

STELLAR ABERRATION

According to 'MATTER (Re-examined)'

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Abstract: Reversals of earth's direction of motion in its orbital path around sun is an essential requirement for contemporary explanations on stellar aberration. Earth's orbital path around sun is an apparent concept. Reversal of direction of motion of a macro body of the size of earth and moving at real linear speed of earth, in three months period without affecting its integrity is irrational. However, considering corpuscles of light as 3D matter-particles can provide logical explanation for this phenomenon.

Keywords: Stellar aberration, astronomical aberration, aberration of light

Apparent displacements of celestial objects about their locations are referred to as stellar aberration (astronomical aberration or aberration of light). All contemporary explanations of this phenomenon are based on the assumption that earth moves around (static) sun, in elliptical orbital path. In that, earth is assumed to reverse its direction of motion every six-month period. Average relative linear speed of earth, with respect to sun, is estimated at 29780 m/sec. Even without considering linear speed of solar system (as a whole), it is absurd to think that a composite macro body of earth's size and moving at this linear speed can reverse its direction of motion in three-months time and yet maintain its integrity. Therefore, explanations of stellar aberration, based on reversal of earth's direction of motion, are not rational. Similarly, explanations on other phenomena, based on apparent orbital path of earth around sun, also need reconsideration.

We now know that sun is a moving object. It is physically impossible for a mechanically unattached macro body to move around another moving object in any sort of closed geometrical path. Therefore, planetary body's orbital path around central body is imaginary. Heliocentric solar system is an apparent structure, derived from relative positions of planets about sun (in assumed static state). Each planetary body is assumed to move around central body in elliptical/circular path. Apparent orbital paths are good

for predicting phenomena associated with relative positions of central and planetary bodies. However, they cannot give correct results if used to determine real parameters of the macro bodies or their paths.

All cosmic bodies, except stable galaxies, have translational motions in space [1]. Currently, linear speed of sun is estimated at about 250000 m/sec. Earth and whole of solar system moves with sun at its linear speed. At this linear speed, no planetary body in solar system can orbit around sun but may orbit about sun. Planetary body moves with sun at median linear speed equal to sun's linear speed. It moves in wavy path about sun, periodically moving to front and to rear of sun. Linear speed of earth in its median direction of motion varies between $(250000 + 29780)$ m/sec and $(250000 - 29780)$ m/sec. Median direction of motion never reverses; it is maintained along with sun's direction of motion.

Alternative concept, presented in book, 'MATTER (Re-examined)', envisages light as constituted by stream of photons (corpuscles of independent 3D matter-particles with associated distortions in universal medium). Observer's motion cannot affect photons, in any way, until they are physically received by observer. Since direction of motion of light cannot be affected by observer's motion, in case of light, the belief that '*aberration causes objects appear to be angled or tilted towards the direction of motion of observer, compared to when the observer is stationary*' is a fallacy.

However, having 3D matter-cores, photons are gravitationally attracted (limited by certain restrictions) towards other 3D matter-bodies. Directions of rays of light, passing near solar system, are affected by gravitational attraction towards macro bodies in the system. Sun, being by far the largest macro body in solar system, (for approximate estimations) whole matter-content of solar system may be assumed as concentrated in sun. A ray of light, passing near solar system bends towards sun, under gravitational attraction.

Figure 1 shows relative locations of sun and earth during one apparent orbital period (one solar year). Central line represents a small part of sun's curved path around galactic centre. Sun is represented by large black circle, moving from right to left. Large grey circles show positions of sun at intervals of 6 weeks. Small black circle represents earth and small grey circles show relative positions of earth corresponding to position of sun at different positions. Dashed curved line shows earth's real orbital path about sun, for duration of one solar year. Difference in curvatures of earth's orbital path on either side of sun's path is due to small scales used in figure. In reality they are almost of same shape.

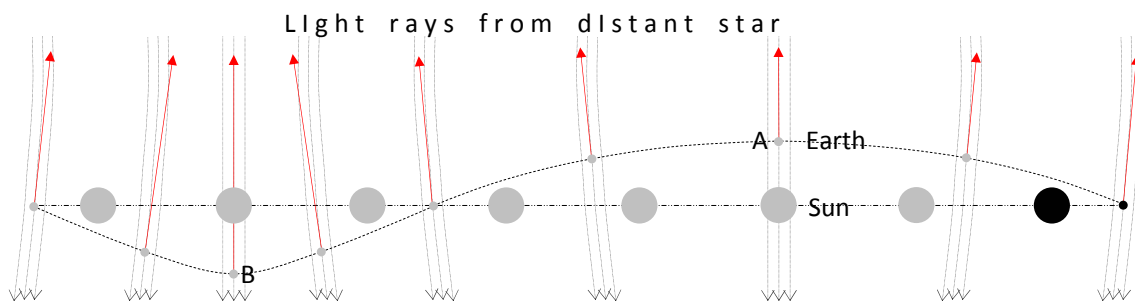


Figure 1

Thin dotted lines represent rays of light from a distant star. Three parallel rays are shown near each position of earth. Photons in light rays bend towards sun under gravitational attraction. Bend-rays of light, received by observer on earth appear to come from different direction and distant star appears to have shifted in the direction of line of sight, indicated by red arrows. This apparent deflection of position of distant star causes stellar aberration.

Change in direction of aberration is caused by alternating locations of earth relative to sun. For half of apparent orbit (from A to B in real orbital path, as shown in figure), earth is in front of sun. For remaining half of apparent orbit (from B in figure to position similar to A in next half cycle of earth's real orbital path), earth is behind sun. Hence, direction of deflection of rays of light from distant star (towards sun) is effectively forward, from earth's position at A to position at B. For rest of earth's relative position from B

to A (in forward direction), direction of deflection of rays of light from distant star is effectively rearward. Reversal of direction of earth's motion is not an essential requirement to recognize stellar aberration.

Magnitude and direction of stellar aberration, from any planetary body, depends only on its relative position with respect to central body. As the aberration is caused (mainly) due to matter-content of central body, its magnitude and direction from all planetary bodies (at any particular relative position) are identical, irrespective of their linear speed or size of their apparent orbital paths.

If distant star is located in the plane of orbital paths of sun and earth, it appears to move forward and backward in the same plane. If location of distant star is 90° to the plane of orbital paths of sun and earth, it appears to move upwards and downwards (in vertical direction) to the orbital paths. If distant star is located in any other direction its apparent displacement traces elliptical/circular figures in space.

As distance travelled by solar system, in a solar year, is considerable, difference this makes in relative direction of distant star (various types of parallaxes) also has to be accounted for. In order to account for stellar aberration, light rays from distant star should have constant direction relative to observer, who is moving with solar system in (almost) linear direction within galaxy. Therefore, measurements of stellar aberrations of light rays from stars in nearer galaxies become erroneous.

Reference:

- [1] Nainan K. Varghese, *MATTER (Re-examined)*, <http://www.matterdoc.info>

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