

Graveney Astrophysics Course 2010

Stellar Parallax and Distances

Proxima Centauri is the closest star to the Sun. It was discovered in 1916 and its distance was measured in 1917 by a Dutch astronomer J. Voute, based in South Africa. He measured the parallax as 0.755 arcseconds. The error in his measurement was quoted as ± 0.028 arcseconds.

Use the original article published by the Royal Society to help you answer the following questions

http://www.physicsteachers.com/A2_stellar_parallax.html

Questions:

1. Given the parallax is quoted as 0.755 arcseconds, what is this angle in degrees?
2. Why do you think it took until 1917 to discover the distance of this star from the Sun?
3. What is the definition of the astronomical unit or AU? State the value of 1 AU in m.
4. How is the parsec defined and what is its value in AU, light years and m?
5. Given the parallax of Proxima Centauri is 0.755 arcseconds find its distance from the Sun in parsec?
6. Given the error in the parallax quoted in the article what is the error in distance from the Sun measured in AU?
7. More recent data on the measurements of parallax have put the value for Proxima Centauri at 0.7723 arcseconds. Find the current distance of the star from the Sun.
8. The first successful use of parallax to determine the distance of a star by parallax was in 1838 when Bessel measured the parallax of 61 Cygni as 0.3136 arcseconds. Previously Tycho Brahe in the sixteenth century rejected the heliocentric view of the universe put forward by Copernicus because he failed to discover any stellar parallax. Why do you think it took so long to discover the parallax of stars?
9. What are the limits on the use of stellar parallax in determining the distance of stars?