

## Re: Talking about distance

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- *From:* oriel36 <kelleher.gerald@xxxxxxxx>
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On Jan 22, 7:33 pm, "Dennis Woos" <dpw...@xxxxxxxx> wrote:

In what sense is it true that M31 might no longer exist, or that one's hand might no longer exist, or that anything and everything might no longer exist no matter how arbitrarily close we are to it? I have never been comfortable with this "might not exist" stuff, and maybe it is because of some vague ideas of Relativity and a "light cone". Anybody have any thoughts/assistance? How should amateur astronomers be talking about distance?

I approach this in two different ways, depending on the sophistication of my audience. The simple answer is more or less along the lines you give: the light left a long time ago, so we are seeing something as it was, not as it is. Most people seem to get this; if not, the example of thunder and lightning works pretty well. Thunder and lightning are created at the same instant; the lightning tells us when that is, but the thunder is subject to time-of-flight.

For those advanced enough to grasp some General Relativity (about 12 years old in my experience), I try for a more accurate answer. Under GR, time does not pass for something traveling at  $c$ . So it is perfectly reasonable to say that we are truly seeing M31 as it is now, because time and space are inextricably connected. Wheeler had a great graphic of a universe filled with a latticework of meter sticks with clocks at each intersection. There are different ways of synchronizing these clocks, but essentially it amounts to sending a light wave out from one of them, and as each clock sees that wave pass it gets reset. Each of those times is the same "now". We think the clocks have different times

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only because we (in our mind experiment) are watching the system from outside the Universe. But that can't be done in reality.

An event that is a million ly distant cannot have any effect on us for a million years, under GR, that event happens when it is observed, not at some time propagated backwards based on  $c$  and the event distance. This is the light cone you are referring to (although it is a 4D cone, which isn't so easy to visualize, so this is usually shown by analogy in a 2D+T universe).

The interesting thing is, some people get this very easily, and some people don't get it at all. There doesn't seem to be much middle ground..

This is very helpful, and explains my concern with the "no longer exists" stuff. I do have a question, however. My older son, who is studying some Physics in college (a sophomore), tells me that he thinks that what you are talking about is Special Relativity, and not General Relativity? Also, he says that he has been taught that it is very tricky talking about this stuff, as using common words like "when" (as in "happens when it is observed") is usually misleading.

Ah,'the people without a past',what an unfortunate title.

How intelligent do you have to be to recognise that positional displacement is the sole insight of Roemer in respect to distance and the speed of light where the apparent anomalous motion of Io is accounted for between apparent location and actual location ?.

The physical considerations are based on cyclical orbital comparisons between Earth and Jupiter just as Kepler determined orbital geometry and variations in speed by comparing the Earth's orbit with Mars –

[http://rvgs.k12.va.us/electives/trap/students/2001/avandegr/index\\_files/image001.gif](http://rvgs.k12.va.us/electives/trap/students/2001/avandegr/index_files/image001.gif)

This unrestricted belief that everything is in the past due to the 'equation of Light' is just a consequence of an extremely poor understanding of astronomical principles and all this dithering around with what 'when' means.

As you do, I guess that I will continue to talk about distance using both approaches, depending on the situation. I have to say that I don't much mind

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confusing folks, or being confused myself – especially in the dark with a fabulous view of M31 in the eyepiece!

All these dummies think they built exotic 'relativity' concepts based on 'time' when all they are doing is creating concepts based on the humble clock. A clock is a device that keeps an equable pace and that is it, this constant pace was and remains crucial for determining geographical separation based on longitudes where it is linked to the daily cycle as a convenience and specifically 24 hours/360 degrees

How was Albert to know that Isaac was speaking about the astronomical Equation of Time which creates the 24 hour cycle out of the natural noon cycle in terms of absolute/relative time and how was Isaac to know that Flamsteed botched the relationship between the 24 hour day and daily rotation –

"Absolute time, in astronomy, is distinguished from relative, by the equation or correlation of the vulgar time. For the natural days are truly unequal, though they are commonly considered as equal and used for a measure of time; astronomers correct this inequality for their more accurate deducing of the celestial motions." Newton

There is no mystery behind any of this, no dithering around with definitions and despite the fact that Isaac is expressing fairly accurately the distinction between the natural noon cycle and the 24 hour cycle in his own idiosyncratic language, there is actually no means to separate the 24 hour cycle from the natural noon cycle or get rid of 'absolute time' as some numbskulls would have it a century ago.

Dennis

Go enjoy the celestial arena and forget that junk about seeing into the past without first recognising what goes on in the foreground. If you absolutely hate your family and your own past experiences then stick with that sub-human relativity concept and its homocentric and celestial sphere outriggers