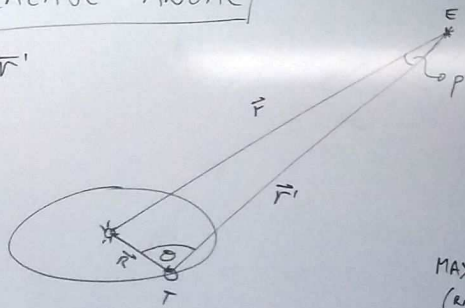


PARALAJE ANUAL

1838 G1 del cisne

$$F = \vec{R} + \vec{r}'$$



$$\frac{\sin p}{R} = \frac{\sin \theta}{r}$$

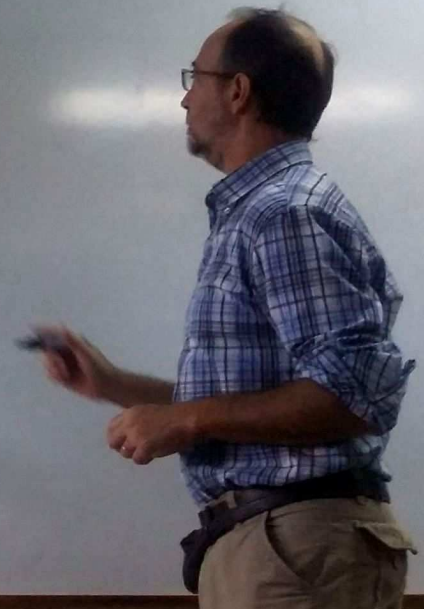
$$\Rightarrow \sin p = \frac{R}{r} \cdot \sin \theta$$

$$p \text{ (rads)} = \frac{R}{r} \cdot \sin \theta$$

$$\text{MAX } p \text{ (rads)} = \pi = \frac{R}{r} \cdot \sin 90^\circ$$

PAR-SEC

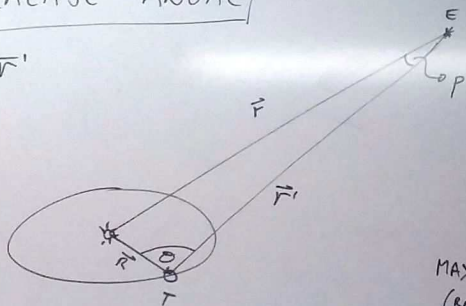
$$\pi = 1'' = \frac{1}{206265}$$



PARALAJE ANUAL

1838 G1 del CISE

$$F = \vec{R} + \vec{V}'$$



$$\frac{\sin p}{R} = \frac{\sin \theta}{r}$$

$$\Rightarrow \sin p = \frac{R}{r} \cdot \sin \theta$$

$$p \text{ (RAD)} = \frac{R}{r} \cdot \sin \theta$$

$$\text{MAX } p \text{ (RAD)} = \pi = \frac{R}{r} \cdot \sin 90^\circ$$

PAR-SEC

$$\pi = 1'' = \frac{1}{206265} \text{ RAD} = \frac{R}{r} = \frac{1 \text{ ua}}{r} \Rightarrow r = 206265 \text{ ua} = 1 \text{ PC}$$

1AL =

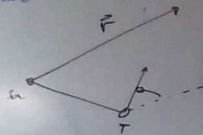
1PC

AL

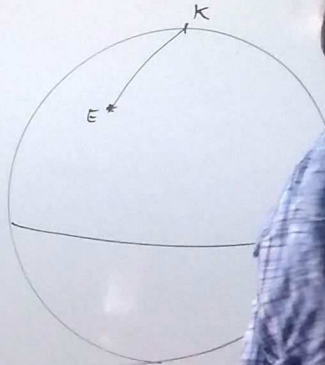
PARALAJE ANUAL

1838

G1 del círculo



$$p(\text{rads}) = \frac{R}{r} \cdot \sin \theta$$



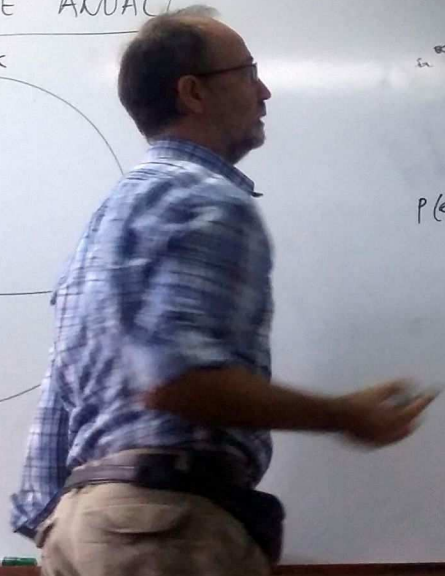
PAR-SEC

$$\pi = 1'' = \frac{1}{206265} = \frac{R}{r} = \frac{1 \mu a}{r} \Rightarrow r = 206265 \mu a = 1 \text{ PC}$$

$1 \mu a = 150 \times 10^6 \text{ km}$

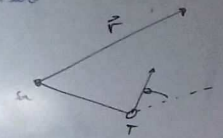
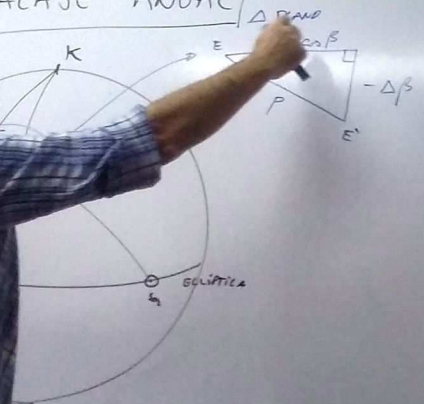
$$1 \text{ PC} = 3,26 \text{ AL}$$

$$1 \text{ AL} = 300.000 \frac{\text{km}}{\text{seg}} \times 60 \times 60 \times 24 \times 365,25$$



PARALAJE ANUAL

1838 G1 de CIGUIS



$$p(\text{rads}) = \frac{R}{r} \cdot \text{un } \theta$$

PAR-SEC

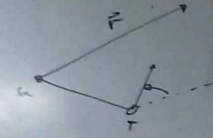
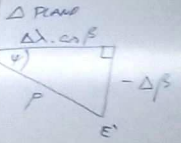
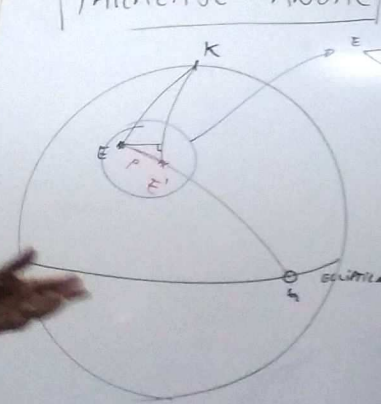
$$\pi = 1'' = \frac{1}{206265} \text{ rads} = \frac{R}{r} = \frac{1 \text{ ua}}{r} \Rightarrow r = 206265 \text{ ua} = 1 \text{ pc}$$

$$1 \text{ pc} = 3,26 \text{ AL}$$

$$1 \text{ AL} = 300.000 \frac{\text{km}}{\text{seg}} \times 60 \cdot 60 \cdot 24 \cdot 365,25$$

PARALAJE ANUAL

1838 GI de CIGUIS



$P(\text{rads}) = \frac{R}{r} \cdot \sin \theta$

$\Rightarrow \Delta \lambda \cdot \cos \beta = P \sin \phi$

$-\Delta \beta = P \sin \phi$

$\Rightarrow \begin{cases} \Delta \lambda \cdot \cos \beta = \frac{R}{r} \cdot \sin \theta \sin \phi \\ -\Delta \beta = \frac{R}{r} \cdot \sin \theta \sin \phi \end{cases}$

PAR-SEC

$\pi = 1'' = \frac{1}{206265} \text{ RADS}$

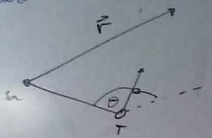
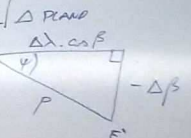
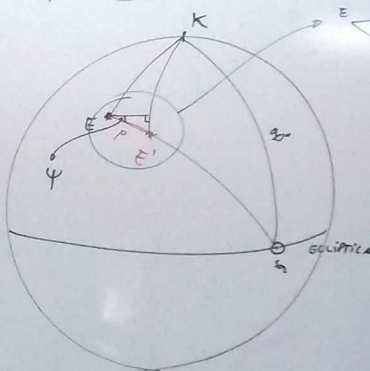
$\frac{R}{r} = \frac{1 \mu a}{r} \Rightarrow r = 206265 \mu a = 1 \text{ Pc}$

$1 \text{ Pc} = 3,26 \text{ AL}$

$1 \text{ AL} = 300.000 \frac{\text{Km}}{\text{Set}} \cdot 60 \cdot 60 \cdot 24 \cdot 365,25$

PARALAJE ANUAL

1838 G1 de CISNE

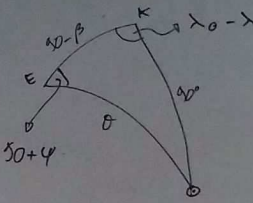


$$p(\text{eas}) = \frac{R}{r} \cdot \sin \theta$$

$$\Rightarrow \Delta \lambda \cdot \cos \beta = p \cdot \cos \psi$$

$$-\Delta \beta = p \cdot \sin \psi$$

$$\Rightarrow \begin{cases} \Delta \lambda \cdot \cos \beta = \frac{R}{r} \cdot \sin \theta \cdot \cos \psi \\ -\Delta \beta = \frac{R}{r} \cdot \sin \theta \cdot \sin \psi \end{cases}$$

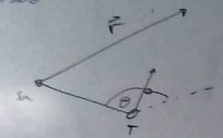
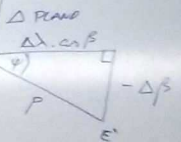
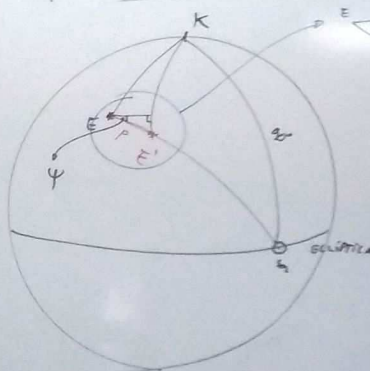


$$\frac{\sin(\lambda_0 - \lambda)}{\sin \theta} = \sin(90 - \beta)$$



PARALAJE ANUAL

1838 GI de CIGUE

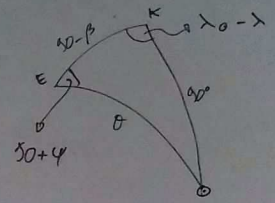


$$p(\text{eads}) = \frac{R}{r} \cdot \sin \theta$$

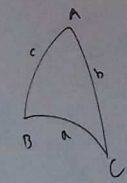
$$\Rightarrow \Delta \lambda \cdot \cos \beta = p \cos \psi$$

$$-\Delta \beta = p \cdot \sin \psi$$

$$\Rightarrow \begin{cases} \Delta \lambda \cdot \cos \beta = \frac{R}{r} \cdot \sin \theta \cdot \cos \psi & (1) \\ -\Delta \beta = \frac{R}{r} \cdot \sin \theta \cdot \sin \psi \end{cases}$$



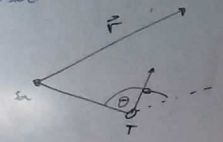
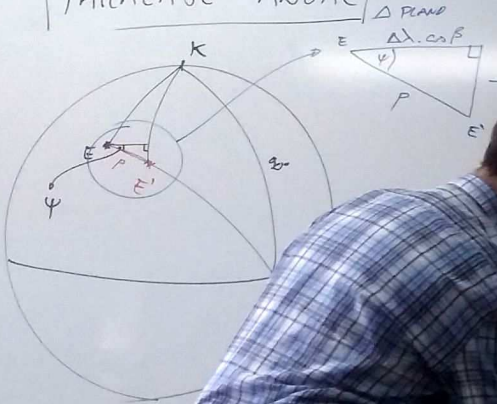
$$\frac{\sin(\lambda_0 - \lambda)}{\sin \theta} = \frac{\sin \psi}{\sin \theta} \Rightarrow \sin(\lambda_0 - \lambda) = \sin \theta \cdot \sin \psi \quad (1)$$



$$\sin a \cos B = \cos b \sin c - \sin b \cos c \cos A$$

PARALAJE ANUAL

1838 G1 de CIGUE

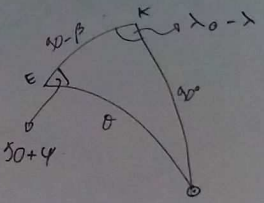


$$P(\text{rad}) = \frac{R}{r} \cdot \sin \theta$$

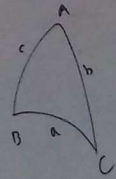
$$\sin \psi$$

$$\frac{R}{r} \cdot \sin \theta \cdot \sin \psi \quad (1)$$

$$\frac{R}{r} \cdot \sin \theta \cdot \cos \psi$$



$$\frac{\sin(\lambda_0 - \lambda)}{\sin \theta} = \frac{\sin(90 + \psi)}{\sin 90} \Rightarrow \sin(\lambda_0 - \lambda) = \sin \theta \cdot \cos \psi \quad (1)$$



$$\sin a \cos B = \cos b \sin c - \sin b \cos c \cos A$$

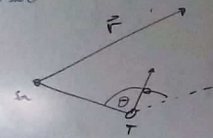
$$\sin \theta \cdot \cos(90 + \psi) = 0 - 1 \cdot \cos(90 - \beta) \cdot \cos(\lambda_0 - \lambda)$$

$$\sin \theta \cdot (-\sin \psi) = -\sin \beta \cdot \cos(\lambda_0 - \lambda)$$

$$\sin \theta \sin \psi = \sin \beta \cdot \cos(\lambda_0 - \lambda) \quad (2)$$

PARALAJE ANUAL

1838 G1 del círculo



$$\Delta\lambda \cdot \cos\beta = \pi \cdot \sin(\lambda_0 - \lambda)$$

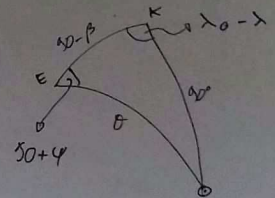
$$\Delta\beta = -\pi \cdot \sin\beta \cdot \cos(\lambda_0 - \lambda)$$

λ_0 (*)

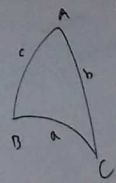
$$\Rightarrow \Delta\lambda \cdot \cos\beta = p \cdot \cos\psi \quad p(\text{en AU}) = \frac{R}{r} \cdot \sin\theta$$

$$-\Delta\beta = p \cdot \sin\psi$$

$$\Rightarrow \begin{cases} \Delta\lambda \cdot \cos\beta = \frac{R}{r} \cdot \sin\theta \cdot \cos\psi & (1) \\ -\Delta\beta = \frac{R}{r} \cdot \sin\theta \cdot \sin\psi & (2) \end{cases}$$



F. ANALOGA



$$\sin a \cos B = \cos b \sin c - \sin b \cos c \cos A$$

$$\sin\theta \cdot \cos(90+\psi) = 0 - 1 \cdot \cos(90-\beta) \cdot \cos(\lambda_0 - \lambda)$$

$$\sin\theta \cdot (-\sin\psi) = -\sin\beta \cdot \cos(\lambda_0 - \lambda)$$

$$\sin\theta \sin\psi = \sin\beta \cdot \cos(\lambda_0 - \lambda) \quad (2)$$

F. SENO

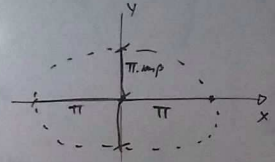
$$\frac{\sin(\lambda_0 - \lambda)}{\sin\theta} = \frac{\sin(90+\psi)}{\sin 90} \Rightarrow \sin(\lambda_0 - \lambda) = \sin\theta \cdot \cos\psi \quad (1)$$

PARALAJE ANUAL

1838 G1 del CIGUE

ELIPSE PARALÁCTICA

$$\frac{x^2}{\pi^2} + \frac{y^2}{\pi^2 \mu \beta} = 1$$

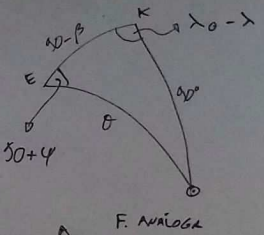


ESTRELLA con $\beta = \pm 90$

$$\Delta \lambda \cdot \cos \beta = \pi \cdot \mu$$

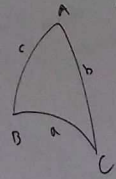
$$y \cdot \Delta \beta = -\pi \cdot \mu \beta$$

$\lambda_0(\star)$



F. SENO

$$\frac{\sin(\lambda_0 - \lambda)}{\sin \theta} = \frac{\sin(90 + \psi)}{\sin 90} \Rightarrow \sin(\lambda_0 - \lambda) = \sin \theta \cdot \cos \psi \quad (1)$$



$$\sin a \cos B = \cos b \sin c - \sin b \cos c \cos A$$

$$\sin \theta \cdot \cos(90 + \psi) = 0 - 1 \cdot \cos(90 - \beta) \cdot \cos(\lambda_0 - \lambda)$$

$$\sin \theta \cdot (-\sin \psi) = -\sin \beta \cdot \cos(\lambda_0 - \lambda)$$

$$\sin \theta \sin \psi = \sin \beta \cdot \cos(\lambda_0 - \lambda) \quad (2)$$

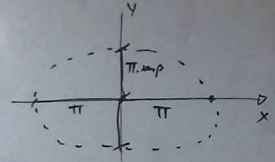
PARALAJE ANUAL

1838 G1 de CIGUE

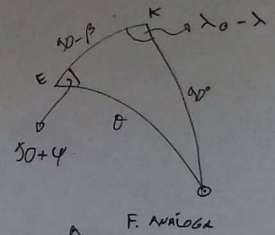
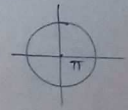
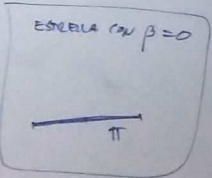
ELIPSE PARALÁCTICA

$$\left. \begin{aligned} \Delta \lambda \cdot \cos \beta &= \pi \cdot \sin(\lambda_0 - \lambda) \\ \Delta \delta &= -\pi \cdot \sin \beta \cdot \cos(\lambda_0 - \lambda) \end{aligned} \right\} (*)$$

$$\frac{x^2}{\pi^2 l^2} + \frac{y^2}{\pi^2 m \beta} = 1$$

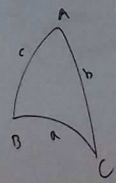


ESTRELLA con $\beta = \pm 90$



F. SEMO

$$\frac{\sin(\lambda_0 - \lambda)}{\sin \theta} = \frac{\sin(90 + \phi)}{\sin 90} \Rightarrow \sin(\lambda_0 - \lambda) = \sin \theta \cdot \cos \phi \quad (1)$$



sen A sen B = sen b sen c - sen b sen c cos A

$$\sin \theta \cdot \cos(90 + \phi) = 0 - 1 \cdot \cos(90 - \beta) \cdot \cos(\lambda_0 - \lambda)$$

$$\sin \theta \cdot (-\sin \phi) = -\sin \beta \cdot \cos(\lambda_0 - \lambda)$$

$$\sin \theta \sin \phi = \sin \beta \cdot \cos(\lambda_0 - \lambda) \quad (2)$$

PARALAJE ANUAL

1838

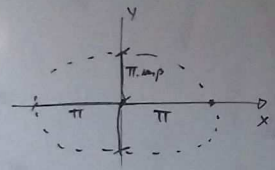
$$\Delta \lambda \cdot \cos \beta = \pi \cdot \sin(\lambda_0 - \lambda)$$

$$\Delta \beta = -\pi \cdot \sin \beta \cdot \cos(\lambda_0 - \lambda)$$

$$\frac{x^2}{\pi^2} +$$

λ_0 (*)

PARALÁCTICA

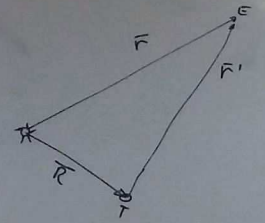


para $\beta = \pm 90$



FORMULACIÓN VECTORIAL

$$\vec{r} = \vec{r} + \vec{r}'$$



PARALAJE ANUAL

1838 G1 de CIGUE

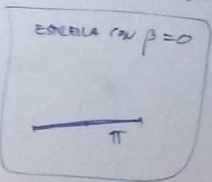
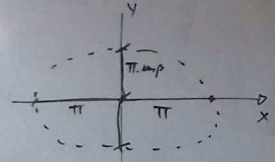
ELIPSE PARALÁCTICA

$$\Delta \lambda \cdot \cos \beta = \pi \cdot \sin(\lambda_0 - \lambda)$$

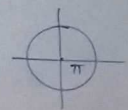
$$y \Delta \beta = -\pi \cdot \sin \beta \cdot \cos(\lambda_0 - \lambda)$$

$\lambda_0(*)$

$$\frac{x^2}{\pi^2 L^2} + \frac{y^2}{\pi^2 m \beta} = 1$$

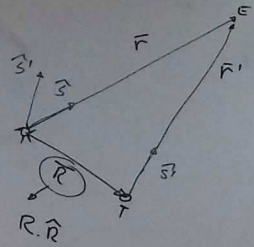


ESTRELLA con $\beta = \pm 90$



FORMULACIÓN VECTORIAL

$$\vec{r} = \vec{R} + \vec{r}'$$



$$r' \cdot \hat{s}' = r \cdot \hat{s} - R \cdot \hat{r}$$

$$r' \cdot \hat{s} \hat{s}' = r \cdot \hat{s} \hat{s}' - R \cdot \hat{s} \hat{r}$$

$$r' \cdot \hat{s} \hat{s}' = -R \cdot \hat{s} \hat{r}$$

$\vec{d}s =$



PARALAJE ANUAL

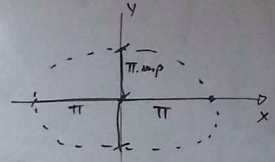
1838 G1 del CIGUE

ELIPSE PARALÁCTICA

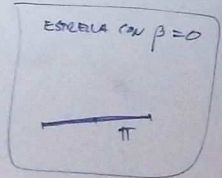
$$\Delta \lambda \cos \beta = \pi \sin(\lambda_0 - \lambda)$$

$$\Delta \beta = -\pi \sin \beta \cos(\lambda_0 - \lambda)$$

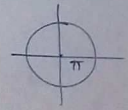
$$\frac{x^2}{\pi^2} + \frac{y^2}{\pi^2 \sin^2 \beta} = 1$$



$\lambda_0 (*)$



ESTRELLA CON $\beta = \pm 90$

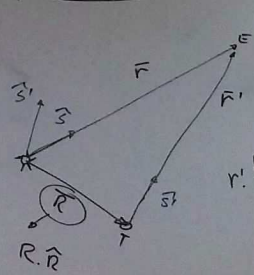


FORMULACIÓN VECTORIAL

$\vec{ds} = \vec{s}' - \vec{s}$

$\vec{r} = \vec{R} + \vec{r}'$

$r' \hat{s}' = r \hat{s} - R \hat{r}$



$r' \hat{s} \hat{s}' = r \hat{s} \hat{s} - R \hat{s} \hat{r}$

$r' \hat{s} \wedge \hat{s}' = -R \hat{s} \wedge (\hat{s} \wedge \hat{r})$

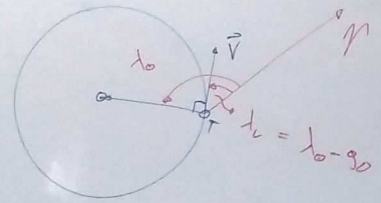
$r' [(\hat{s} \cdot \hat{s}') \hat{s} - (\hat{s} \cdot \hat{s}) \hat{s}'] = -R [(\hat{s} \cdot \hat{r}) \hat{s} - (\hat{s} \cdot \hat{s}) \hat{r}]$

$r' (\hat{s} - \hat{s}') = -R ((\hat{s} \cdot \hat{r}) \hat{s} - \hat{r})$

$\vec{ds} = \left(\frac{R}{r'} \right) [(\hat{s} \cdot \hat{r}) \hat{s} - \hat{r}]$

ABERRACIÓN ANUAL

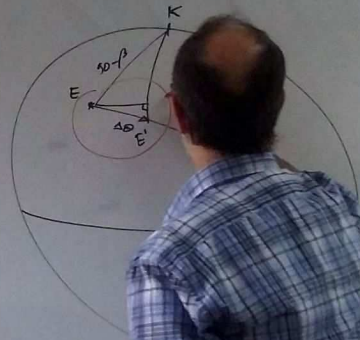
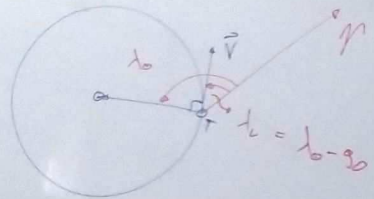
$$\Delta\theta = \frac{v}{c} \cdot \sin\theta$$



ABERRACIÓN ANUAL

$$\Delta\theta = \frac{v}{c} \cdot \sin\theta$$

30 K/K



$$\lambda = \lambda_0 - \beta$$

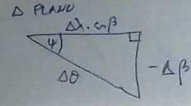
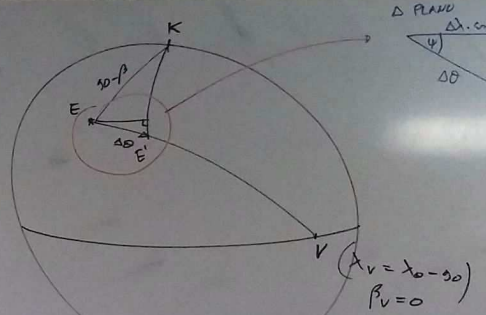
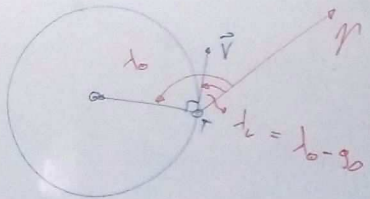
$$\beta_v = 0$$



ABERRACIÓN ANUAL

$$\Delta\theta = \frac{V}{c} \sin\theta$$

30 km/s



$$\Delta\lambda \cdot \cos\beta = \Delta\theta \cdot \cos\psi$$

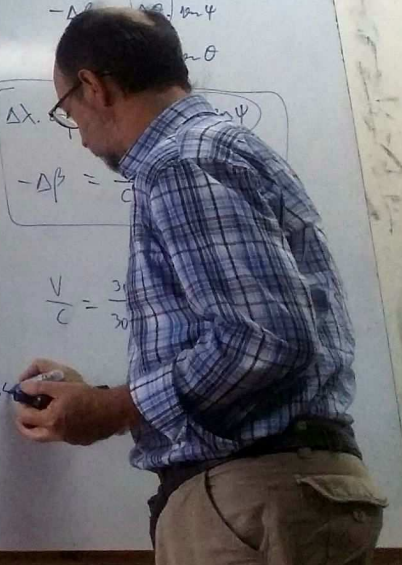
$$-\Delta\beta = \Delta\theta \cdot \sin\psi$$

$$\Delta\lambda \cdot \sin\psi = \frac{V}{c} \sin\psi$$

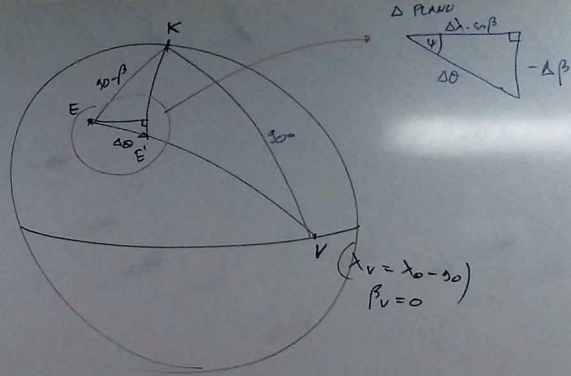
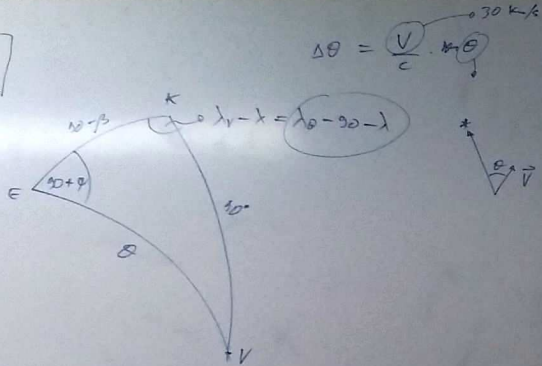
$$-\Delta\beta = \frac{V}{c} \cos\psi$$

$$\frac{V}{c} = \frac{30}{300000000}$$

$$1 \text{ rad} = 206264$$



ABERRACIÓN ANUAL



$$\Delta\lambda \cdot \cos\beta = \Delta\theta \cdot \cos\psi$$

$$-\Delta\beta = \frac{\Delta\theta \cdot \sin\psi}{\frac{V}{c} \cdot \sin\theta}$$

$$\Rightarrow \Delta\lambda \cdot \cos\beta = \frac{V}{c} \cdot \sin\theta \cdot \cos\psi$$

$$-\Delta\beta = \frac{V}{c} \cdot \sin\theta \cdot \sin\psi$$

$$\frac{V}{c} = \frac{30}{300.000} = 1 \times 10^{-4} \text{ RAD}$$

$$1 \text{ RAD} = 206265''$$

$$10^{-4} \text{ RAD} = 20.6''$$

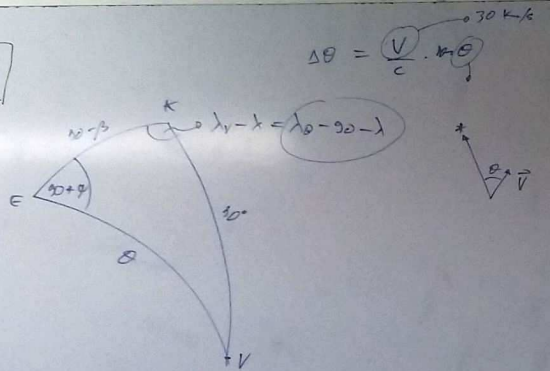
$$20.4'' = K$$

cte de aberración

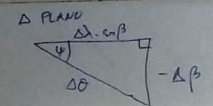
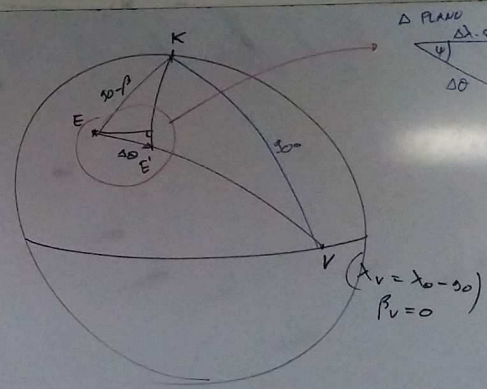
ABERRACIÓN ANUAL

$$\Rightarrow \begin{cases} \Delta\lambda \cdot \cos\beta = -K \cdot \cos(\lambda_0 - \lambda) \\ \Delta\beta = -K \cdot \sin\beta \cdot \sin(\lambda_0 - \lambda) \end{cases}$$

$$\frac{x^2}{K^2} + \dots$$



$$\Delta\theta = \frac{V}{c} \cdot \sin\theta$$



$$\begin{aligned} \Delta\lambda \cdot \cos\beta &= \Delta\theta \cdot \cos\psi \\ -\Delta\beta &= \Delta\theta \cdot \sin\psi \\ &= \frac{V}{c} \cdot \sin\theta \end{aligned}$$

$$\Rightarrow \begin{cases} \Delta\lambda \cdot \cos\beta = \frac{V}{c} \cdot \sin\theta \cdot \cos\psi \\ -\Delta\beta = \frac{V}{c} \cdot \sin\theta \cdot \sin\psi \end{cases}$$

$$\frac{V}{c} = \frac{30}{300000} = 1 \cdot 10^{-4} \text{ RAD}$$

$$\begin{aligned} 1 \text{ RAD} &= 206265'' \\ 10^{-4} \text{ RAD} &= 20.6'' \end{aligned}$$

$$20.4'' = K \text{ CTE ABERRACIÓN}$$

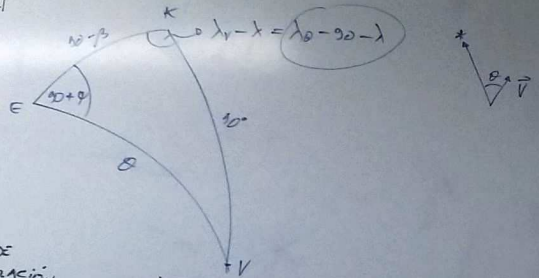
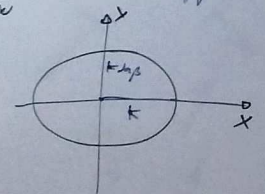
ABERRACIÓN ANUAL

$$\Delta\theta = \frac{v}{c} \cdot \sin\theta$$

$$\begin{aligned} \Rightarrow \Delta\lambda \cdot \cos\beta &= -K \cdot \cos(\lambda_0 - \lambda) \\ \Delta\beta &= -K \cdot \sin\beta \cdot \sin(\lambda_0 - \lambda) \end{aligned}$$

$$\frac{x^2}{K^2} + \frac{y^2}{K^2 \sin^2\beta} = 1$$

ELIPSE DE ABERRACIÓN



$$\begin{aligned} \Delta\lambda \cdot \cos\beta &= \Delta\theta \cdot \cos\psi \\ -\Delta\beta &= \Delta\theta \cdot \sin\psi \\ &= \frac{v}{c} \cdot \sin\theta \end{aligned}$$

$$\begin{aligned} \Rightarrow \Delta\lambda \cdot \cos\beta &= \frac{v}{c} \cdot \sin\theta \cdot \cos\psi \\ -\Delta\beta &= \frac{v}{c} \cdot \sin\theta \cdot \sin\psi \end{aligned}$$

$$\frac{v}{c} = \frac{30}{300.000} = 1 \cdot 10^{-4} \text{ RAD}$$

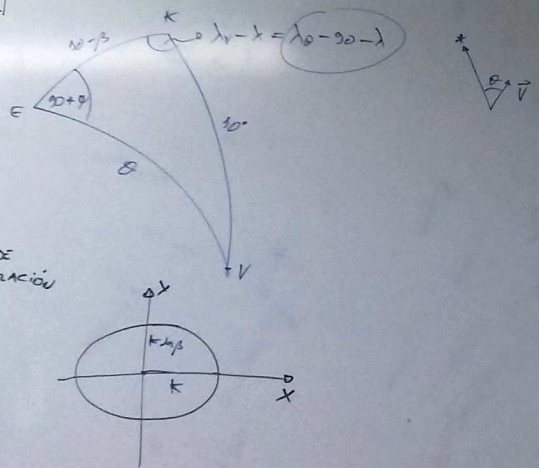
$$\begin{aligned} 1 \text{ RAD} &= 206265'' \\ 10^{-4} \text{ RAD} &= 20.6'' \end{aligned}$$

$$20.4'' = K \text{ CTE DE ABERRACIÓN}$$

ABERRACIÓN ANUAL

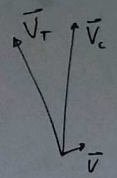
$$\Delta\theta = \frac{V}{c} \cdot \sin\theta$$

$$\begin{aligned} \Rightarrow \Delta\lambda \cdot \cos\beta &= -K \cdot \cos(\lambda_0 - \lambda) \\ \Delta\beta &= -K \cdot \sin\beta \cdot \sin(\lambda_0 - \lambda) \end{aligned}$$



$$\frac{X^2}{K^2} + \frac{Y^2}{K^2 \sin^2\beta} = 1$$

ELIPSE DE ABERRACIÓN



$$\begin{aligned} \Delta\lambda \cdot \cos\beta &= \Delta\theta \cdot \cos\psi \\ -\Delta\beta &= \Delta\theta \cdot \sin\psi \\ &= \frac{V}{c} \cdot \sin\theta \end{aligned}$$

$$\begin{aligned} \Rightarrow \Delta\lambda \cdot \cos\beta &= \frac{V}{c} \cdot \sin\theta \cdot \cos\psi \\ -\Delta\beta &= \frac{V}{c} \cdot \sin\theta \cdot \sin\psi \end{aligned}$$

$$\frac{V}{c} = \frac{30}{300000} = 1 \cdot 10^{-4} \text{ RAD}$$

$$\begin{aligned} 1 \text{ RAD} &= 206265'' \\ 10^{-4} \text{ RAD} &= 20.6'' \end{aligned}$$

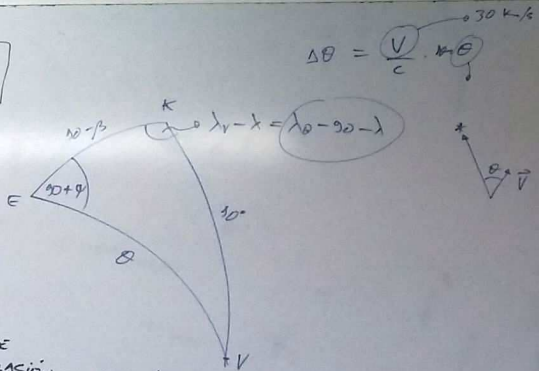
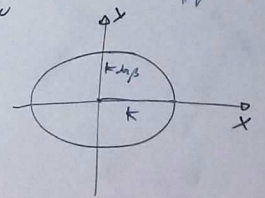
$$20.4'' = K \text{ CTE DE ABERRACIÓN}$$

ABERRACIÓN ANUAL

$$\Rightarrow \begin{cases} \Delta\lambda \cdot \cos\beta = -K \cdot \cos(\lambda_0 - \lambda) \\ \Delta\beta = -K \cdot \sin\beta \cdot \sin(\lambda_0 - \lambda) \end{cases}$$

$$\frac{x^2}{K^2} + \frac{y^2}{K^2 \sin^2\beta} = 1$$

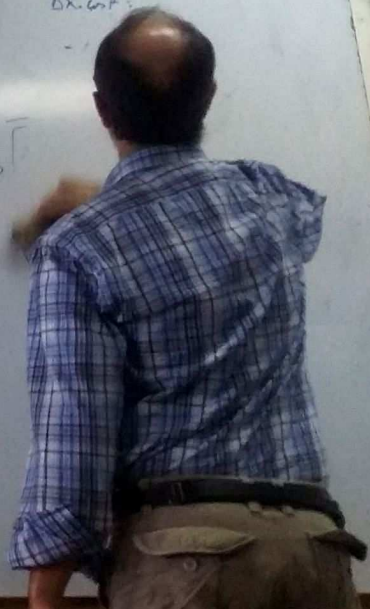
ELIPSE DE ABERRACIÓN



$$\Delta\theta = \frac{V}{c} \cdot \sin\theta$$

$\Delta\lambda \cdot \cos\beta$

\Rightarrow



ABERRACIÓN ANUAL

$$\Delta\theta = \frac{v}{c} \cdot \sin\theta$$

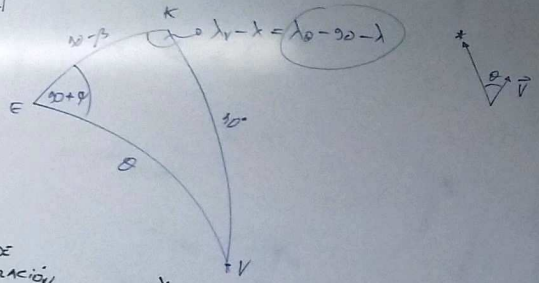
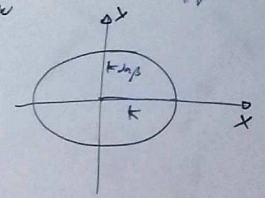
30 km/s

$$\Delta\lambda \cdot \cos\beta = -K \cdot \cos(\lambda_0 - \lambda)$$

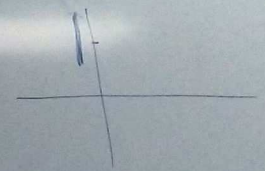
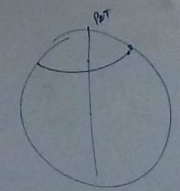
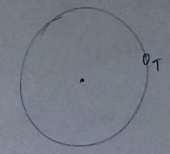
$$\Delta\beta = -K \cdot \sin\beta \cdot \sin(\lambda_0 - \lambda)$$

$$\frac{x^2}{K^2} + \frac{y^2}{K^2 \sin^2\beta} = 1$$

ELIPSE DE ABERRACIÓN



$$y = \frac{p}{r} (\sin\delta \sin\phi' \cos H - \cos\delta \sin\phi')$$

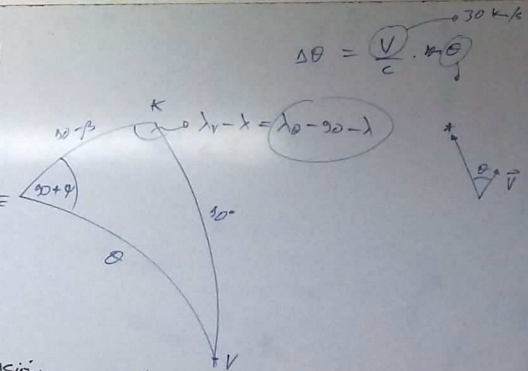
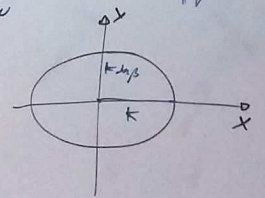


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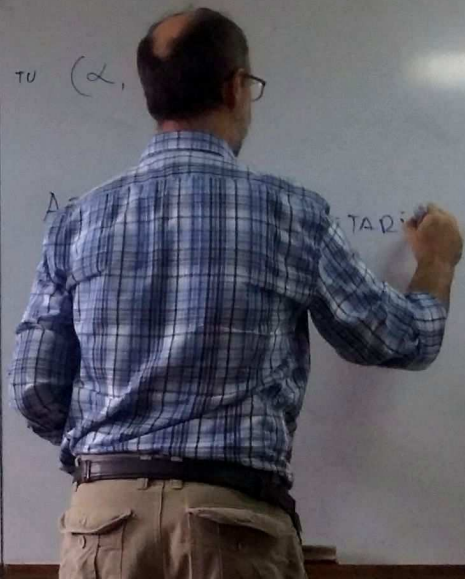
$$\Rightarrow \begin{cases} \Delta\lambda \cdot \cos\beta = -K \cdot \cos(\lambda_0 - \lambda) \\ \Delta\beta = -K \cdot \sin\beta \cdot \sin(\lambda_0 - \lambda) \end{cases}$$

$$\frac{x^2}{K^2} + \frac{y^2}{K^2 \sin^2\beta} = 1$$

ELIPSE DE ABERRACIÓN



$$\Delta\theta = \frac{V}{c} \cdot \sin\beta$$

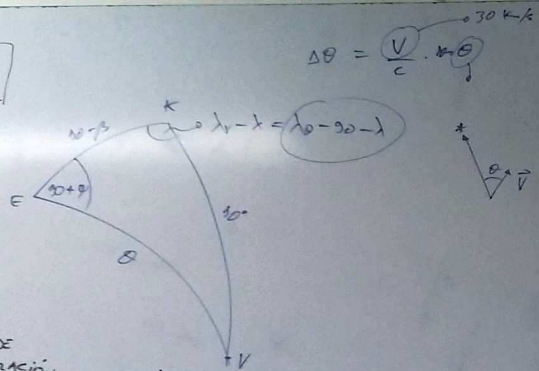
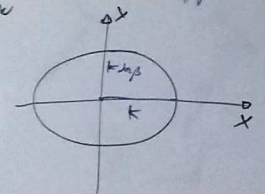


ABERRACIÓN ANUAL

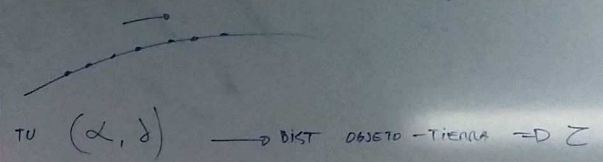
$$\Rightarrow \begin{cases} \Delta \lambda \cdot \cos \beta = -K \cdot \cos(\lambda_0 - \lambda) \\ \Delta \beta = -K \cdot \sin \beta \cdot \sin(\lambda_0 - \lambda) \end{cases}$$

$$\frac{x^2}{K^2} + \frac{y^2}{K^2 \sin^2 \beta} = 1$$

ELIPSE DE ABERRACIÓN



$$\Delta \theta = \frac{V}{c} \cdot \sin \theta$$



ABERRACIÓN PLANETARIA = CORRECCIÓN POR TIEMPO-LUZ

$$\begin{aligned} \alpha_{obs} &= \alpha - z \cdot \frac{d\alpha}{dt} \\ \delta_{obs} &= \delta - z \cdot \frac{d\delta}{dt} \end{aligned}$$