International Journal of Astrophysics and Space Science
2025, Vol. 13, No. 2, pp. 63-72
https://doi.org/10.11648/j.ijass.20251302.14

Research Article

Alpha Centauri Not a Binary Star System, Angular Separation, Brightness Analysis

Kolemann Lutz*

Physics, Space, & Engineering Department, Multi Planet University, Washington DC, United States

Abstract

Data suggests the belief of Alpha Centauri (α-Cen) A (Kentaurus) and B (Toliman) as a binary star is based on 1600s -1800s. This is the first study to propose that Alpha Centauri is not a binary or triple star as data suggests a single star system based on data analysis, angular separation, trigonometry, and image analysis. Telescope observations suggest 5.4" in 2020,9.036" and as high as 22" between A-Cen-A and A-cen-B. Based on 7.1" average, this suggests distance α-Cen is 3.97E+12km or 26,582AU away or 314+ Solar systems could fit in between A-Cen A & B, excluding ISM gas shell. Moreover, apparent magnitude difference of 99% and visual luminosity difference of 240% between AC-a reference star and α-Cen-B may suggest a 2-3 fold diff in brightness between α-Cen-a and α-Cen-b with proportional distance up to 2-3X, where Toliman star system could be up to <8.73ly+ away. Star Brightness Period Equation is also derived from Kole Lutz to model variables stars and harmonic motion. PCA ELA Image data analysis is conducted on X-ray & Optical images of A-Cen, identifying common regions. As data suggests nonbinary stars, results may also help to discover insights toward orbits, UV fluxes, magnetospheres, and habitability of planets orbiting b-Toliman and planets (b & c) orbiting Proxima Centauri.

Keywords

Astronomy, Astrophysics, Optics, Image Data Analysis

1. Introduction

The Alpha Centauri A & B stars have been studied for centuries and examined by telescopes for four decades. In 1689, French Jesuit priest, Jean Richaud, proposed the binary nature of A. Centauri A (Kentaurus or AC-a) and B (Toliman or AC-b). Proxima C was proposed to co-orbit A Centauri in 1915 with 3 orbiting planets. However, some propose A and B Stars come within 11.2AU and as far as 35.6AU. Angular separation between them was 4.92 arcseconds(") to 5.49" in 2020. Although, other observe apparent separation varies as much as 1.7 to 22" van Zyl, [1, 2]. Additional A-Cen AB angular separation estimates include: 2008: 8.3″ 2009: 7.5″ 2016: 4.0″. On mass comparison, 1000 Jupiters (5.2AU from sun) could fit into sun, however, AC-a, AC-b are proposed to be of similar mass and size to Sun. AB stars were examined in 1970s by HEAO-2, *Röntgen-Satellit* (*ROSAT)* [3] and recently Stars *α* C. and Proxima (HIP 70890, GJ551). The third star Proxima is a cool red dwarf (M5.5V), believed to be closer to Earth by 7800AU [14, 17] further found kinematic data that suggests Proxima is not bound in orbit about α Cen A/B, however recent studies in 2017 claimed Proxima was gravitationally bound to AB. Some also claim third star Proxima Centauri varies from 4,300 to 13,000AU, as far as

*Corresponding author: kole@mp-university.net (Kolemann Lutz)

Received: 4 April 2025; **Accepted:** 27 April 2025; **Published:** 6 June 2025

equivalent to about 430X radius of Neptune's orbit. Moreover, with digitization of telescopes in 1994, star image data was stored instead of photographic plates.

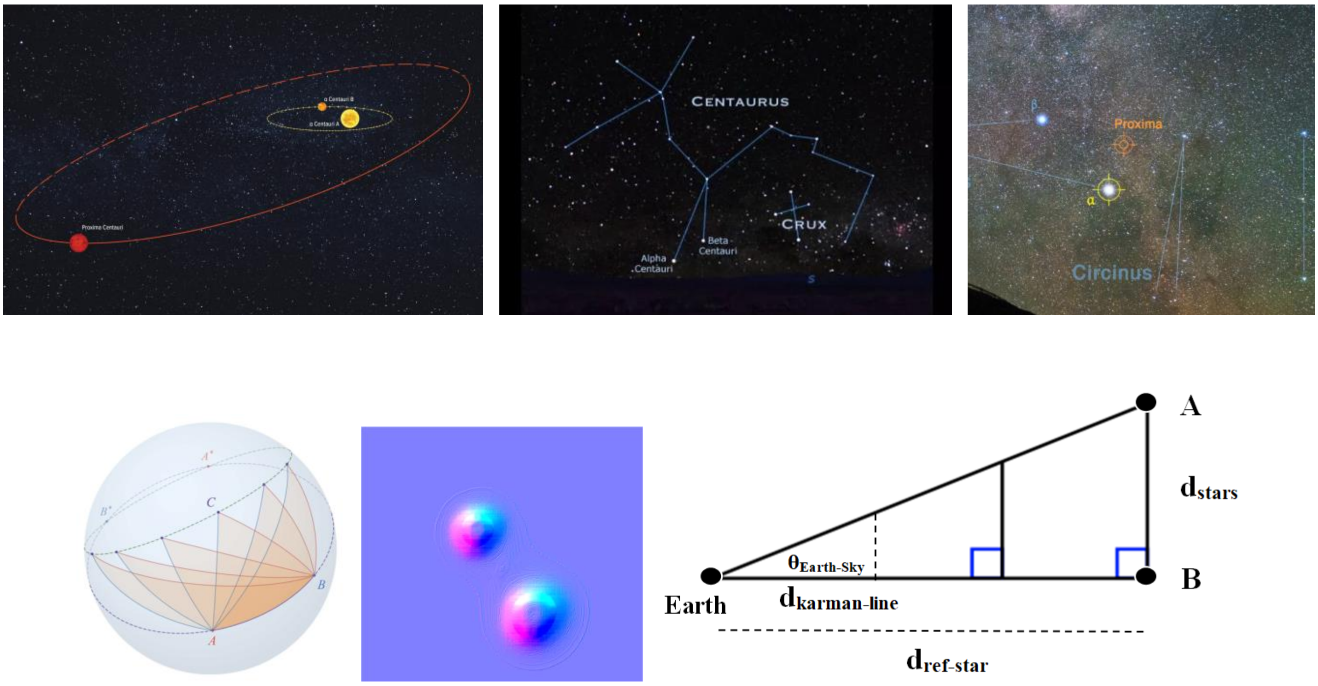


Figure 1. *a) A Centauri Orbits b) Centaurus Const, c) A Cen & α-Cen-B from JWST WFPC2 and WFC. d) Angular Separation Distance Analysis with Triangle Laws e) Spherical Right Triangles example of Star Orbits, f) X-ray & Optical of α-cen A (left) and B (right) from Hubble (Ayres, 2018) after Luminance ELA PCA Gradient Analysis.*

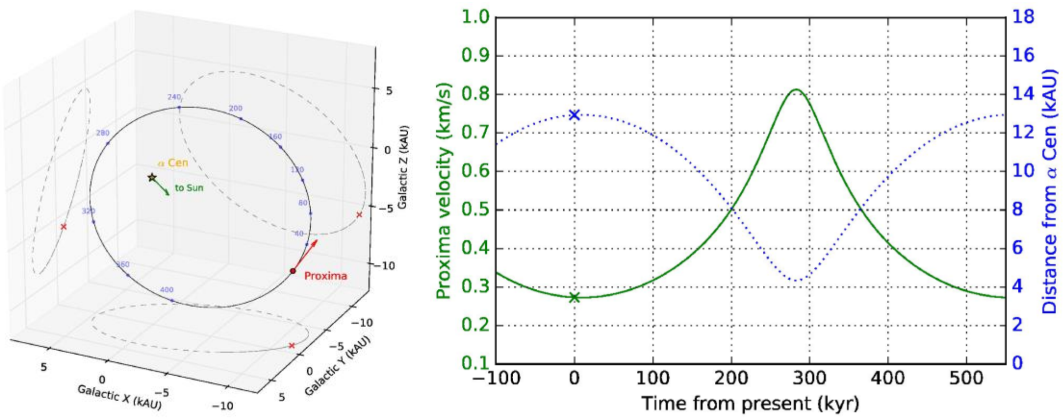


Figure 2. *Velocity measurements (solid line) & separation (dotted line) of Proxima vs α Cen. Present values with crosses [4].*

As photons or electrons [18] from stars travel from nearby stars such as Alpha Centauri, the below equations and models help to characterize brightness, distances, galactic coordinates, and derivation of Star Brightness Period Equation.

2. Methods and Equations

$$a^2 + b^2 + c^2 = d^2 \quad (1)$$

$$d^2 = a^2 + z^2 = (x^2 + y^2) + z^2 \quad (2)$$

$$\cos(c/R) = \cos(a/R) * \cos(b/R) \quad (3)$$

Above equation is spherical 3D pythagorean theorem, where c is the length of the hypotenuse (the side opposite the right angle). a and b are lengths of the other two sides (legs) and R is radius. Spherical Pythagorean Theorem visualization is provided from Wolfram and Spherical Right Triangles Visualization from [5]

$$\frac{baseline}{circumference} = \frac{\theta}{360^\circ} \quad (4)$$

$$distance = \frac{baseline}{2\pi} * \frac{\theta}{360\circ} \quad (5)$$

$$d_{Earth\ to\ Star} \approx d_a\ x\ \frac{M_a}{M_b} \quad (6)$$

where M is average apparent brightness to Star A and B respectively. Assuming direct proportional, linear rough estimates and stellar brightness ratio method may provide rough comparison estimates to local stars.

$$m_2 - m_1 = -2.5log\ \frac{b_2}{b_1} \quad (7)$$

where radius of big circle is distance to foreground object and theta is converted in deg for angular shift.

$$CC = |M_{v\text{-reference star}} - M_{reference\ star}| \quad (8)$$

$$M_{BC} = |M_{Bol} - M_V| \quad (9)$$

“Reference stars can provide a benchmark to measure the brightness of other variable stars. Change in target star's brightness (dM/dt) relative to reference star suggests variation in target star's intrinsic or absolute brightness and period. Bolometric correction (M_{BC}), BC, correction constant is difference of bolometric magnitude (M_{Bol}) and the magnitude (M_V) of target star.

$$M_{V\text{-Abs}}=M_{Bol} \pm |M_{BC}| \quad (10)$$

$$\delta/dt\ M_{V\text{-Abs}}=\delta M_{Bol}/\delta t + \delta M_{BC}/\delta t \quad (11)$$

After Norman Pogson suggested star brightness as a log ln function based on current observations data in 1856, by Henrietta Swan Leavitt helped to discover Period-luminosity relation in 1908. However, science communities continued to use log ln functions until Astronomer Kole Lutz modeled Phase lightcurves and derived Star Brightness Period Equation. Based on Period Luminosity relationship, variable star & pulsation suggest harmonic periodic motion instead of log function. Derived by Kole Lutz in 2025, Star Brightness Period Equation from (12-16) is:

$$B_{App} = A*\sin\ (P+c) \quad (12)$$

$$Y = A\ \sin(\omega t + \varphi) \quad (13)$$

$$y= 2A\ \sin\ (x+C)+B_{Min} \quad (14)$$

$$x=Period\ =2pi/|B|\ \text{ or }\ P= 360/|B| \quad (15)$$

where B is brightness, B_{Min} is vertical shift or min brightness, or how often in between peaks, C is phase shift or dt upon imaging or 'psi' phase constant or initial phase. WIth Amplitude (A) or Brightness range, apparent Magnitude (M_{App}) suggests:

$$M_{App}= 2A\ \sin\ (x+C)+B_{Min} \quad (16)$$

3. Results

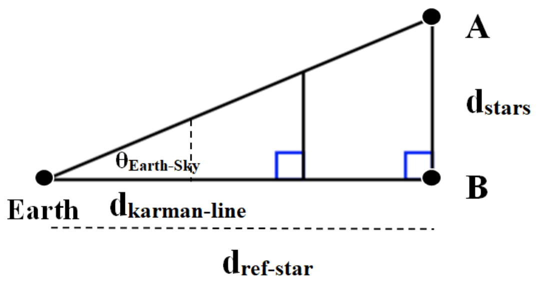


Figure 3. *Congruent Triangles Law applied to Astrophysics, Euclidean distances not to scale.*

where base is altitude to Karman line and bottom right is distance to ref star, top right is target star

$$\frac{D_{stars}}{D_{Karm-St}} = \frac{D_{ref-star}}{D_{Karm}} \quad (17)$$

$$d_{stars} = d_{karman} * \tan\ (\theta) \quad (18)$$

where assuming $\theta_{ang\text{-}sep}$ 5.49deg is.09581rad from π/180 and 1rad=206265”, this suggests $d_{karmn\text{-}star}$ is 9.61129km. Based on Congruent Triangles Law with AA and AAA Rule and SSS Proportionate Law and RHS (Right angle-Hypotenuse-Side), this suggests law of proportionality and eq above. where assuming Acen is 4.37ly (4.1343e13km), this suggests d_{stars} is 3.976619e+12km or 26582AU. To put into reference the edge of Solar system is measured to be 110AU as measured by Voyager 1 after passing Heliopause. Assuming 26,582AU Euclidean distance, this suggests 241+ Solar systems could fit in between A-Cen A and A-Cen B, excluding ISM gas shell separation that allow for stellar gravity field equilibrium.

Alpha Centauri Angular Separation Distance Analysis				
Angular Sep	distance (karman)	AB Distance (km)	AU	Solar Systems
4.92	8.608188369	3561591195071	23808	216
5.49	9.611290003	3976619049631	26582	242
9.36	16.48317442	6819823914042	45588	414
8.3	14.58842231	6035880516684	40347	367
7.5	13.16524976	5447050600372	36411	331
7.1 Avg	**12.48047289**	**5163727888762**	**34517**	**314**

Figure 4. *A-Cen Ang Separation Distance Analysis based on Congruent Triangles Law.*

Potential sources of deviation and error from estimates may factor in " angular separation distances as a function of light bending gravity wells and atmospheres. Future research may average "/dT. Hyperbolic triangles are expanded further below where Congruency Laws would still apply and likely yield greater distance estimates.

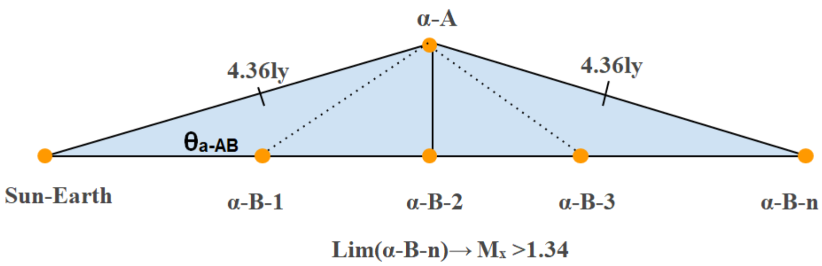


Figure 5. *Star Separation Angle Paradigm with Linear Sketch illustrating potential differences between Alpha Centauri A and B. Not drawn to scale.*

Star Magnitude Brightness Analysis				
	Centauri A	Centauri B	Difference	Ratio a/b
Apparent visual magnitude	0.01	1.34	1.33	99.25%
Absolute visual magnitude	4.36	5.69	1.33	23.37%
Visual luminosity: ___ x Sol	1.567	0.46	-1.107	240.65%
Color Index (B-V)	0.64	0.84	0.2	23.81%
Color Index (U-B)	0.23	0.64	0.41	64.06%
Color Index (R-I)	0.22	0.29	0.07	24.14%
Source	ESO	Lionel		

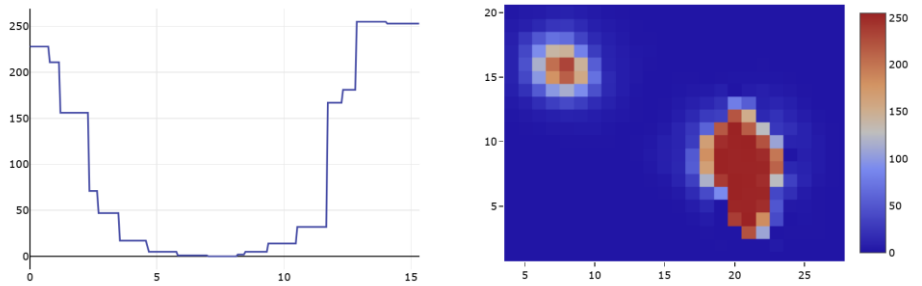
Figure 6. *α-AB Brightness Analysis with Apparent Magnitude for α-A ~.01 vs α-B ~1.34.*

Alpha Centauri was believed to have a combined apparent magnitude of -0.27, however, Toliman (B) has a visual magnitude of 1.33. If it were not part of A-Cen system, it would still be a first-magnitude star with +1.5. Some suggest A-Cen as two stars would be 10X as bright as Venus at Venus' peak. However, Venus remains one of brightest objects in sky with -4.4 to –4.6 apparent magnitude. Also, if α-AB were a binary this would have been visible during the day in Earth sky.

Moreover, A-cen is listed as V645 as Variable Star v4.2 that can brighten rapidly by <0.6 at visual wavelengths, and fade after only a few minutes. [6, 14] with outbursts measured using either optical or radio telescopes [7] Based on one observed flare, α-B appears to be more magnetically active than A-cen A, with a cycle of 8.2±0.2 yr compared to 11 years for the Sun, and half the min-to-peak variation in coronal luminosity of the Sun [8, 15].

AAVSO Variable Star Plotter logs Alpha Centauri (V0645) with 1deg FOV, -62,40 DEC, 113 label @ 11.3Mag, 14:30:55.49RA vs -62:41:27.5DEC from APASS (The AAVSO Photometric All-Sky Survey). Moreover, Hubble Space Telescope (HST) Fine Guidance Sensor 3 (FGS 3) measured Alpha Centauri (V0645) which can brighten rapidly by as much as 0.6 magnitude at visual wavelengths, then fade after only a few minutes. [7]

In this study, two observations from 2009 and 2007 with Skynet were analyzed with 10.1 x 10.1 arcmins FOV scale: 0.587193 arcsec/pix at Azimuth +149:59:18.708 and Elevation 19:30:54.084. Photometry in Afterglow was conducted to compute Flux of 1956+/-56 for A-Cen-A and 8457 +/-94 on average for A-cen-B, suggesting up to 332% heat photon flux difference. At 15.389 pixels, 9.036arcsec is observed between centres of the two stars.



Measurement	Value
Start	425.52, 536.88 +14:39:30.413, -60:50:8.32
End	438.665, 528.878 +14:39:31.422, -60:50:13.537
Length	15.389 pixels 9.036 arcsecs 0.1506 arcmins
Orientation	121.331 degrees CW of +Y 125.266 degrees E of N

Figure 7. *A-Cen Observations in SkyNet.*

3.1. Luminance ELA PCA Gradient Analysis

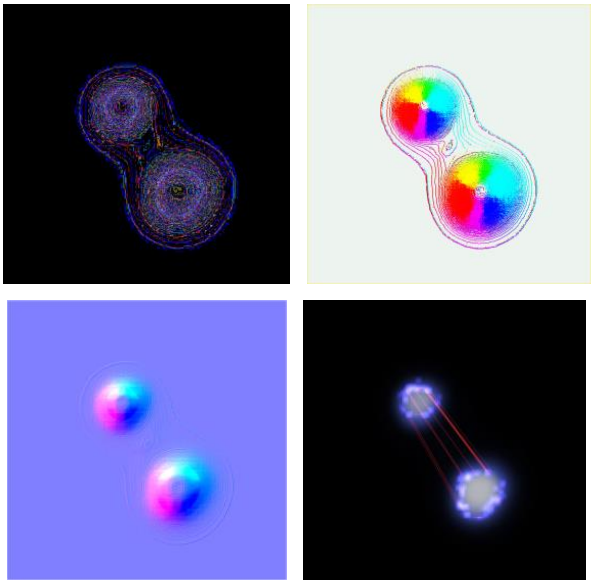


Figure 8. *X-ray & Optical Images of of A-Cen with α-Cen A (left) & α-Cen B (right). Error Level Analysis (ELA) with PCA Luminance Gradient. ELA Difference analyses the changes in brightness along the x and y, which displays anomalies.*

In ELA, Bright or Red Areas are higher error levels and are likely to be manipulated regions. Cloned areas show a different error level than original area. White means more change, and black indicates no change. Figure 4 is computed with min similarity of.12, min detail.62, block size of 4. Minimal Similarity is how similar the cloned pixels are to original. Min cluster Size is how many clones there are in similar regions. Regions that are similar are in blue and connected with a red line as outlined in Figure 6d above. If a lot of similar regions overlap, the result can look white.

3.2. Alpha Centauri Linear Angular Positions, Distance Estimates and Models

Ten years of HARPS data are enough to derive the complement of the visual orbit for a full 3D orbit of α Cen. A-Cen is a bit more massive than previously thought (1.13 and 0.97 M⊙ for A and B, respectively) [16]. The galactic coordinates of A. Centauri in the (X, Y, Z) system are approximately (3.165, -3.048, -0.0818) ly. The eq coordinates are Right Ascension (RA)= 14h 39m 36.5s, DEC = -60 °50' 02". Some previously proposed A-Cen A and B are separated by varying 11.2 and 35.6 AU.

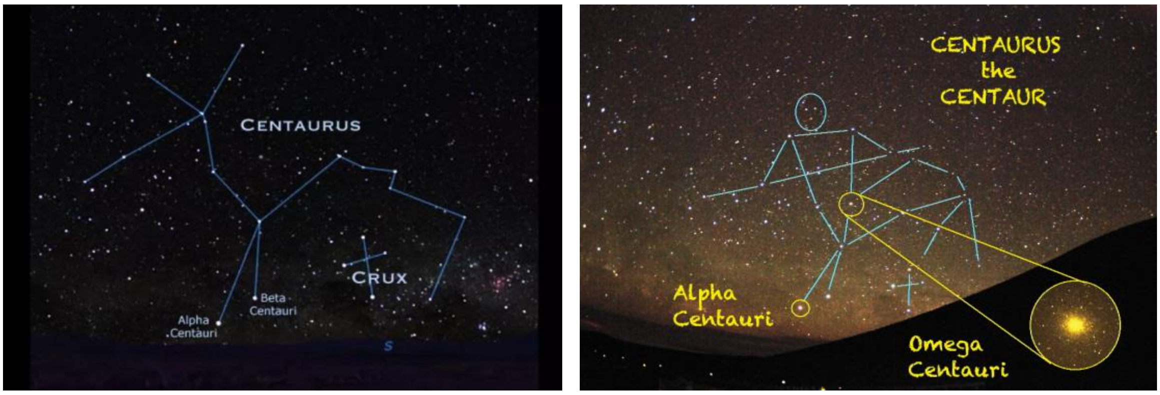
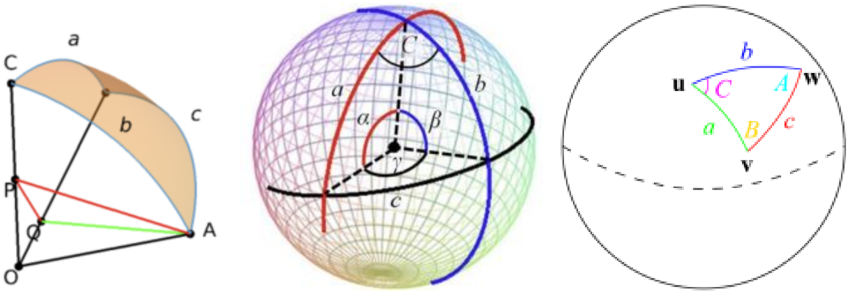


Figure 9. *Centaurus Constellation with α Cen 29°S latitude, α Cen is circumpolar and never sets below the horizon and is located around latitude 29 °N near equator.*

While some estimate 4.92”, s=r*theta would put Alpha A and B (5.49” to 9.36”) separation farther away, whereas, some previously proposed distance between AB-a and AB-b of 11.2 to 35.6AU. Others cite Proxima C lies 2.18deg to 2.1958deg SW of AB. Also, considering the average angular separation between stars in the night sky is 3. NonEuclidean expansion of space is further discussed.

3.3. Geometry, Triangle Cosines Laws, NonEuclidean Models

Modern angular separation and parallax estimations are based on eq assumes stars are at equal radial distances. To model non euclidean distances and light curves, spherical trigonometry and sin-cosine laws apply.



$$
\begin{aligned}
&(\text{R1}) \quad \cos c = \cos a \, \cos b, && (\text{R6}) \quad \tan b = \cos A \, \tan c,\\
&(\text{R2}) \quad \sin a = \sin A \, \sin c, && (\text{R7}) \quad \tan a = \cos B \, \tan c,\\
&(\text{R3}) \quad \sin b = \sin B \, \sin c, && (\text{R8}) \quad \cos A = \sin B \, \cos a,\\
&(\text{R4}) \quad \tan a = \tan A \, \sin b, && (\text{R9}) \quad \cos B = \sin A \, \cos b,\\
&(\text{R5}) \quad \tan b = \tan B \, \sin a, && (\text{R10}) \quad \cos c = \cot A \, \cot B.
\end{aligned}
$$

Figure 10. *Spherical Right Triangles and Spherical law of cosines.*

u, v, and w on the sphere (shown at right). If the lengths of these three sides are a (from u to v), b (from u to w), and c (from v to w), and angle of the corner opposite c is C, then 1st spherical law of cosines states:

$$\cos(c) = \cos(a)\cos(b) + \sin(a)\sin(b)\cos(C) \qquad (19)$$

Where angles are recorded in radians based on a unit sphere, where sinA/(sina) = sinB/sinb for spheres. For a non-unit sphere, lengths are subtended angles times radius where Eq 8 is still true, if a, b and c are reinterpreted as subtended angles. For hyperbolic geometry when the curvature is −1, the law of sines is:

$$\frac{\sin A}{\sinh a} = \frac{\sin B}{\sinh b} = \frac{\sin C}{\sinh c}$$

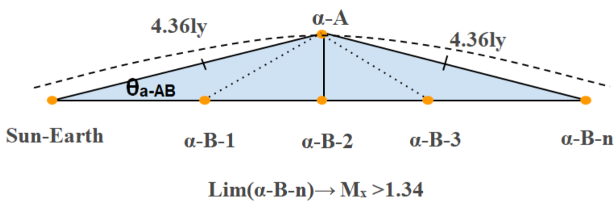


Figure 11. *Spherical right triangle, Distance Estimates & orbits in dashed lines.*

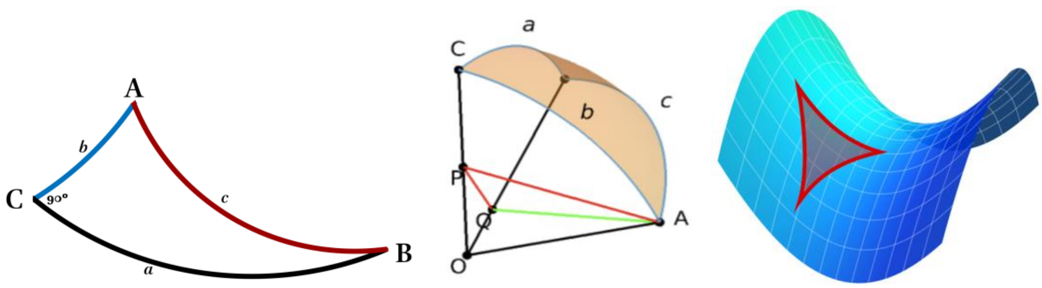


Figure 12. *Hyperbolic Triangle and Curved Geometry.*

If each point of spherical right triangle is Object or Star A, B, C, and O is Earth or from observer then the above equations and models can be used to derive angle-distance measurements. In modifying star points of Sphere triangle Fig a to b above would be transformation similar to Fig c. In hyperbolic geometry, sum of interior angles is <180 degrees (π radians).

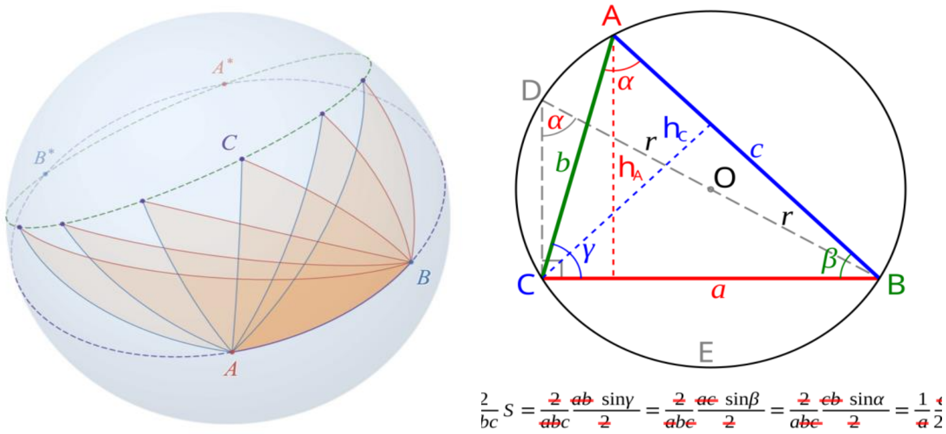


Figure 13. *Spherical Right Triangles.*

If points A, B, C are related to A-Cen or star of interest, the orbits the plane along C and AB are illustrated in dashed lines in Figure b and c) which also help to illustrate LOS variances. To model moving point coordinates, Lexells theorem from 1784 states triangles of constant area on a fixed base AB have their free vertex C along a small circle through the points antipodal to A and B. As illustrated in Figure 10, the locus of variable apex C is a small circle (dashed green) passing through the points antipodal to A and B.

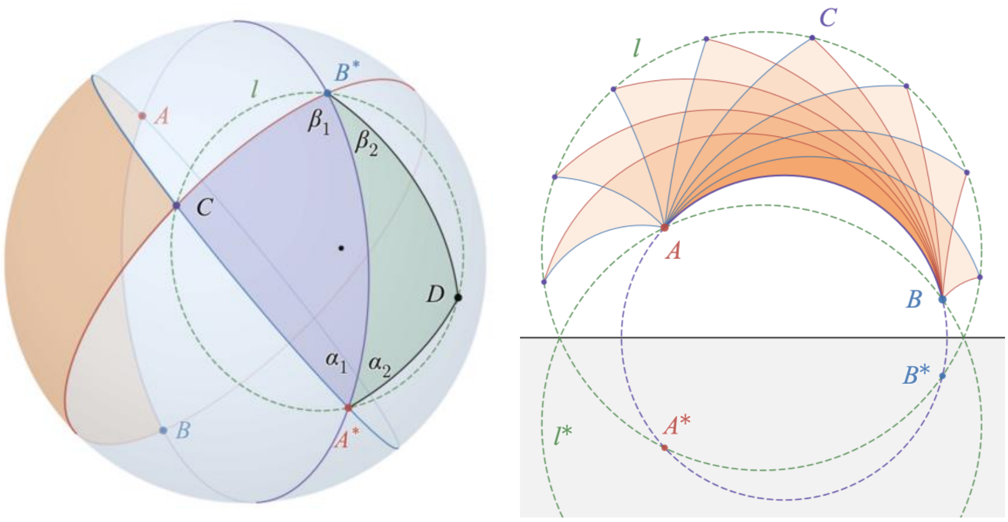


Figure 14. *a) Lexells Theorem b) Lexell-Steiner Proof, Steiner's proof inscribes quadrilateral ADBC inside Lexell's circle.*

In Figure c) above, In the half-plane model, antipodal points are reflections into the opposite half-plane (shaded gray). The locus of apex C is a hypercycle (dashed green) passing through points antipodal to A and B. With three sides, each of which is part of a great circle, two points on a sphere are antipodal if they are diametrically opposite, as far apart as possible. To accommodate closer orbits, antipodal transformation (or antipodal point) maps could model half plane shifted vertically and horizontally. [9]. Euler wrote more proofs follow up in 1778 followed by Steiner's Proof in 10d) and Gauss.

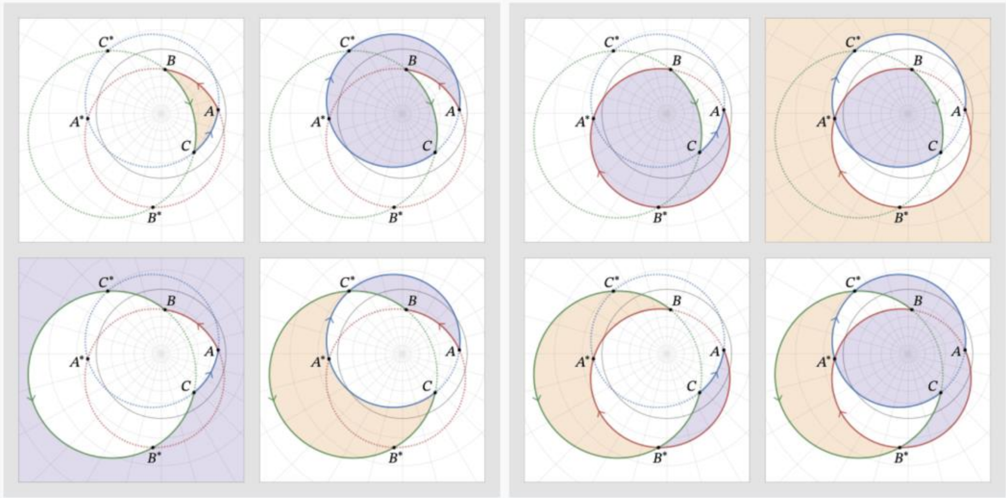


Figure 15. *Generalized Spherical Triangles for vertices A, B, C, shown in stereographic projection, with orange and purple shading representing areas of opposite signs from Lexell's Theorem Proof.*

In planar hyperbolic geometry, a hyperboloid of two sheets can be embedded in Minkowski space, which is a 4D dimension that includes time dimension, or nonEuclidean. The antipodal transformation represents a reflection (-x,y,z) across the yz-plane, negating x-coordinate and flips point across Y ans Z. Antipodal is a point reflection through the center of the hyperboloid or sphere, as a point on the opposite side [9].

4. Discussion

Alpha Centauri planetary habitability has been debated for centuries with lack of quantitative imaging data to confirm planetary transits and wobbles, where hypothetical intense stellar activity has been considered from belief of the binary nature. With data suggesting a single star system, the UV flux would be significantly less on planets and atmospheres in A-Cen & P-Cen star systems, which opens new discussions and opportunities for discovery and models in UV-flux, MHD, and RF Radio Transit models. While P. Centauri, however, is believed to have 3 confirmed planets, Proxima b, c, and d.

The magnetopause standoff distance is large enough to shield the surface from the stellar wind if Proxima b has a magnetic field similar to or greater than Earth's. This result, using PLUTO Code with 3D magneto-hydrodynamic (MHD) simulations to model planet Proxima b, gives rise to the expectation that giant planets in close-in orbits could be directly detected from Earth via radio waves. [10] Furthermore, Hazra et al 2022 simulated RF-based MHD models of the HD 189733 star–planet system to predict radio transit modulations. The data suggests that if radio transits could be observed, their synthetic radio images would enable the creation of synthetic radio light curves in different frequencies, which could then provide data about EM B-field strength of the transiting exoplanets through sensitive radio interferometers. [11] These distance estimates also do not factor in Solar Electromagnetic Lensing (SEL) and PEL how stars and plants charged particles and light around stars and planets toward Magnetic Reconnection (MR) regions or focal point in magnetotail, further outlined from [19]. If alternative spectral brightness fluxes from nearby stars are received outside of atmospheres, future spacecraft and systems at SEL and PEL points may help to support planetary Imaging, communications and transportation. [19]

A-Cen has been visited regularly by Chandra X-ray Observatory since late 2005 suggesting relatively smooth 8 yr coronal (T ~ 2 MK) activity cycle. [8] As a G2 star, A Cen A has UV Variability of 19% in 1715- to 1915-Å range, and A-Cen B has <5X more X-rays than A-Cen A. [8] Based on 3yrs of 57 obs of A Cen A solar analogue, International Ultraviolet Explorer suggested stellar activity cycle is similar to Sun, [12] Another study with VLT in Chile, with thermal chronograph found the signal around A-Cen A analyzed 100 hours of data. In 2021, astronomers spotted a potential exoplanet, Candidate 1 (C1), orbiting Alpha Centauri A based on 75–80% of the best quality images from 100 hrs, however, instrument artifacts hinder mid-IR data interpretation [13].

Future R&D should quantify and collect data on:

1) Star brightness A-Cen A,B,C vs Averages Brightness over Min/Max Solar Cycles
2) Compute Average Brightness to Distance Analysis and Harmonic Star Brightness Period Equation
3) Radio Transit MHD Observations & UV Flux Models of Planets around a Single Star A-Cen
4) Factor in non binaries to galactic latitude and longitude coordinates of Alpha Centauri and stars
5) Model orbits, and habitability, of two planets orbiting b-Toliman and planets (b & c) orbiting Proxima Centauri

5. Conclusions

This is a first study to propose that Alpha Centauri is not a binary star as data suggests a single star system based on data analysis, trigonometry, and image analysis. Based on 7.1” separation average, this suggests d_{stars} is 3.97E+12km or 26,582AU or 314+ Solar systems could fit in between A-Cen A and A-Cen B, excluding ISM gas shell distances. Apparent magnitude difference of 99% and visual luminosity difference of 240% between AC-a reference star and α-Cen-B, suggests a 2-3 fold difference in brightness between α-Cen-a and α-Cen-b and may suggest proportional distance up to 2-3X difference, where Toliman star system could be up to <8.73ly+ away. Moreover, PCA ELA Image data analysis is conducted on X-ray & Optical images conducted to compute images in Figure 1, identifying many common regions that are similar are marked in blue connected with a red line. Results may reveal new insights toward orbits, and habitability, of 2 planets orbiting b-Toliman and 2 planets (b & c) orbiting Proxima Centauri.

Abbreviations

A-Cen	Alpha Centauri
BC	Bolometric Correction
DEC	Declination
ELA	Error Level Analysis
LOS	Line of Site
MR	Magnetic Reconnection
MHD	Magnetohydrodynamics
PCA	Principle Component Analysis
SEL	Solar Electromagnetic Lensing
UV	Ultraviolet

Acknowledgments

Author K. Lutz thanks friends, family and MPU University for helping sustain research. The authors confirm this material or similar material has not been published in any other publication.

Author Contributions

Kolemann Lutz is the sole author. The author read and approved the final manuscript.

Funding

This work is not supported by any external funding. There are no conflicts of interest to report and no competing financial interests exist.

Data Availability Statement

The data supporting the outcome of this research work has been reported in this manuscript. The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The author declares no conflicts of interest.

References

[1] Van Zyl, Johannes Ebenhaezer (1996). Unveiling the Universe: An introduction to astronomy. Springer. ISBN 978-3-540-76023-8.

[2] Hartung, E. J.; Frew, David; Malin, David (1994). *Astronomical Objects for Southern Telescopes*. Cambridge University Press.

[3] Schmitt & Liefke 2004, NEXXUS: A comprehensive ROSAT survey of coronal X-ray emission among nearby solar-like stars, A&A, 417 2 (2004) 651-665, https://doi.org/10.1051/0004-6361:20030495

[4] Kervella, Pierre & Thévenin, F. & Lovis, Christophe. (2016). Proxima's orbit around Alpha Centauri. Astronomy & Astrophysics. 598. https://doi.org/10.1051/0004-6361/201629930.

[5] Izidor Hafner (2017), Spherical Right Triangles, Wolfram Demonstrations, https://demonstrations.wolfram.com/SphericalRightTriangles/

[6] Benedict, G. et al. (1998). Proxima Centauri: Time-resolved astrometry of a flare site using HST fine guidance sensor 3. The Tenth Cambridge Workshop on Cool Stars, Stellar Systems and the Sun. ASP Conference Series. Vol. 154. p. 1212.

[7] Page, A. A. (1982). "Mount Tamborine Observatory". International Amateur-Professional Photoelectric Photometry Communication. 10: 26. https://ui.adsabs.harvard.edu/abs/1982IAPPP..10...26P

[8] Ayres, T R., 2014. "The Ups and Downs of α Centauri". The Astronomical Journal. 147 (3): 12. arXiv:1401.0847,

[9] Johnson, N. W. (1981). Absolute Polarities and Central Inversions. In: Davis, C., Grünbaum, B., Sherk, F. A. (eds) The Geometric Vein. Springer, New York, NY. https://doi.org/10.1007/978-1-4612-5648-9_28

[10] Pena-Monino, Luis et al. 2023, Magnetohydrodynamic simulations of the space weather in Proxima b: Habitability conditions and radio emission.” Astronomy & Astrophysics (2024): https://doi.org/10.1051/0004-6361/202349042

[11] Hazra et al 2022, Exoplanet Radio Transits as a Probe for Exoplanetary Magnetic Fields—Time-dependent MHD Simulations, The Astrophysical Journal, Volume 936, Number 2, https://doi.org/10.48550/arXiv.2208.06006

[12] Sofia, et al (1989), Ultraviolet variability of the solar analogue star Alpha Centauri A, J. Geophys. Res., 94(A7), 9117–9124, https://doi.org/10.1029/JA094iA07p09117

[13] Wagner, K., et al. 2021, Imaging low-mass planets within the habitable zone of α Centauri. Nat Commun 12, 922 (2021). https://doi.org/10.1038/s41467-021-21176-6

[14] Benedict, G. F., "Interferometric Astrometry of Proxima Centauri and Barnard's Star Using HUBBLE SPACE TELESCOPE Fine Guidance Sensor 3: Detection Limits for Substellar Companions", The Astronomical Journal, vol. 118, no. 2, IOP, pp. 1086–1100, 1999.

[15] Ayres, T. R., 2018 "Alpha Centauri Beyond the Crossroads", Research Notes of the American Astronomical Society, vol. 2, no. 1, Art. no. 17, IOP, 2018. https://doi.org/10.3847/2515-5172/aaa88f.doi.org

[16] Pourbaix, D. et al 2016, "Parallax and masses of α Centauri revisited", Astronomy and Astrophysics, vol. 586, Art. no. A90, 2016. https://doi.org/10.1051/0004-6361/201527859

[17] Robert Matthews, Gerard Gilmore, Is Proxima really in orbit about α Cen A/B?, Monthly Notices of the Royal Astronomical Society, Volume 261, Issue 1, March 1993, PagesL5–L7, https://doi.org/10.1093/mnras/261.1.L5

[18] Lutz, K. (2025). Sunlight Photons Made of Electrons from Stars. International Journal of Astrophysics and Space Science, 13(1), 11-20. https://doi.org/10.11648/j.ijass.20251301.12

[19] Lutz, K, Planetary and Solar Electromagnetic Lensing (SEL) for Exoplanet Imaging, Comms, and Space Transportation, AIAA ASCEND 2024, Las Vegas, NV. http://dx.doi.org/10.2514/6.2024-4925

Biography

Kolemann Lutz is a researcher with 7+ years in R&D, physics, materials, space, astrophysics, and math. He has published 25+ research publications to advance physics, biology, engineering, & life on Earth, in space, and beyond. He is the Cofounder and Faculty of Multiplanet University. In co-founding MPU in 2020, Kolemann has lead team of 20+ staff, faculty and researchers. He is an alumni from ISU in Space Systems Engineering in 2020, studying physics and math at UVA, and graduated with a Bachelors of Science from University of Mary Washington (UMW) in 2017. He was also recently awarded Top 100 Men in Aerospace in 2022 and is a Lead Scientist and PI with proposed NASA Projects and Missions.

Research Field

Kolemann Lutz: Space Physics & Sciences; Astrophysics, Heliophysics; Applied Mathematics, Aerospace Systems; Engineering & Systems