The New Redshift Interpretation Affirmed

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Abstract

In late 1997 I published (*Mod. Phys. Lett. A* **12** (1997) 2919; astro-ph/9806280) the discovery of the New Redshift Interpretation (NRI) of the Hubble relation and the 2.7K CBR, which showed for the first time that it was possible to explain these phenomena within the framework of a universe governed by Einstein's static-spacetime general relativity instead of the Friedmann-Lemaitre expanding-spacetime paradigm. Recently Carlip and Scranton (astro-ph/9808021) claim to have found flaws in this discovery based on the assumption that the NRI represents a static cosmological model of the universe. This assumption is incorrect, and I show their misunderstanding of this fundamental point is what led them to come to erroneous conclusions about the NRI. I show the NRI very definitely encompasses an expanding universe wherein galaxies are undergoing Doppler recession according to the Hubble relation and, moreover, that—contrary to Carlip and Scranton's claim—that the NRI does yield the correct form of the Hubble magnitude-redshift relation. Lastly I note that Carlip and Scranton signally fail to respond to the general relativistic results wherein I show (gr-qc/9806061) that the universe is governed by

> Einstein static-spacetime general relativity, and not the Friedmann-Lemaitre expanding spacetime paradigm on which Big bang cosmology is critically hinged, and also the most embarrassing fact that the F-L paradigm has always involved gargantuan nonconservation-of-energy losses amounting to the mass equivalent of about thirty million universes, each with a mass of 10^{21} suns.

For almost seven decades cosmologists have assumed the universe is governed by Friedmann-Lemaitre expanding-spacetime general relativity, and that both the Hubble relation and the 2.7K CBR have their origin in redshifts due to universal spacetime expansion. A widely accepted corollary of this belief has been that no other explanation of the Hubble relation and the 2.7K CBR is possible except that due to expansion redhifts.

Despite its long acceptance, this corollary was recently shown to be incorrect when I reported the discovery [1] of A New Redshift Interpretation (NRI) of the Hubble relation and the 2.7K CBR based on the premise that the universe is governed by Einstein's static-spacetime general relativity, rather than Friedmann-Lemaitre expanding-spacetime general relativity. In the NRI's Einstein framework the redshifts responsible for the Hubble relation and the 2.7K CBR are a combination of relativistic Doppler and gravitational effects rather than being attributed to Friedmann-Lemaitre spacetime expansion. The discovery of the NRI naturally raised the question of whether the universe is governed by the Einstein static-spacetime paradigm, or by the Friedmann-Lemaitre expanding spacetime paradigm.

To answer this crucially important cosmological question I subsequently compared the general relativistic predictions of both paradigms, and made a second discovery—namely, that the results of several general relativistic experiments provide proof that the universe is governed by Einstein's static-spacetime general relativity, not Friedmann-Lemaitre expanding spacetime general relativity [2]. As of early October 1998 I am unaware of any attempt to refute this second discovery.

On the other hand, in their recent e-print [3], Carlip and Scranton (C&S) have attacked the analysis supporting the first discovery [1]. Their e-print lists several factors which they claim demonstrate the NRI is a failure. I now

demonstrate their conclusion results from both misunderstanding the NRI's results and by mixing them with unwarranted assumptions, which in turn lead to presumed contradictions.

Their first big misunderstanding—which leads them to make several errors in their evaluation—is their claim that the NRI is a "new static cosmological model." This is wrong on two counts: The NRI is not a cosmological model and definitely does not represent a static universe. On page 2921 of my NRI paper we read the following: "...the NRI attempts to account for the Hubble relation and the 2.7K CBR by using Doppler and gravitational redshifts embedded in a universe governed by static-space-time general relativity." This quote shows that at present the NRI is only an interpretation or description of the structure of the universe. As yet I have not presented it as a cosmological model.

And it is definitely not a static description because galaxies are moving away from the Center according to the Hubble relation. Indeed, the NRI is distinguished from all previous attempts to describe the universe in that it describes galaxies that are experiencing Doppler expansion within the framework of a universe governed by static-space-time general relativity. Clearly, then, the NRI universe governed by static-space-time general relativity cannot possibly represent a static cosmological model. Thus when C&S characterize the NRI as a static cosmological model in Sections 1, 3, 4 and 5, and use this erroneous assumption to claim the NRI fails several different tests, they are in reality waging a war against a straw-man argument of their own devising.

Their errors in Section 4 are specially egregious. Because of their erroneous claim of the NRI being a static model, they incorrectly conclude the luminosity will have only one factor of $(1 + z)$ in the denominator, and from that incorrect deduction, they then conclude that the NRI will give predictions contrary to the Hubble diagram. Hence, they say, the NRI must be a failure. However, if C&S had carefully read the NRI paper they would have noted there are two redshifts which are combined in Eq. (2) of my NRI paper [1], one due to gravity and the other due to Doppler recession between source and the receiver. Thus, in the NRI, the flux of radiation received at earth from any distant galaxy is spread over a sphere (area = $4\pi r^2$), and

is diminished by one redshift factor at the point of emission. The energy of each photon is decreased by $1 + z$ because of this redshift, and a second redshift occurs because Doppler recession causes the rate at which photons arrive at earth to be diminished by the same factor. The net result is that in the NRI, which is based on Einstein's static-spacetime general relativity, the flux we expect to receive from any distant source of luminosity L is

$$\text{flux}_{\text{NRI}} = \frac{L}{4\pi r^2(1+z)^2}\text{erg} \cdot \text{cm}^{-2}\text{s}^{-1}, \tag{1}$$

which is the actually the expression cosmologists use to relate the flux and redshift on the assumption that the universe is undergoing Friedmann-Lemaitre spacetime expansion [4]. And, following standard astronomical practice [4], the foregoing expression enables us to define an effective luminosity distance for the NRI framework as

$$d_L = r(1+z). \tag{2}$$

Given that the above definition applies to the NRI, we can then substitute it in the definition for the distance modulus,

$$m - M = 5(\log d_L - 1), \tag{3}$$

to obtain

$$m - M = 5[\log r(1+z) - 1] \tag{4}$$

as being applicable to the NRI. The expression for $m - M$ in terms of z can now be obtained by substitution of r in terms of z from Eq. (2) of the NRI paper [1]. As C&S appropriately note, in the case for $z < 1$, a good approximation for NRI's Eq. (2) is $Hr/c \approx z/(1+z)$. In this case the above expression becomes,

$$m - M = 5[\log cz - \log H] - 5, \tag{5}$$

which is the simplified Hubble magnitude-redshift relation, minus the now superfluous Ω_0 term (see ref. [4], page 448).

Thus C&S's dire prediction that the NRI's expression for z is way out of sync with the observational data is not only wrong, we find just the opposite is true. The fact is that the above relation shows the NRI does give the correct

expression for the Hubble magnitude-redshift relation once it is correctly interpreted in terms of galaxies undergoing Doppler expansion combined with gravitational redshifts.

Likewise, also in Section 4—the section C&S claim is of greatest importance because it presumes to deal with observational data—their assumption of the NRI as a static cosmological model also leads them to erroneously ascribe their Eq. (23) to the NRI, whereas in fact this is not the case. More specifically, in this instance C&S adopt the assumption of constant quasar density—an assumption that is neither stated nor implied in the NRI paper—and from that proceed to apparently show how the redshift distribution of quasars in the NRI compares poorly with that based on the flat FLRW model. In actuality, all they did here was to again prove that—as with everything else in life—if you make a wrong assumption, you will surely come to a wrong conclusion.

Now, concerning their discussion in Section 3 of the NRI's outer hydrogen shell, and their claim of its instability, rapid evaporation and temperature decline, the fact is that I envision the outer luminous, hot hydrogen shell as being a thin spherical shell of overlapping galaxies, with a thickness of about one galactic diameter. A thin shell of overlapping galaxies effectively resolves the opacity problem as well as questions of short-time radiative cooling and gravitational instability.

Next, concerning their criticism in Section 3 of the constant density assumption, this is at best ill-founded. Just as with the standard cosmology, which they would hope to defend, they should easily have realized the constant density assumption in the NRI is a relative assumption—meaning it is assumed to be valid for the present epoch wherein the observations are being made. Thus C&S err when they claim that their Eq. (9) is a problem for the NRI; it becomes a problem only by the imposition of certain cosmological constraints on the NRI, constraints which I do not accept and which are not a part of the NRI framework [1]. In this respect it is also worthy to note that C&S apparently overlooked the fact that in the NRI the main component of the total density is due to that of the vacuum; so it is evident that a modern, infinitesimally slow decrease in the ordinary density—as per their Eq. (8)—has virtually no effect on the dynamics of galactic recession in the

NRI framework.

Thus, the failures that C&S describe do not represent what is in my NRI paper. They represent instead C&S's mistaken attempts to place my paper into a mold of their own construction. Nowhere is this more evident than in Section 1. There they identify the NRI with a static cosmological model as the prime reason for concluding that the NRI is not consistent with general relativity. Completely aside from their misidentifying the NRI as a static cosmological model, it is ironic that they raise the issue of consistency with general relativity because in gr-qc/9086061 I have already reported on two matters of considerable importance considering this point.

First, among other things, my analysis fully exposes one of the best kept secrets of Big Bang cosmology—namely, that the Friedmann-Lemaitre expanding spacetime paradigm has always necessitated gargantuan nonconservation of radiation energy losses the equivalent to thirty million universes like our own, each composed of 10^{21} suns. Some cosmologists are aware of this; some aren't. But, to the best of my knowledge, none have ever chosen to publish or publicize this most embarrassing fact. Thus, for all practical purposes, only a tiny fraction of physicists in other fields are aware that Big Bang's Friedmann-Lemaitre spacetime redshifts involve huge and continuing nonconservation of energy losses. For some reason C&S were not at all inclined to increase that tiny fraction by making reference to my e-print gr-qc/9806061, which details the specifics of this result.

Next, when C&S attempt to disprove the NRI by arguing that their Eq. (24) represents the truth about z, H, and r, they do so using the implicit assumption that the universe is formatted according to FLRW expanding spacetime general relativity. (Earlier herein I showed the NRI does agree with the Hubble magnitude-redshift relation.) The problem is that they were aware that my e-print, gr-qc/9806061, documents experimental general relativity results which I claim conclusively demonstrate that the universe is formatted by Einstein's static-spacetime general relativity, and not FLRW expanding-spacetime general relativity which is necessary for Big bang cosmology. For some reason, however, in their highly critical evaluation of the NRI, C&S completely omit any discussion—or even an acknowledgment of the existence—of this result.

Now it has always been my understanding that when scientists undertake to critique a colleague's results, they are under the highest obligation to fairly consider all the evidence that bears on a controverted topic, even when that evidence contradicts a position that has long been considered unimpeachable. But in this instance C&S signally avoided dealing with the very experimental evidence [2] that contradicts the fundamental basis of their attempt to discredit the NRI, evidence which at the same shows that the Big bang theory is fallacious, and that the NRI, or some version of it, must be the correct description of the structure of the universe. I can think of only two reasons why they have thus far chosen to remain silent on such a crucially important topic—namely, that the evidence I cite in favor of the universe being governed by Einstein's static-spacetime general relativity is truly unimpeachable. Second, at the close of their Section 4, C&S criticize the NRI for not having a guiding principle to account for primordial nucleosynthesis, in contrast to what they say is the standard cosmology's successful prediction of light element abundances. But what C&S don't say is that their portrayal of a successful prediction is predicated on the existence of spacetime expansion redshifts, which in turn is predicated on our universe being governed by expanding-spacetime relativity. By omitting mention of the overwhelming evidence that our universe is governed by static-spacetime—and hence cannot possibly exhibit expansion redshifts—C&S have conveniently ignored the very information which disproves their success story.

Having said this, I wish to close on a positive note. C&S emphasize that the NRI is a finely-tuned description of the universe. I fully agree with this emphasis. Indeed, how could it ever be otherwise? Surely a universe that is so obviously fine tuned as ours, must necessarily require a description that is equally fine tuned!

References

[1] Robert V. Gentry, *Mod. Phys. Lett. A* **12** (1997) 2919; astro-ph/9806280.

[2] Robert V. Gentry and David W. Gentry, gr-qc/9806061.

[3] Steven Carlip and Ryan Scranton, astro-ph/9808021.

[4] J. Silk, *The Big Bang*, pp. 447–448, W. H. Freeman & Co., Revised edition, 1989.