Anisotropy in Stelar Plasma Doppler Profile disproves Cosmic Inflation

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Abstract: I'm going to prove in this brief paper that actually there is not a so called "cosmic inflation", because that so called "cosmic inflation" is just an artifact of an incorrect theoretic model of Doppler effect for electromagnetic waves in remote sources.

I. THE MAIN PRESENTATION

Hitherto, it seems undisputed galaxies and galaxy clusters are departing, spreading out each other at a recessional velocity that increases directly proportional to the distance. This effect was discovered by Edwin Hubble, as we know.

Nowadays, we already know there is that "cosmic inflation", but what is worse, we know it seems that "cosmic inflation" is taking place in an accelerated manner. I'm going to prove that our observable universe is not only not expanding in an accelerated motion, but that it is fundamentally stationary (no inflation at all). For that tiny, although rigorous demostration. I'm going to take advantage of two undeniable facts. The first one is that Doppler effect of electromagnetic waves can be completely modeled by means of the following formula: $f = f_0 \exp(v/c$. The second irrefutable fact is the so called Doppler broadening of spectral lines.

Let's observe the light of a distant star. We know stars are primarily composed of Hidrogen which, by means of fusion reactions, transforms into Helium, releasing a great amount of energy. Part of that energy reaches us as photons. But, we also observe a star has an atmosphere whose shape is nearly spherical, and its photon sources are randomly distributed. That Doppler broadening of spectral lines is caused by a statistical distribution of atoms and molecules.

Let's derive now a formula for that Doppler broadening coming from plasma in a remote star.

When thermal motion makes a Hidrogen atom, in the photosphere of that remote star, move towards the observer, the emitted radiation will relatively undergo a shift towards higher frequencies. Likewise, when the photon source is moving away, measured frequency gets lower. For relativistic speeds (according to CGR, Complete Galilean Relativity), the Doppler shift for frequencies is modeled by:

$$f = f_0 \exp\left(\frac{v}{c}\right) \tag{1}$$

where f is the observed frequency, f_0 is the frequency at rest, v is source speed with respect to observer, and c is speed of light. Since in every volume element of that radiant body there is a velocity distribution pointing towards the observer or moving away from him, the net effect is a broadening of the observed line. If $P_v(v)dv$ is the fraction of particles with velocity component v to $v+dv$ along the line of sight, the distribution of frequencies is described by:

$$P_f(f)df = P_v(v)\frac{dv}{df}df \tag{2}$$

where v is velocity towards observer, belonging to the Doppler shift of the rest frequency f_0 to f. So, differentiating (1), we get:

$$\begin{aligned} v &= c \ln \frac{f}{f_0} \\ dv &= \frac{c\, df}{f} \end{aligned} \tag{3}$$

so, then we get:

$$P_f(f)df = \frac{c}{f} P_v\left(c \ln \frac{f}{f_0}\right) df \tag{4}$$

In the case of thermal Doppler broadening, which is what is observed in stelar plasma profiles, the distribution of velocities is expressed by a Maxwell-Botzman distribution

$$P_v(v)dv = \sqrt{\frac{m}{2\pi kT}} \exp\left(-\frac{mv^2}{2kT}\right) dv \tag{5}$$

where M is the mass of the emitted particle, T is temperature, and k is Boltzmann constant. Then, we get:

$$P_f(f)df = \left(\frac{c}{f}\right) \sqrt{\frac{m}{2\pi kT}} \exp\left(-\frac{mc^2 \ln^2(\frac{f}{f_0})}{2kT}\right) df \tag{6}$$

We can now observe in (6) that we are looking at a **log-normal distribution**, and that means there is not only a broadening of spectral lines, but a Doppler redshift, beause of an anisotropy that produces that exponential in the Doppler profile.

A log-normal distribution has a probability density function:

$$f(x;\mu,\sigma)=\frac{1}{x\sigma\sqrt{2\pi}}e^{-(\ln x-\mu)^2/2\sigma^2} \tag{7}$$

So, for (6) we know the mean would be $\mu=\ln f_0$, and if we express f_0 in natural units, and at the same time, being σ the standard deviation of logarithm of variable f, we get:

$$\begin{aligned} 2\sigma^2 &= 2\frac{kT}{mc^2} \\ \sigma &= \sqrt{\frac{kT}{mc^2}} \end{aligned} \tag{8}$$

Let's observe the next examples of probability density functions of log-normal distributions.

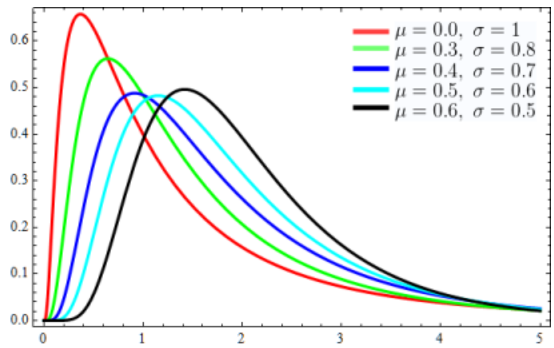

FIG. 1:

We must remember now Planck Law, which predicts the intensity of the emitted radiation by a black body with a temperature T and frequency f:

$$I(f,T)=\frac{2h\pi f^3}{c^2}\frac{1}{e^{\frac{hf}{kT}}-1} \tag{9}$$

and also remember some graphs like these in fig.2:

These graphs are loudly telling us that such curves actually are probability density functions of log-normal distributions. The key question is then "why Planck Law cannot be expressed as log-normal distribution?

Let's scale now those graphs above by some scale factors, s, fig.3:

II. DISCUSSION

These latter graphs make us think that Planck Law can be modeled by means of log-normal distributions with an additional scale factor. Therefore, it makes us think that derivation of Planck Law using statistical mechanics is just a poorer approximation than that achieved by means

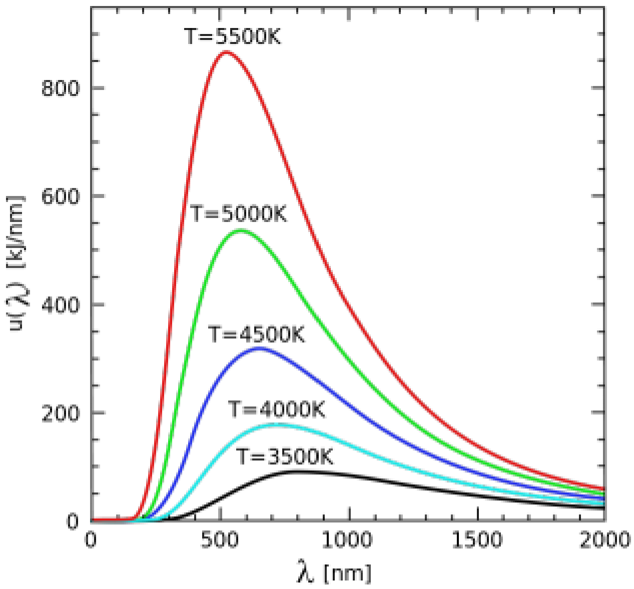

FIG. 2:

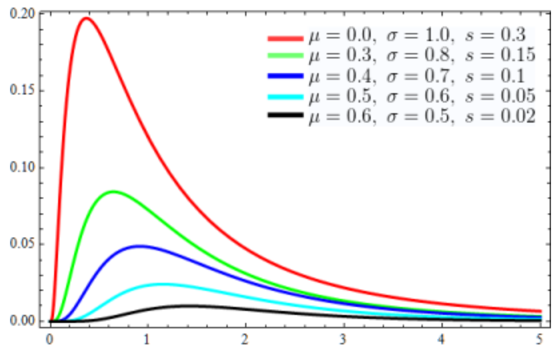

FIG. 3:

of log-normal distributions. Let's pay attention now to the Cosmic Microwave Background Radiation (CMBR) . If we perform a plot of the intensity of the CMBR as function of photon frequencies (see COBE), we attain a graph that can be defined as the emission of a black body, therefore it follows the Planck Law. But, if we observe the log-normal distributions, it is now more than evident that this CMBR reaches us as a log-normal distribution. And it means that if we adopt that model then we can predict observables that under the standard model cannot be predicted.

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