

## The unit of distance — the parsec (pc)

Stellar distances are huge. The parsec is the distance from which the radius of the orbit of the Earth subtends an angle of one second of arc.

1 pc = distance of a star the parallax of which is one second of arc

"parsec": combination of "parallax" and "one second of arc"

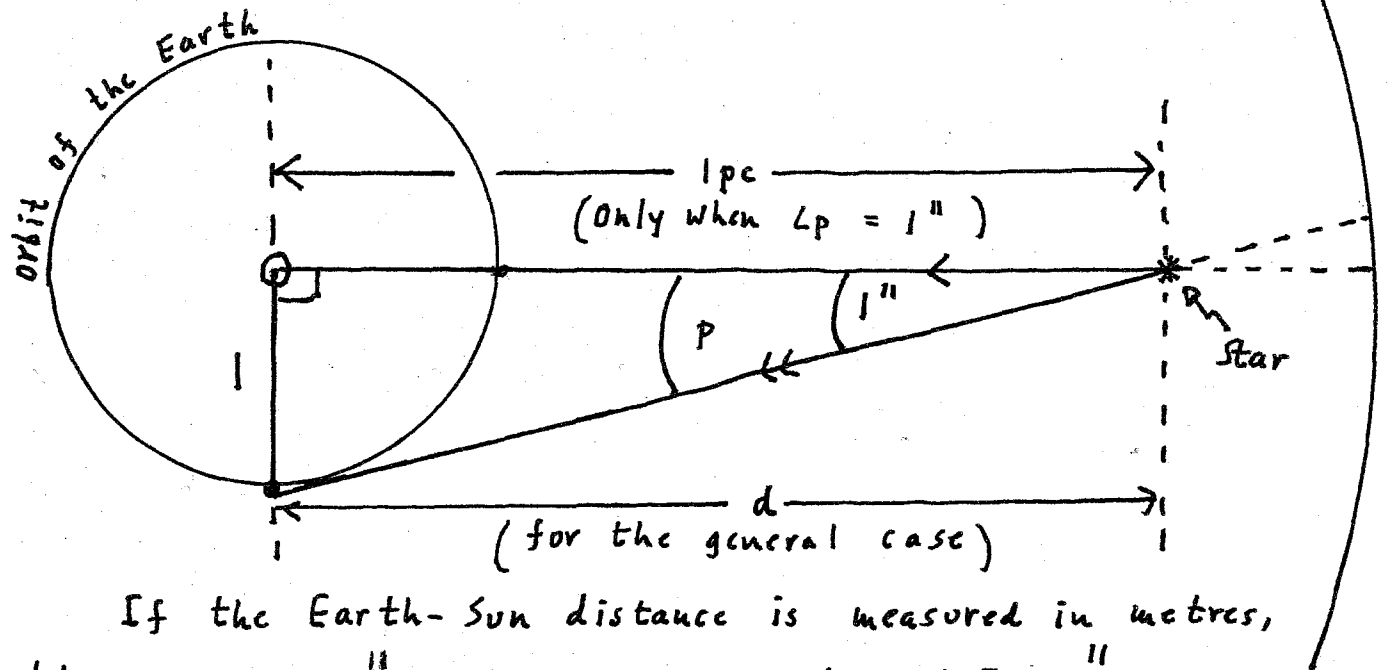
If the Earth-Sun distance is represented by 1 (A.U.), then,

$$\frac{1}{d} = \tan p$$

$$\therefore \boxed{d = \frac{1}{\tan p}}$$

d will be in Astronomical Units

Compare one parsec with one light-year



If the Earth-Sun distance is measured in metres, then,

$$\frac{1.5 \times 10^{11} \text{ m}}{d} = \tan p \quad \therefore d = \frac{1.5 \times 10^{11} \text{ m}}{\tan p}$$

Now, from the definition of the parsec,  $\angle p = 1''$

$$\begin{aligned} \text{and } d &= \frac{1.5 \times 10^{11} \text{ m}}{\tan 1''} \\ &= \frac{1.5 \times 10^{11} \text{ m}}{4.8 \times 10^{-6}} \end{aligned}$$

$$\therefore \underline{d_{1pc} = 3.1 \times 10^{16} \text{ m}}$$

Clearly, if  $\angle p = 0.5'' (0.5'')$  then,  $d = 2 \text{ pc}$ ; if  $\angle p = 0.1''$  then  $d = 10 \text{ pc}$ , and so on.

D.F.

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