THE ABSENCE OF DOUBLE STAR MULTIPLE IMAGES AND GEOCENTRICITY

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Introduction

On page 8, paragraph B) of the *Biblical Astronomer* No. 74, Fall 1995, and elsewhere in the same article, Harald Heinze calls attention to the fact that all we know of stars is from the light reaching us from them. And because of this there is an interdependence of *all* parameters describing a star. It had occurred to me many years ago that the incestuous nature of stellar data could just as easily support a cosmological distance scale on the order of light years (or even much smaller) as well as the current establishment scale of billions of light years. I am personally somewhat ambivalent to the size of the cosmological distance scale since whether it be small or large, it is much, much greater than my senses can appreciate and, furthermore, whatever the scale, it must be compatible with a geocentric universe.

I wish to bring the argument around to geocentricity and I especially wish to focus on the apparent absence of multiple images of binary stars whose orbital planes are seen nearly edgewise, *i.e.*, those binary stars whose orbital inclinations are near 90 degrees or -90 degrees as found in star catalogs. For example, we might consult Aitken's *The Binary Stars,* (1935), or Antonin Becvar's *Atlas of the Heavens*, which contain sizable tabulations of both visual and spectroscopic binary stars. I believe that the absence of multiple images of such binary stars is compatible with geocentricity, whether the distance scale be large or small.

Circumstances of multiple images

In order to provide a mathematical inquiry we will treat a binary system that is seen edgewise and has a companion star in a circular orbit revolving around a large central star fixed on the celestial sphere (*i.e.*, we shall not complicate matters by considering the system's barycentric motion or spatial motion). In Figure 1, let E denote the place of the earth

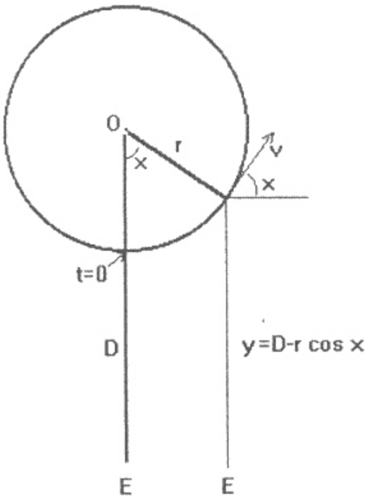

Figure 1

and O the center of the binary system. The central star at point O has mass M and is at distance D from the earth. The companion star orbits in a circular path of radius r and period P. The orbital position of the companion is given by the central angle x measured from direction OE starting at time t=0. The tangential velocity of the companion is v. It is assumed that D is rather larger than r. Let the distance from the companion to the earth be y. Hence we may write $x=(2\pi/P)t$ and approximate $y = D - r \cos x$. At this time let the light from the star system travel at constant velocity c, then the travel time u for light to traverse distance y is approximated by

$$u = y/(c - sv \sin x)$$

where the term $sv \sin x$ may be used to include the ballistic contribution of the companion's motion to the speed of light emanating in the direction of the earth. If s=1, then the emanation is fully ballistic; if s=0 the light velocity is independent of its source as is held by relativists. Of course other values of s could be entertained. The expression for u may be more conveniently represented by the following approximations:

$$\begin{aligned} u &= (D - r \cos x)/(c - sv \sin x) \\ &= D(1 - (r/D) \cos x)\, c^{-1}\, (1 - s(v/c) \sin x)^{-1} \\ &= (D/c)(1 + s(v/c) \sin x - (r/D) \cos x) \end{aligned}$$

Then the time T at which the companion's light arrives at the earth is:

$$T = t + u = \mathrm{a}x + \mathrm{b} \sin x - \mathrm{c} \cos x + \mathrm{d}$$

where

$$a = P/(2\pi),\ b = s\,D\,v/c^2,\ c = r/c,\ d = D/c.$$

A more useful expression for T is:

$$T = ax + A \sin(x + B) + d$$

where

$$A = t(b^2 + c^2)^{1/2},\ B = -a \tan(c/b).$$

Plots of T versus x might look like those in Figure 2. The first plot represents a large amplitude A whereby many (6 in this example) companion images can occur. The second plot with a smaller amplitude shows only 3 and the last plot, with a small amplitude shows only one image. Note that for an instant, in the first two plots, the number of images decreases when we, as we progress up the T axis, reach a maximum or minimum. It seems that it is the third case that occurs in nature, *i.e.*, the amplitude A in relation to the slope a is such that the plot of T versus x is monotonically increasing. This occurs when no maxima or minima occur:

$$0 = dT/dx = a + A \cos(x + B)$$

has no solution, or when the solution

$$x = a \cos(a/A) - B$$

is not defined, and this occurs when $a/A > 1$. Hence a/A is the discriminant for multiple images.

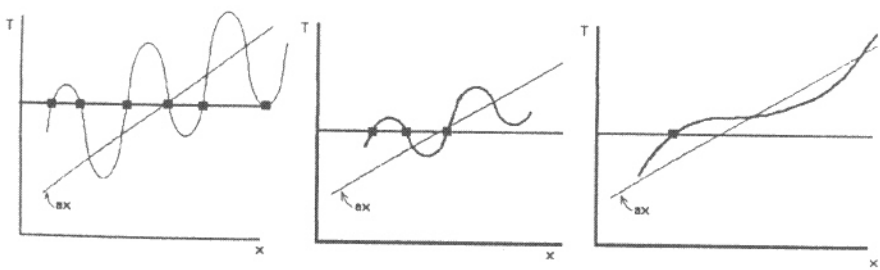

Figure 2

The application of physical theory

In paragraph C), Harald goes on to question the validity of invoking celestial mechanics to fit *apparent* orbital observations of binary systems for, once again, all data comes from the single source of the light coming from stellar bodies. This may be so since the important quantities, r, D and M are *not* independently obtained. Furthermore, Paul places a difference between terrestrial and celestial things (1 Cor. 14:40-41). Be that as it may, let us nevertheless proceed using Keplerian orbits and Newton's formulas for them in order to express a/A in terms of physical constants (if there really is such a thing) and the fundamental quantities r, D and M. Hence, in accordance with Newton, let us set:

$$P = 2\pi r^{3/2} (G M)^{-1/2}, \quad v = (G M r^{-1})^{1/2}$$

where $G = 6.67\text{x}10^{-8}$ (cm^3 sec^{-1} gm^{-1}) and where $c = 3\text{x}10^{10}$ (cm sec^{-1}), which yields:

$$1 < a/A = r^{3/2} (G M)^{-1/2} (s^2 D^2 G M r^{-1} c^{-4} + r^2 c^{-2})^{-1/2}$$

This inequality may be manipulated into the following more useful form:

$$\begin{aligned} z &= G M c^{-2} r^{-1} (s\, G M c^{-2} D^2 r^{-3} + 1) \\ &= 8\text{x}10^{-29} s^2 M r^{-3} D^2 + 1) \end{aligned}$$

where, if $z > 1$ multiple images occur and if $z < 1$, they do not. It is clear that binary stars at great distances should show multiple images since no matter what the values of M and r, there will always be a D sufficiently large to cause $z > 1$ provided s is not equal to zero.

Application of data

Hence we see that if light, at least celestial light, behaves ballistically ($s = 1$) then the universe should be limited in size (*i.e.*, "small"). In this case, the limiting D can be obtained by setting $z = 1$, $s = 1$ and solving for D:

$$D^2 = (G M r^{-2} c^{-2})^{-2} (1 - G M r^{-1} c^{-2}).$$

If the binary system Alpha Centauri is somewhat typical ($M \sim 10^{34}$ gm, $r \sim 10^{15}$ cm so that $G M r c^{-2} \sim 10^{-10}$, and, ignoring this term gives:

$$D = (G M r^{-2} c^{-2})^{-1}.$$

Let M_{min} be 1/1000th of the solar mass ($M_{sun} = 2\text{x}10^{33}$ gm) and let r_{max} be a million astronomical units (1 A.U. = $1.5\text{x}10^{13}$ cm), then:

$$D_{max} \sim G^{-1} c^2 M_{min}{}^{-1} r_{max}{}^{2} \sim 10^{36} \text{ cm} \sim 10^{18} \text{ light years.}$$

This figure seems not to qualify as small, however, a choice of one solar mass and one A.U. would yield 1,000 light years. I agree with Harald Heinze that the circularity of observations brings into question mass and distance values.

For Alpha Centauri published values of $D = 4\text{x}10^{18}$ cm, $r = 4\text{x}10^{14}$ cm and $M \sim 10^{34}$ gm gives:

$$z = 2\text{x}10^{-9} (0.2 s^2 + 1) < 1$$

which signifies that there are no multiple images. Alpha Aurigae has the shortest period (0.2848 year) from amongst Becvar's visual binaries: $D \sim 3\text{x}10^{20}$ cm, $r \sim 7\text{x}10^{13}$ cm and $M \sim 10^{35}$ gm and that gives:

$z = 1\text{x}10^{-7} (2\text{x}10^6 s^2 + 1) \sim 0.2 s^2$ (no multiple images?)

For Beta Cassiopeia: $D \sim 1\text{x}10^{22}$ cm, $r \sim 1\text{x}10^{16}$ cm and $M \sim 10^{36}$ gm,

$$z = 8\text{x}10^{9} (8\text{x}10^3 s^2 + 1) < 1$$

and, again, there are no multiple images.

P. Moon and D. Spenser held to the ballistic theory and that light from stars did not travel in a Euclidean manner. In this way they found the apparent absence of multiple images to limit stellar distances to a few light years or less.[1] Many years ago I corresponded with Prof Moon (M.I.T.) to see if he had done further work in this area. At that time he had not published anything and I do not know if he ever did.

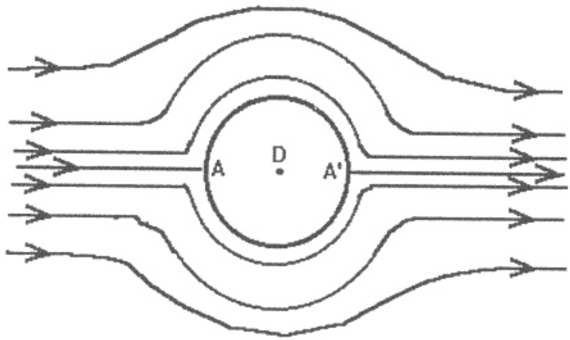

Figure 3

Geocentricity and multiple binary star images

If $G\ c^{-2}\ M\ r^{-1} > 1$, then multiple images would occur (though not necessarily discernible from the earth) whether or not light behaved ballistically. This would be the case for a very massive central star and a very close companion, *e.g.*, if $M = 10^{40}$ (gm) and $r = 10^{11}$ (cm) then z=8. It seems to me that in a geocentric universe that multiple images would not be possible since the light from an object follows along one and only one path through an observer's position. Furthermore, the light would not follow along a straight line but along curved paths whose curvatures would account for stellar parallax and the various stellar aberrations which are thought to be caused by the earth's motions. I suggest that light emanating from a star flows from it like a fluid flowing from a source and hence only one streamline goes through any given point. The only exception would be isolated stagnation points due to the interaction with other sources. For example, a fluid doublet at D would produce two stagnation points A and A' in the presence of uniform parallel flow.

The doublet produces a circular obstacle in that its flow is confined to the interior of the circle. In this model the earth is the universal sink which eventually would absorb all light. The sun as a fluid light source going around the earth would produce time-varying deflections and the apparent direction of a star so as to account for parallax and aberration. Lunar and planetary effects or parallax and aberration are accounted for since they also are moving sources which slightly change the apparent direction of a star. Such a theory suggests that there is a distance-luminosity (light-source strength) relationship. In the adjoining figure a single star is emitting fluid-light in all directions. However, those streamlines going towards an observer at E on the earth are perturbed by a source at the sun which alters the directional streamlines so that the apparent place of the star along the tangent line at E is displaced from the actual place by a small angle which is numerically equal to the sum of the traditional parallax and aberration angles. In this figure a stagnation point would occur for some streamline heading right at the sun and would be located well within the sun. The relativistic bending can also be included without invoking relativity.

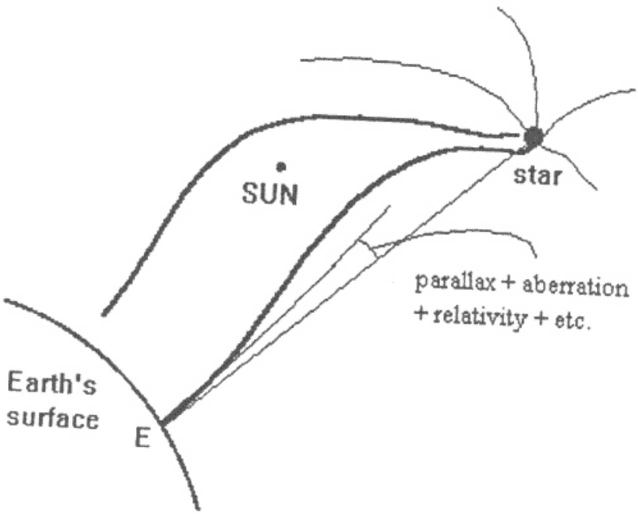

Figure 4

This refinement and others can be included by letting the sun be a source, or a doublet, or a multiplet, or these in combination, with a vortex, *e.g.*, a vortex superimposed upon a source produces spiral flow. Note that the speed of light changes along the path and it is the sun's motion that causes parallax and aberration. One might object that by having the earth be the ultimate sink for all stellar light that the earth would be greatly heated. This would surely be the case for evolutionary time, but the earth has been in existence only 6,000 years and will probably be around for somewhat over another 1,000 years, it being an expendable commodity that God will dispose of at the end of the millennium.

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QUOTE

Contrary to popular misconception, it is the "lesser," not the "greater," scientist who is more likely to have and "open mind." The greater the scientist, lthe more likely he is to develop a position and to push it as far as possible.

— Ian I. Mitroff[2]

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1. P. Moon and D. Spenser, 1953. "Binary Stars and the Velocity of Light," *J. Optical Society of America*, **43**:639.

2. Mitroff, Ian I., 1974. '"Studying the Lunar-Rock Scientist," *Saturday Review/World*, **1**(28):65. 11/2/74.