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TASC

TASC's mission is to rebuild and strengthen the foundation of the Christian faith by increasing awareness of the scientific evidence supporting the literal Biblical account of creation and refuting evolution.

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RED SHIFT RIDDLES

Preface by David A. Plaisted, PhD

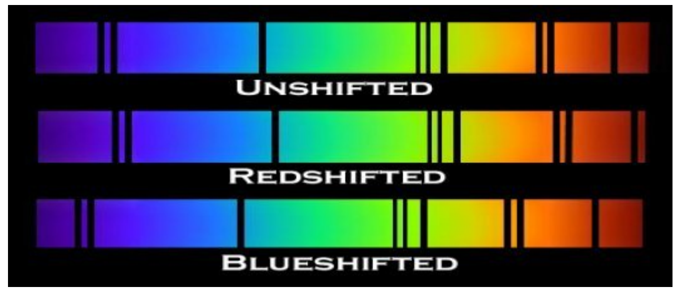
When astronomers view distant objects through the telescope, they find that the more distant objects have a larger red shift. This means that their light is shifted towards the red end of the spectrum; in other words, the wavelengths have become longer than for similar objects seen close to us. They interpret this as meaning that these distant objects are receding from us and that objects farther away are receding from us faster. It's a little like the Doppler effect that makes sound have a lower pitch when the source is traveling away from us. The faster an object travels, the larger the change in pitch. However, some properties of the red shift call this interpretation into question; these are the subject of the article that follows. One such property is the quantization of red shifts. They seem to occur in abrupt steps rather than continuously, which has interesting implications for the study of the universe. This suggests that the red shift may be caused by something other than the expansion of the universe, at least in part.

Note: The following is taken directly from an article concerning this phenomenon entitled "Quantized Galaxy Redshifts" by William G. Tifft and W. John Cocke, University of Arizona, Sky & Telescope Magazine, *January 1987, pages 19–21.*

As the turn of the next century approaches, we again find an established science in trouble trying to explain the behavior of the natural world. This time the problem is in cosmology, the study of the structure and "evolution" of the universe as revealed by its largest physical systems, galaxies and clusters of galaxies. A growing body of observations suggests that one of the most fundamental assumptions of cosmology is wrong.

Most galaxies' spectral lines are shifted toward the red, or longer wavelength, end of the spectrum. Edwin Hubble showed in 1929 that the more distant the galaxy, the larger this "redshift". Astronomers traditionally have interpreted the redshift as a Doppler shift induced as the galaxies recede from us within an expanding universe. For that reason, the redshift is usually expressed as a velocity in kilometers per second.

One of the first indications that there might be a problem with this picture came in the early 1970s. William G. Tifft, University of Arizona noticed a curious and unex-



Shifts in the lines of absorption in the spectrum of visible light

pected relationship between a galaxy's morphological classification (Hubble type), brightness, and red shift. The galaxies in the Coma Cluster, for example, seemed to arrange themselves along sloping bands in a redshift vs. brightness diagram. Moreover, the spirals tended to have higher redshifts than elliptical galaxies. Clusters other than Coma exhibited the same strange relationships.

By far the most intriguing result of these initial studies was the suggestion that galaxy redshifts take on preferred or "quantized" values. First revealed in the Coma Cluster redshift vs. brightness diagram, it appeared as if redshifts were in some way analogous to the energy levels within atoms.

These discoveries led to the suspicion that a galaxy's redshift may not be related to its Hubble velocity alone. If the redshift is entirely or partially non-Doppler (that is, not due to cosmic expansion), then it could be an intrinsic property of a galaxy, as basic a characteristic as its mass or luminosity. If so, might it truly be quantized?

Clearly, new and independent data were needed to carry this investigation further. The next step involved examining the rotation curves of individual spiral galaxies. Such curves indicate how the rotational velocity of the material in the galaxy's disk varies with distance from the center.

Several well-studied galaxies, including M51 and NGC 2903, exhibited two distinct redshifts. Velocity breaks, or discontinuities, occurred at the nuclei of these galaxies. Even more fascinating was the observation that the jump in redshift between the spiral arms always tended to be around 72 kilometers per second, no matter which galaxy was considered. Later studies indicated that velocity breaks could also occur at intervals that were ½, ⅓, or ⅙ of the original 72 km per second value.

At first glance, it might seem that a 72 km per second discontinuity should have been obvious much earlier, but such was not the case. The accuracy of the data then available was insufficient to show the effect clearly. More importantly, there was no reason to expect such behavior, and therefore no reason to look for it. But once the concept was defined, the ground work was laid for further investigations.

The first papers in which this startling new evidence was presented were not warmly embraced by the astronomical community. Indeed, an article in the *Astrophysical Journal* carried a rare note from the editor pointing out that the referees "neither could find obvious errors with the analysis nor felt that they could enthusiastically endorse publication." Recognizing the far-reaching cosmological implications of the single-galaxy results and undaunted by criticism from those still favoring the conventional view, the analysis was extended to pairs of galaxies.

Two galaxies physically associated with one another offer the ideal test for redshift quantization; they represent the simplist possible system. According to conventional dynamics, the two objects are in orbital motion about each other. Therefore, any difference in redshift between the galaxies in a pair should merely reflect the difference in their orbital velocities along the same line of sight. If we observe many pairs covering a wide range of viewing angles and orbital geometries, the expected distribution of redshift differences should be a smooth curve. In other words, if redshift is solely a Doppler effect, then the differences between the measured values for members of pairs should show no jumps.

But this is not the situation at all. In various analyses the differences in redshift between pairs of galaxies tend to be quantized rather than continuously distributed. The redshift differences bunch up near multiples of 72 km per second. Initial tests of this result were carried out using available visible-light spectra, but these data were not sufficiently accurate to confirm the discovery with confidence. All that changed in 1980 when Steven Peterson, using telescopes at the National Radio Astronomy Observatory and at Arecibo, published a radio survey of binary galaxies made in the 21-cm emission of neutral hydrogen.

Wavelength shifts can be pegged much more precisely for the 21cm line than for lines in the visible portion of the spectrum. Specifically, redshifts at 21 cm can be measured with an accuracy better than the 20 km per second required to detect clearly a 72 km per second periodicity.

Red shift differences between pairs group around 72, 144, and 216 km per second. Probability theory tells us that there are only a few chances in a thousand that such clumping is accidental. In 1982 an updated study of radio pairs and a review of close visible pairs demonstrated this same periodic pattern at similarly high significance levels.

Radio astronomers have examined groups of galaxies as well as pairs. There is no reason why the quantization should not apply to larger collections of galaxies, so redshift differentials within small groups were collected and analyzed. Again a strongly periodic pattern was confirmed.

The tests described so far have been limited to small physical systems; each group or pair occupies only a tiny region of the sky. Such tests say nothing about the properties of redshifts over the entire sky. Experiments on a very large scale are certainly possible, but they are much more difficult to carry out.

One complication arises from having to measure galaxy redshifts from a moving platform. The motion of the solar system, assuming a Doppler interpretation, adds a real component to every redshift. When objects lie close together in the sky, as with pairs and groups, this solar motion cancels out when one redshift is subtracted from another, but when galaxies from different regions of the sky are compared, such a simple adjustment can no longer be made. Nor can we apply the difference technique; when more than a few galaxies are involved, there are simply too many combinations. Instead, we must perform a statistical test using redshifts themselves.

As these first all-sky redshift studies began, there was no assurance that the quantization rules already discovered for pairs and groups would apply across the universe. After all, galaxies that were physically related were no longer being compared. Once again, it was necessary to begin with the simplest available systems. A small sample of dwarf irregular galaxies spread around the sky was selected.

Dwarf irregular galaxies are low-mass systems that have a significant fraction of their mass tied up in neutral hydrogen gas. They have little organized internal or rotational motion and so present few complications in the interpretation of their redshifts. In these modest collections of stars, we might expect any underlying quantum rules to be the least complex. Early 20th century physicists chose a similar approach when they began their studies of atomic structure; they first looked at hydrogen, the simplest atom.

The analysis of dwarf irregulars was revised and improved when an extensive 21-cm redshift survey of dwarf galaxies was published by J. Richard Fisher and R. Brent Tully. Once the velocity of the solar system was accounted for, the irregulars in the Fisher-Tully Catalogue displayed an extraordinary clumping of redshifts. Instead of spreading smoothly over a range of values, the redshifts appeared to fall into discrete bins separated by intervals of 24 km per second, just ⅓ of the original 72 km per second interval. The Fisher-Tully redshifts are accurate to about 5 km per second. At this small level of uncertainty, the likelihood that such clumping would randomly occur is just a few parts in 100,000.

Large-scale redshift quantization needed to be confirmed by analyzing redshifts of an entirely different class of objects. Galaxies in the Fisher-Tully catalogue that showed large amounts of rotation and interval motion (the opposite extreme from the dwarf irregulars) were studied.

Remarkably, using the same solar-motion correction as before, the galaxies' redshifts again bunched around certain specific values. But this time the favored redshifts were separated by exactly ½ of the basic 72 km per second interval. This is clearly evident. Even allowing for this change to a 36 km per second interval, the chance of accidentally producing such a preference is less than 4 in 1000. It is therefore concluded that at least some classes of galaxy redshifts are quantized in steps that are simple fractions of 72 km per second.

Current cosmological models cannot explain this grouping of galaxy redshifts around discrete values across the breadth of the universe. As further data are amassed, the discrepancies from the conventional picture will only worsen. If so, dramatic changes in our concepts of large-scale gravitation, the origin and "evolution" of galaxies, and the entire formulation of cosmology would be required.

Several ways can be conceived to explain this quantization. As noted earlier, a galaxy's redshift may not be a Doppler shift, it is the currently commonly accepted interpretation of the red shift, but there can be and are other interpretations. A galaxy's redshift may be a fundamental property of the galaxy. Each may have a specific state governed by laws, analogous to those in quantum mechanics that specify which energy states atoms may occupy. Since there is relatively little blurring on the quantization between galaxies, any real motions would have to be small in this model. Galaxies would not move away from one another; the universe would be static instead of expanding.

This model obviously has implications for our understanding of redshift patterns within and among galaxies. In particular, it may solve the so-called "missing mass" problem. Conventional analysis of cluster dynamics suggests that there is not enough luminous matter to gravitationally bind moving galaxies to the system.

DECEMBER TASC MEETING HIGHLIGHTS

TASC's December meeting provided an opportunity for guests to bring and ask questions about creation, creation science, and naturalistic evolution using a panel format consisting of TASC board members and authors. Both guests and panelists seemed to enjoy the interactive participation. This outreach to answer questions from our guests and provide discussion touched the hearts of our guests those of the panel as well.


TASC panel at December meeting

As competition with many other December activities limited the attendance, we plan to consider this format again for meetings in 2011 to help create more interest and attendance. Our panel members have much creation science expertise to share with you. Please let us know if you would like to come out to TASC meetings in 2011 using the panel discussion format by contacting us through our website or by mail. Perhaps you would like to have the panel come to your church or organization. We look forward to hearing from you.

COMING EVENTS

Thursday, January 13, 7:00 P.M., Providence Baptist Church, 6339 Glenwood Ave., Raleigh, Room 631
Topic to be determined.

Contributions can be made at the TASC web site at www.tasc-creationscience.org
through any of these major credit cards or through PayPal.

Or mail your contribution to: TASC, P.O. Box 12051, Research Triangle Park, NC 27709-2051