Appendix 21

The Tychos – Our Geoaxial Binary System

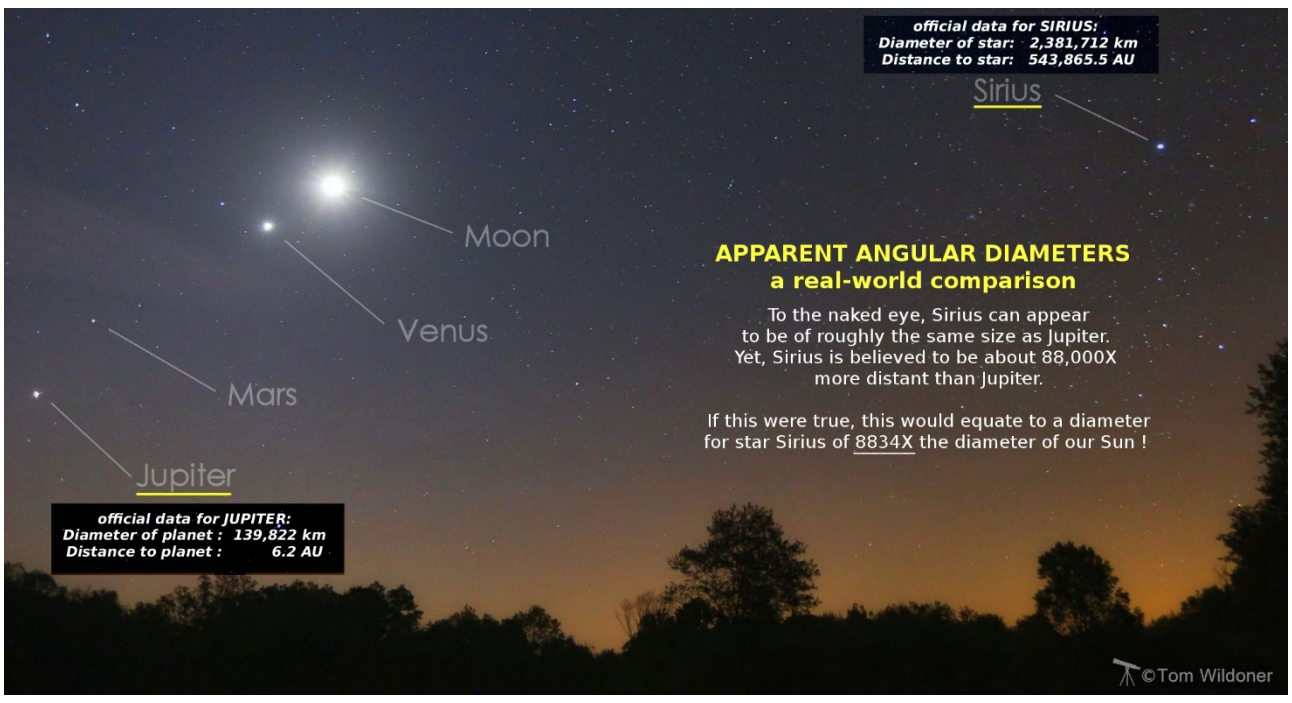
13 June 2019, 12:48 am[1]

About the apparent size of the stars

The other day I came across a short yet most interesting academic paper by David W. Hughes (2001) titled “Galileo’s measurement of the diameter of a star, and of the eye’s pupil”.[2]

The apparent angular diameter[3] of the stars as perceived from Earth by the human eye has been one of the most hotly debated issues of astronomy ever since the Copernican theory came along. Since the theory implied that the stars were hugely more distant than previously believed, it became imperative for the Copernican advocates to find some justification for the apparent size of the stars. This, because the stars in our skies (especially the largest or closest “first-magnitude stars”) appear to our naked eye to be far too large, if they were to be as distant as currently believed.

Let me use a real photograph of our night skies to illustrate the issue at hand. Note how the apparent diameter of the star Sirius seems to be roughly the same size, or even a tad bigger, than that of the planet Jupiter, as viewed from Earth by a naked-eye observer:



That’s right: if we were to trust our own eyes (something we may need to learn anew and start doing!), we would have to conclude that Sirius is about 8,834 times larger than the Sun. That is, of course, assuming that Sirius is truly as distant as currently claimed (i.e., 8.6 light years, or 543,865 times further away than the Sun). Moreover, we would have to accept that all the stars are many thousands of times larger than our own star. As it is, this is precisely what Tycho Brahe held as the most unacceptable notion put forth by the Copernicans: the absurdity of the gigantic star sizes and distances their model implied.

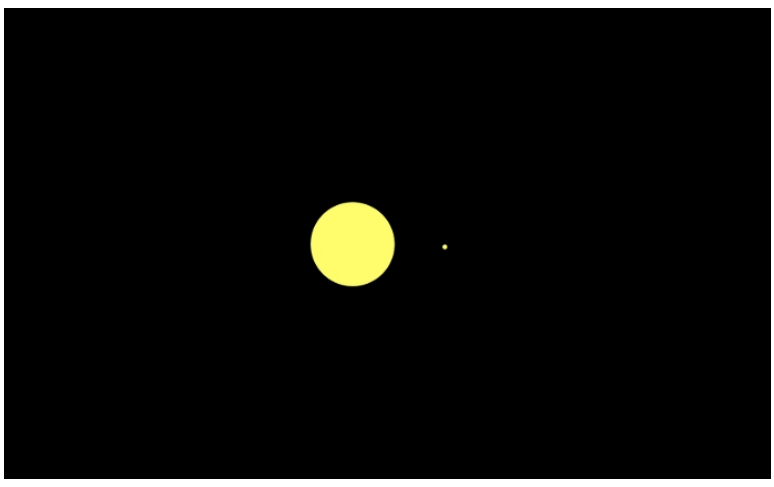
Over the last centuries, volumes of science literature have sought to explain the apparent optical aberration of the observed star sizes. Ironically, it was a famed technological advancement—the telescope—that ultimately provided the Copernicans with some tentative “justification” for the pesky problem, courtesy of the British Astronomer Royal George Airy. Today, aspiring astronomers are taught that the observed dimensions of the points of light emanating from the stars are spurious because they are artificially enlarged as they traverse Earth’s atmosphere. In telescopes, a phenomenon known as “diffraction” would cause the angular diameter of the stars to appear larger than they are in reality. Here’s a quote from Wikipedia describing “the Airy disk”:

> *“Airy disk*
> *The resolution of optical devices is limited by diffraction. So even the most perfect lens can’t quite generate a point image at its focus, but instead there is a bright central pattern now called the Airy disk, surrounded by concentric rings comprising an Airy pattern. The size of the Airy disk depends on the light wavelength and the size of the aperture. John Herschel had previously described the phenomenon, but Airy was the first to explain it theoretically. This was a key argument in refuting one of the last remaining arguments for absolute geocentrism: the giant star argument. Tycho Brahe and Giovanni Battista Riccioli pointed out that the lack of stellar parallax detectable at the time entailed that stars were a huge distance away. But the naked eye and the early telescopes with small apertures seemed to show that stars were disks of a certain size. This would imply that the stars were many times larger than our sun (they were not aware of supergiant or hypergiant stars, but some were calculated to be even larger than the size of the whole universe estimated at the time). However, the disk appearances of the stars were spurious: they were not actually seeing stellar images, but Airy disks. With modern telescopes, even with those having the largest magnification, the images of almost all stars correctly appear as mere points of light.”*[4]

In short, Airy claimed that we cannot trust our eyes when it comes to judging the angular diameters of the stars, since points of light are distorted/enlarged as they traverse Earth’s atmosphere. However, there’s an obvious problem with Airy’s theory: why wouldn’t the points of light emanating from our planets (e.g. Jupiter) be similarly affected? Doesn’t the light coming from our planets also traverse our atmosphere much as that emitted by the stars? Of course it does.

Tycho Brahe’s estimate of the angular diameter of Vega (a so-called “first-magnitude star”) was 120 arcseconds, or only about 16 times smaller than the angular diameter subtended by the sun (1920 arcseconds). Now, many of you will probably scoff at such a “generous” estimate of the size of Vega, yet here’s a simple comparative graphic I made to illustrate what this would look like:

[1] https://cluesforum.info/viewtopic.php?p=2412479#p2412479
[2] http://adsabs.harvard.edu/full/2001JBAA..111..266H
[3] https://en.wikipedia.org/wiki/Angular_diameter
[4] https://en.wikipedia.org/wiki/George_Biddell_Airy#Airy_disk



Large dot=the Sun. Small dot=a 1st magnitude star such as Vega, visually 16 times smaller than the Sun, according to Tycho Brahe.

The small dot is only 16 times smaller than the big dot (representing the Sun). All in all, it doesn't look too different from what we can see in reality with our own eyes, does it? Please also peruse the real photograph of our night skies posted above: you may compare the observed angular diameter of the Moon (which subtends the same angular diameter as the sun) with the observed angular diameter of Sirius. Do the two look proportionally much different from the dots in my above graphic? In fact, Tycho Brahe's observation that first-magnitude stars are only 16 times smaller than the Sun seems quite reasonable.

Now consider this: Vega (the second-brightest star in the northern celestial hemisphere, after Arcturus) is currently believed to be 1,583,000 times—yes, more than 1.5 million times!—further away than our Sun, i.e. 25.04 light years. Yet, Vega's diameter is claimed to be only about 2.3 times larger than that of the Sun. Now, if I enlarged the big dot in my above comparative graphic 2.3 times, then scaled it down 1.5 million times, would it be visible from Earth to the naked eye? I honestly do not think so and I would certainly question such a surreal notion. In light of this, I trust you will concede that Tycho Brahe's estimate is far more realistic than what is currently claimed.

The gist of the above-mentioned paper by David Hughes is to praise Galileo (a staunch promoter of the Copernican model) for his "ingenious explanation" of why the stars appear to be much larger than would be expected. Again, Tycho Brahe's main objection to the Copernican model was that our many visible stars could not be so hugely distant, or else they would all have to be hugely larger than our Sun. Brahe reckoned instead that the actual respective diameters of the visible stars were more homogeneous, i.e. only somewhat larger or smaller than our Sun—not thousands of times larger.

Let us now compare the angular diameter of Vega as estimated by Galileo, Tycho Brahe and modern astronomers:

Galileo: 5 arcseconds
Tycho Brahe: 120 arcseconds
Modern astronomers: 0.0029 arcseconds

In other words, the estimate of modern astronomers is 1,724 times smaller than that of Galileo and 41,379 times smaller than that of Tycho Brahe.

At this point, we should pause for a moment and wonder how such astronomical discrepancies can even occur: were both Galileo and Tycho Brahe completely inept? Or could it possibly be that modern science has had to artificially shrink the "apparent angular diameter" of Vega in order to rescue the Copernican model from its inevitable demise? To be sure, if Vega were truly 1.5 million times further away and only 2.3 times larger than our Sun, it would have to subtend a microscopic angular diameter of about 0.0029″. The problem is: this is more than 20,500 times below the angular resolution (approx. 60 arcseconds) of the human eye, meaning that we would all need Superman's krypton vision to see it. Yet Vega is one of the brightest "naked eye stars"[5] in our skies.

You may thus justly ask yourself: "how do modern astronomers explain how we are able see such a small and distant point of light with our naked eyes?" Well, they will tell you that Vega is about 40 times more luminous than the Sun and since our night skies are very dark (as opposed to the shiny stars), we can see even very distant stars. But what about stars much more distant than Vega? Well, they will tell you, for instance, that Deneb's luminosity (a star supposedly 2,600 light years away, i.e. more than 100 times more distant than Vega) is "somewhere between 55,000 and 196,000 times that of the Sun" (Wikipedia).[6] Good Heavens! Does this sound even remotely scientific? In light of this, you may be forgiven for suspecting that Copernican astronomers are perhaps living in a surreal fantasy world of their own and just making things up as they go along, trying to make sense of their own theory.

Needless to say, I strongly believe that Tycho Brahe was closer to the truth. His estimate of Vega's apparent angular diameter was 41,379 times larger than the value now claimed by modern science. As it happens, the Tychos model proposes that the stars are about 42,633 times closer than currently believed. A pretty good agreement, don't you think?

So how large is Vega in reality?

Let us do some simple math and see if we may at least "rescue" the mainstream notion that Vega is 2.3 times larger than the Sun.

Vega is claimed to be 25.04 light years away. In the Tychos model, 1 light year = 1.48366 AU (i.e. 42,633 times less than 1 light year). Hence, the distance between Earth and Vega is 25.04 x 1.48366 = 37.15 AU.

Remember now that Tycho Brahe estimated Vega's angular diameter, as seen from Earth, to be about 16 times smaller than our Sun's. Well, if Vega is truly 37.15 times further away than the Sun, and appears to be 16 times smaller, this would indeed make Vega about 2.3 times larger than the Sun:

37.15/16 = 2.321875

[5] https://en.wikipedia.org/wiki/Naked_eye
[6] https://en.wikipedia.org/wiki/Deneb

To summarize:

- Tycho Brahe may have been right all along about the visible size of Vega and the stars in general.
- My proposed reduction factor of 42,633 for the currently estimated star distances may well be correct, as it seems to agree with Brahe's observations.
- If the stars are 42,633 times less distant than currently reckoned, their true diameters may not necessarily need to be 42,633 times smaller than current values. To be sure, further study is needed in the field of optical astronomy, a branch of cosmology rife with controversy still today. In any event, the spiny question of the actual star sizes and how they are affected by various phenomena (e.g. "Airy disk" and assorted optical aberrations) is far from being a settled matter.
