.7	#NUM!	30.0	3.37E-178	6353	1.27E-07	#NUM!
6.62607E-34	1.38065E-23	4.20E+14	2.7	#NUM!	30.0	5.43E-298	6353	1.50E-07	#NUM!
6.62607E-34	1.38065E-23	4.93E+14	2.7	#NUM!	30.0	#NUM!	6353	1.37E-07	#NUM!
6.62607E-34	1.38065E-23	7.80E+14	2.7	#NUM!	30.0	#NUM!	6353	6.08E-08	#NUM!

从上表可以看出：物体温度在 2.7K 时，其可见光波段内的辐射强度（表中橙色区域）小于 $1.57*10^{-247}$（J/Hz*m^3）（因 Excel 计算能力限制，实际上可能在 10^{-800}（J/Hz*m^3）以下）；30K 时，其可见光波段内的辐射强度小于 $5.43*10^{-298}$(J/Hz*m^3)，而太阳(6353K)的可见光强度为 $6.08*10^{-8}$ 以上。由此可见，随着物体温度的降低，其产生的可见光强度迅速下降。30K 的太阳系边缘物质与太阳在可见光范围内的辐射强度相差达 10^{290} 倍以上，而与 2.7K 的所谓宇宙背景辐射源比较，则太阳在可见光范围内的辐射强度可能高达 10^{800} 倍以上！当人们以可见光来衡量物质是否可见时，这些低温物质自然是我们所说的不可见物质，或所谓的暗物质。如果我们能用 2.7K 温度对应的峰值频率 $1.5*10^{11}$Hz 来观测时，将会出现宇宙各处都是可见物质的正常物质了，所谓的暗物质也就不存在了。

三、宇宙背景辐射机理及物理意义

所谓的宇宙背景辐射为类似 2.7K 温度的黑体辐射，在地球上观测此辐射时表现为各向同性，也就是各个方向上强度基本相同，且比其他温度的黑体辐射强度大得多，以至于无法采取措施进行压制与消除。

从上表可知：2.7K 温度黑体辐射强度峰值所对应的频率（简称"峰值频率"）为 $1.5*10^{11}$Hz 左右，其辐射强度比同频率的太阳辐射强度小四个数量级，也就是：宇宙背景峰值辐射强度仅是太阳同频率辐射强度的万分之一！但客观事实却是：宇宙背景辐射强度远大于同频率的太阳辐射强度！为什么会出现此种现象呢？这是因为普朗克黑体辐射公式是以面辐射源为基础的，而所谓的宇宙背景辐射却是体积型的。也就是宇宙空间各处都存在平均温度为 2.7K 左右的低温物质，它们共同产生了所谓的宇宙背景辐射。本人在二年多前以宇宙背景辐射推测：宇宙空间中，特别是星系间的广大空域中存在着平均温度为 2.7K 左右的低温且不产生可见光的物质！**本次探测结果实际上只是证实了本人的这一推断而已。**

四、本次成果的物理意义

1、暗物质只是温度较低的不怎么产生可见光的正常物质

由以上分析可知：所谓的暗物质或不可见物质只是温度低的、不能或不怎么产生可见光的物质，但它们都是正常物质，并非所谓的不参与电磁相互作用、只参与万有引力作用的暗物质！

2、哈勃定律将不可适用

由于宇宙空间并非哈勃设想的理想真空，星光在星际空间中的传递将受到宇宙空间中无处不在的低温物质的作用而成为折射光。它的频率随在介质中的运动距离降低就如光纤通讯中的频散现象一样，是由介质作用的结果，而非多普勒效应！因此，哈勃定律自然不再适用。

3、相对论光速不变基础动摇

由于宇宙空间无处不在的介质作用，光速不可能在任意参照系中速度恒定不变，最多只能在相对均匀介质静止的参照系中速度恒定。因此，即使是相对论理论上正确，但也不再适用！

第二章

不同方法测量得到的哈勃常数各异的本质因素分析

一、哈勃常数的由来及实测情况简述

1、哈勃定律和哈勃常数的由来

哈勃定律(Hubble's law)：Vf = Hc x D

参数说明：

Vf：Velocity (Far Away) 远离速率 单位：km / s

Hc：Hubble's Constant 哈勃常数 单位：km / (s・Mpc)

D：Distance 相对地球的距离 单位：Mpc 百万秒差距

哈勃定律：速度和距离均是间接观测得到的量。速度——距离关系和速度——视星等关系，是建立在观测红移——视星等关系及一些理论假设前提上的。哈勃定律原来由对正常星系观测而得，现已应用到类星体或其他特殊星系上。哈勃定律通常被用来推算遥远星系的距离；

哈勃定律是物理宇宙论的陈述：来自遥远星系光线的红移与他们的距离成正比。这条定律是哈勃和米尔顿·修默生在接近十年的观测之后，于 1929 年首先公式化的。它被认为是在扩展空间范例上的第一个观察依据，和今天经常被援引作为支持大爆炸宇宙学的一个重要证据。这个常数的最佳数值是在 2003 年使用人造卫星威尔金森微波各向异性探测器(WMAP)测得的，数值为 71 ± 4 km/s/Mpc。在 2006 年的资料，图中对应的是 77 km/s/Mpc。[摘自百度百科]

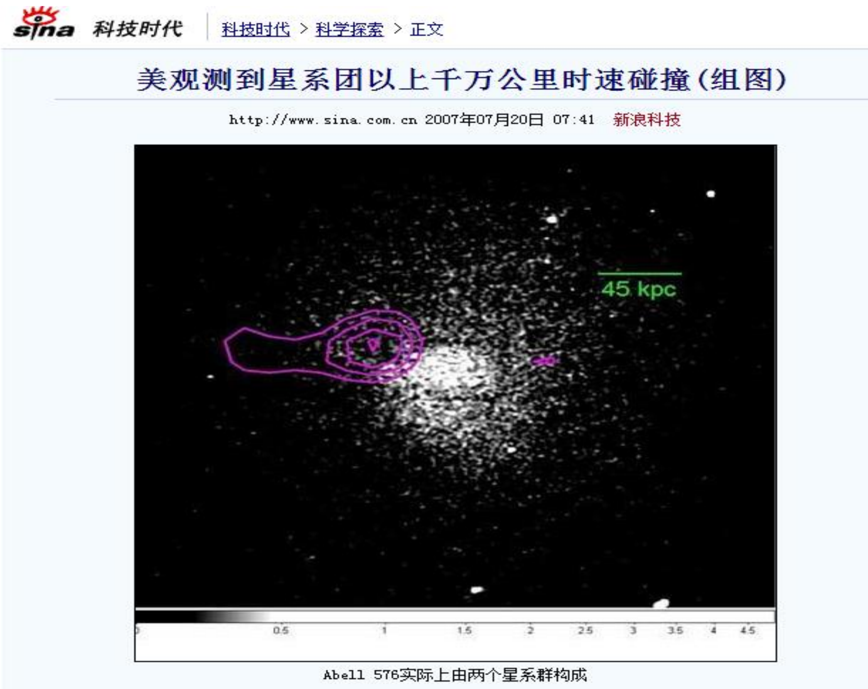
据相关资料记载：哈勃最初测量得到的哈勃常数为 500 km/s/Mpc；利用哈勃望远镜观测造父变星和标准宇宙烛光法计算星系的距离，给合星系红移量计算的哈勃常数为 74Km/s/Mpc；利用宇宙背景辐射观测数据与宇宙标准模型法得到的哈勃常数为 67.8Km/s/Mpc；而用红巨星代替标准烛光造父变量计算得到的哈勃常数为 69.8Km/s/Mpc。

二、哈勃常数数值各异的可能原因分析

1、哈勃定律存在根本性原生错误

目前已经有的证据有：哈勃望远镜拍摄到的不少星系相互碰撞的照片（如下面的照片所示）以及类星体存在的多组红移量不等的吸收谱线簇。这些证据表明：天体间的距离并非均随时间不断加大；星光在来地球的途中频率是在不断变化并降低的。这从根本上否定了星光红移量是由天体相对地球退行造成的，也就否定了哈勃定律。

同时，从目前已有的光与介质间相互作用规律：入射光使介质中的原子与分子极化并产生次生光，所谓的反射、散射、折射和透射光只是介质产生的次生光的一部分而已。因此，地球人观测到的星光是被星际物质作用后的折射光，其运动方向、运动速度、振幅、相位与频率均会与原生的星光有所不同，且可能随星光在星际空间的运动距离而不断变化着。因此，星光随距离降低频率应该是由星际物质作用的结果，而非天体退行导致的。


sina 科技时代 | 科技时代 > 科学探索 > 正文

美观测到星系团以上千万公里时速碰撞（组图）

http://www.sina.com.cn 2007年07月20日 07:41 新浪科技

Abell 576实际上由两个星系群构成


sina 科技时代 | 科技时代 > 科学探索 > 正文

美观测到四星系大碰撞 将合并成一个超大星系

http://www.sina.com.cn 2007年08月08日 07:48 新浪科技

美天文学家观测到四星系大碰撞壮观景象

2、哈勃测量的哈勃常数存在的问题

哈勃仅测量了数十个离地球较近的星系的红移量，且当时的测量技术与确定天体的距离的方法也不尽完善。因此，得到的哈勃常数自然就不够准确，并与后来用哈勃望远镜等先进设备与方法测量的结果自然会差别悬殊。

3、三种测量方法得到的哈勃常数值不同的原因

从三种测量方法所使用的接收星光频率段与所得到的实测数据分析可知：**哈勃常数值随使用的频率增加而增加。**即频率最低的宇宙背景辐射法为 67.8Km/s/Mpc；频率次高的红巨星法为 69.8Km/s/Mpc；而频率最高的造父变星法为 74Km/s/Mpc。这一规律可能正好说明天体红移量是由星际物质作用的结果：**频率越高的星光在星际物质中频率降低的速率越大**。

三、验证哈勃定律正确如否的方法

1、方案的理论基础和依据

1.1、百余年前的天文观测实测到：天体的红移量与天体到地球的距离成正比；

1.2、天体红移量主要由多普勒效应（天体远离地球运动）、宇宙学红移、引力红移和星际物质作用（介质作用或带电体的康普顿效应）等；

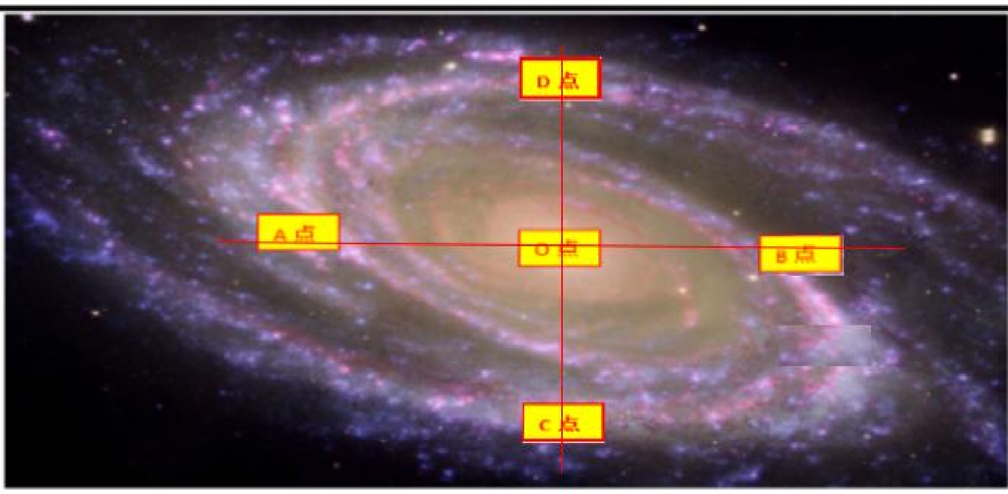
1.3、假设天体远离地球的视速度为 u（远离在正值，朝天体运动为负值），则多普勒红移分量分量为$H_{多}=(u/(C-u))$；假设宇宙学红移系数为 j，则宇宙学红移分量为$H_{宇}=jS_0$（S_0为星光从天体出发时，天体与地球间的距离。）；因天体离地球较远时，引力红移分量所占比例很小，在此暂忽略；假设星际物质作用产生的红移系数为 k，则介质红移分量为$H_{介}=ks$（k 为常数或为与距离相关的单值函数、s 为天体到地球的距离）。则有：

$$H_{总}=H_{多}+H_{宇}+H_{介}=u/(C-u)+jS_0+ks \quad \text{（公式 1）}$$

因星光实际运动总距离 s 与原始距离 S_0 间存在如下关系：$S_0=s/(1+j)$。代入上式则有：

$$H_{总}=H_{多}+H_{宇}+H_{介}=u/(C-u)+js/(1+j)+ks \quad \text{（公式 1-1）}$$

1.4、利用对已知距离相等但相对速度不同和已知视速度相等但距离不同的天体进行红移量的实测，分别获得其红移总量。再利用数学运算计算出多普勒红移分量、宇宙学红移分量和介质红移分量。如下图 2-1 所示：



图一：不同天体红移量观测方案示意图

1.4.1、假设：在时间为T_0时刻，对图 2-1 中 A、B、C、D 和 O 点进行实测，分别得到的红移总量为$H(A,T_0)$、$H(B,T_0)$、$H(C,T_0)$、$H(D,T_0)$和$H(O,T_0)$；O 点远离地球的视速度为 u、A 和 B 点绕 O 点逆时针方向旋转的视速度分别为-v 和+v，则相对地球的视速度分别为（u-v)和（u+v)；C、D 两点相对地球的视速度与 O 点相同，均为 u；A、B 和 O 点到地球的距离相等，均为$S(T_0)$；C、D 到地球的距离分别为$(S(T_0)-L)$和$(S(T_0)+L)$。则有：

$$H(O,T_0)=H_{多}+H_{宇}+H_{介}=u/(C-u)+jS(T_0)/(1+j)+kS(T_0) \quad \text{（公式 2）}$$

$H(A,T_0)＝H_{多}+H_{宇}+H_{介}＝(u-v)/(C-u+v)+jS(T_0)/(1+j)+kS(T_0)$ （公式 3）

$H(B,T_0)＝H_{多}+H_{宇}+H_{介}＝(u+v)/(C-u-v)+jS(T_0)/(1+j)+kS(T_0)$ （公式 4）

$H(C,T_0)＝H_{多}+H_{宇}+H_{介}＝u/(C-u)+j(S(T_0)-L)/(1+j)+k(S(T_0)-L)$ （公式 5）

$H(D,T_0)＝H_{多}+H_{宇}+H_{介}＝u/(C-u)+j(S(T_0)+L)/(1+j)+k(S(T_0)+L)$ （公式 6）

（公式 2）-（公式 3）可得：

$H(O,T_0)-H(A,T_0)＝Cv/(C-u)(C-u+v)$ （公式 7）

当已知天体的几何尺寸和旋转速度时，则 A 和 B 点相对 O 点的视速度就为已知量，相对地球的视速度差 v 也为已知量。则根据（公式 7）可得：

$u^2-(2C+v)u+C^2+Cv-Cv/(H(O,T_0)-H(A,T_0))=0$ （公式 8）

进而可得到 u 的值（一元二次方程的解）：

$$u=\frac{2C+v\pm\sqrt{(2C+v)^2-4(C^2+Cv-\frac{Cv}{H(O,T_0)-H(A,T_0)})}}{2}$$ （公式九）也可利用（公式 4）-（公式 3）可得：

$H(B,T_0)-H(A,T_0)＝2Cv/(C-u-v)(C-u+v)$ （公式 10）

来求解 u 的数值。

将求得的 u 值分别代入（公式 2、3、4、5、6）、就可得到：

$(j/(1+j)+k)S(T_0)＝u/(C-u)-H(O,T_0)$ （公式 11）

$(j/(1+j)+k)S(T_0)＝（u-v)/(C-u+v)-H(A,T_0)$ （公式 12）

$(j/(1+j)+k)S(T_0)＝（u+v)/(C-u-v)-H(B,T_0)$ （公式 13）

$(j/(1+j)+k)(S(T_0)-L)＝u/(C-u)-H(C,T_0)$ （公式 14）

$(j/(1+j)+k)(S(T_0)+L)＝u/(C-u)-H(D,T_0)$ （公式 15）

当天体到地球距离 s 和 L 为已知时，就可得到：

$$\frac{j}{1+j}-k=\frac{u}{S(T_0)(C-u)}-\frac{H(O,T_0)}{S(T_0)}$$ （公式 16）

$$\frac{j}{1+j}-k=\frac{u-v}{S(T_0)(C-u+v)}-\frac{H(A,T_0)}{S(T_0)}$$ （公式 17）

$$\frac{j}{1+j}-k=\frac{u+v}{S(T_0)(C-u-v)}-\frac{H(B,T_0)}{S(T_0)}$$ （公式 18）

$$\frac{j}{1+j}-k=\frac{u}{(S(T_0)-L)(C-u)}-\frac{H(C,T_0)}{S(T_0)-L}$$ （公式 19）

$$\frac{j}{1+j}-k=\frac{u}{(S(T_0)+L)(C-u)}-\frac{H(D,T_0)}{S(T_0)+L}$$ （公式 20）

我们还可以用（公式 6）-（公式 5）得到：

$H(D,T_0)-H(C,T_0)=2(j/(1+j)+k)L$

$(j/(1+j)+k)=(H(D,T_0)-H(C,T_0))/2L$ （公式 21）

1.4.2、同样地，当时间 $T_1=T_0+\Delta t$ 时刻，对图 2-1 中 A、B、C、D 和 O 点进行实测，分别得到的红移总量为 $H(A,T_1)$、$H(B,T_1)$、$H(C,T_1)$、$H(D,T_1)$ 和 $H(O,T_1)$；O 点远离地球的视速度仍为 u、A 和 B 点绕 O 点逆时针方向旋转的视速度仍为-v 和+v，则相对地球的视速度分别仍为（u-v)和（u+v)；C、D 两点相对地球的视速度与 O 点相同，均仍为 u；A、B 和 O 点到地球的距离仍相等，均为 $S(T_1)$；C、D 到地球的距离分别为 $(S(T_1)-L)$ 和 $(S(T_1)+L)$。但考虑宇宙空间膨胀与不膨胀条件下的 $S(T_1)$ 值是不同的：因此，设考虑宇宙空间随时间膨胀的距离为 $S(T_{1,1})=S(T_0)+(u\Delta t+S(T_0))j/(1+j)$；设不考虑宇宙空间随时间膨胀的距离为 $S(T_{1,2})=S(T_0)+u\Delta t$。则有：

$H(O,T_1)=u/(C-u)+jS(T_0)/(1+j)+(u\Delta t+S(T_0))j^2/(1+j)^2+kS(T_0)+ku\Delta t$ （公式 22）

$H(A,T_1)=(u-v)/(C-u+v)+jS(T_0)/(1+j)+(u\Delta t+S(T_0))j^2/(1+j)^2+kS(T_0)+ku\Delta t$ （公式 23）

$H(B,T_1)=(u+v)/(C-u-v)+jS(T_0)/(1+j)+(u\Delta t+S(T_0))j^2/(1+j)^2+kS(T_0)+ku\Delta t$ （公式 24）

$H(C,T_1)=u/(C-u)+j(S(T_0)-L)/(1+j)+(u\Delta t+(S(T_0)-L))j^2/(1+j)^2+k(S(T_0)-L)+ku\Delta t$ （公式25）

$H(D,T_1)=u/(C-u)+j(S(T_0)+L)/(1+j)+(u\Delta t+(S(T_0)+L))j^2/(1+j)^2+k(S(T_0)+L)+ku\Delta t$ （公式 26）

（公式 26）-（公式 25）并整理后可得：

$H(D,T_1)-H(C,T_1)=2Lj/(1+j)+2L(j/(1+j))^2+2kL=2L(j/(1+j)+(j/(1+j))^2+k)$ （公式 27）

因此有：

$(j/(1+j))^2+j/(1+j)+k=(H(D,T_1)-H(C,T_1))/2L$ （公式 28）

将（公式 21）代入（公式 28）可得：

$(j/(1+j))^2=(H(D,T_1)-H(D,T_0)-H(C,T_1)+H(C,T_0))/2L$ （公式 29）

设 $\Delta H_D=H(D,T_1)-H(D,T_0)$；$\Delta H_C=H(C,T_1)-H(C,T_0)$，则（公式 29）可简化为：

$(j/(1+j))^2=(\Delta H_D-\Delta H_C)/2L$ （公式 30）

求解（公式 30）可得：

$$j=\frac{\sqrt{\frac{\Delta H_D-\Delta H_C}{2L}}}{1-\sqrt{\frac{\Delta H_D-\Delta H_C}{2L}}}$$ （公式 31）

再将（公式 31）求得的值代入（公式 21）就可求得 k 值：

$k=(H(D,T_0)-H(C,T_0))/2L-j/(1+j)$ （公式 32）

通过以上推导，我们可以利用不同时刻先后两次对同一星系特定位置上红移量的观测数据

就可求得星系中心的运动速度 u、宇宙膨胀系数 j 和星际物质红移系数 k 值了。进而可以验证哈勃定律的正确性！

2、验证方案

利用对二个碰撞星系或同一倾斜星系的不同部位红移量的观测，可得到不同部位的红移量实测值。同时测量碰撞星系间的或同一倾斜星系不同部位间的相对运动速度 v 值或相对间距 L 值，利用距离相等但相对地球视速度存在明显差异即可求取天体实际运动速度 u。进而利用已知天体的距离计算出宇宙学红移系数 j 和星际空间介质作用系数 k。

3、实验结果预判

3.1、利用实测的与距离相关的介质作用系数 k 和宇宙学红移系数 j，可消除天体红移总量中与距离相关的红移分量，由此得到的剩余红移量值才主要为多普勒红移量；

3.2、利用修正后的天体多普勒红移量值对哈勃定律进行检验，就可证明或证伪哈勃定律。即当 k 值等于 0 时，哈勃定律才能成立。

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