

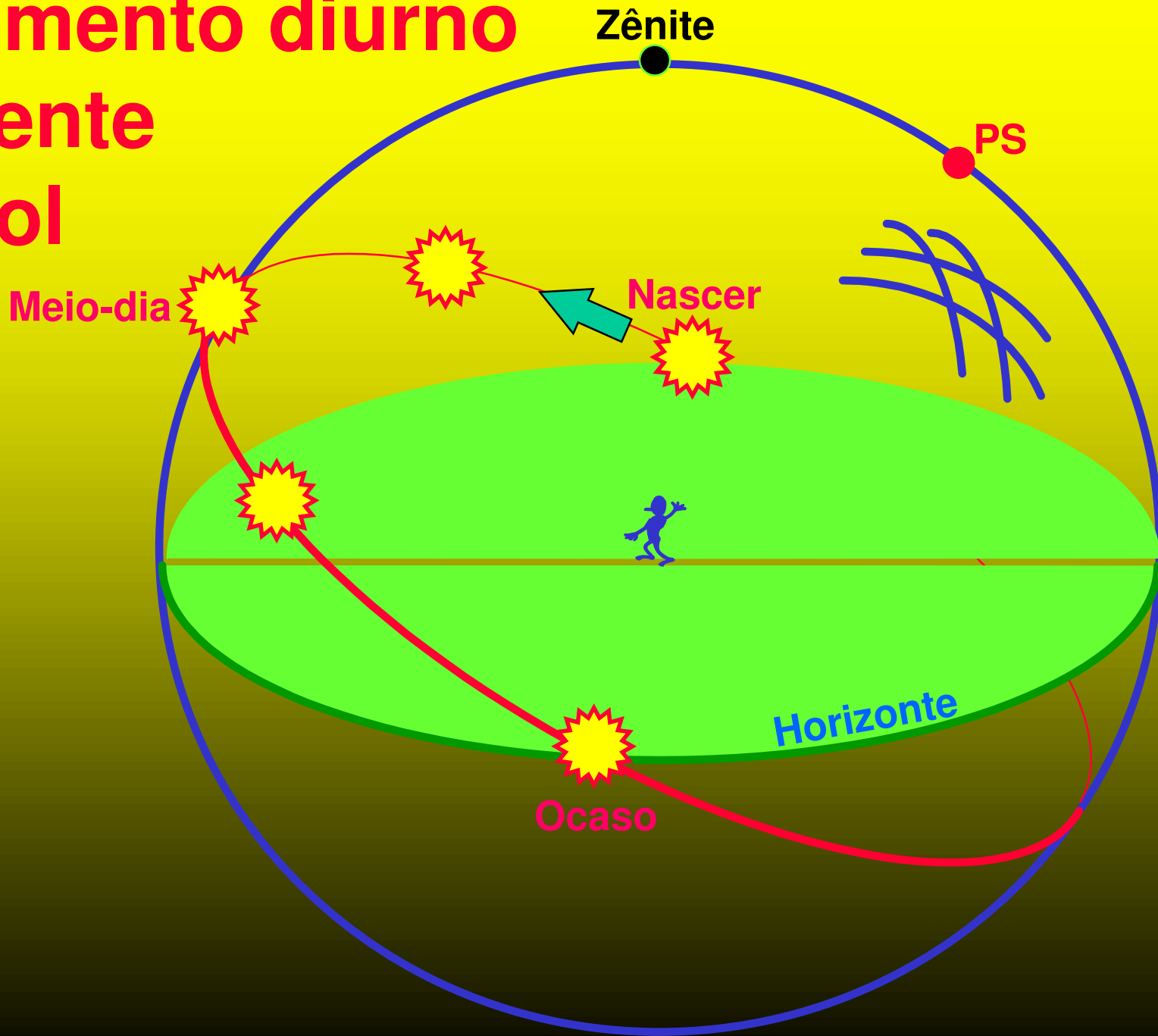
Sistemas de Coordenadas em Astronomia

R. Boczko

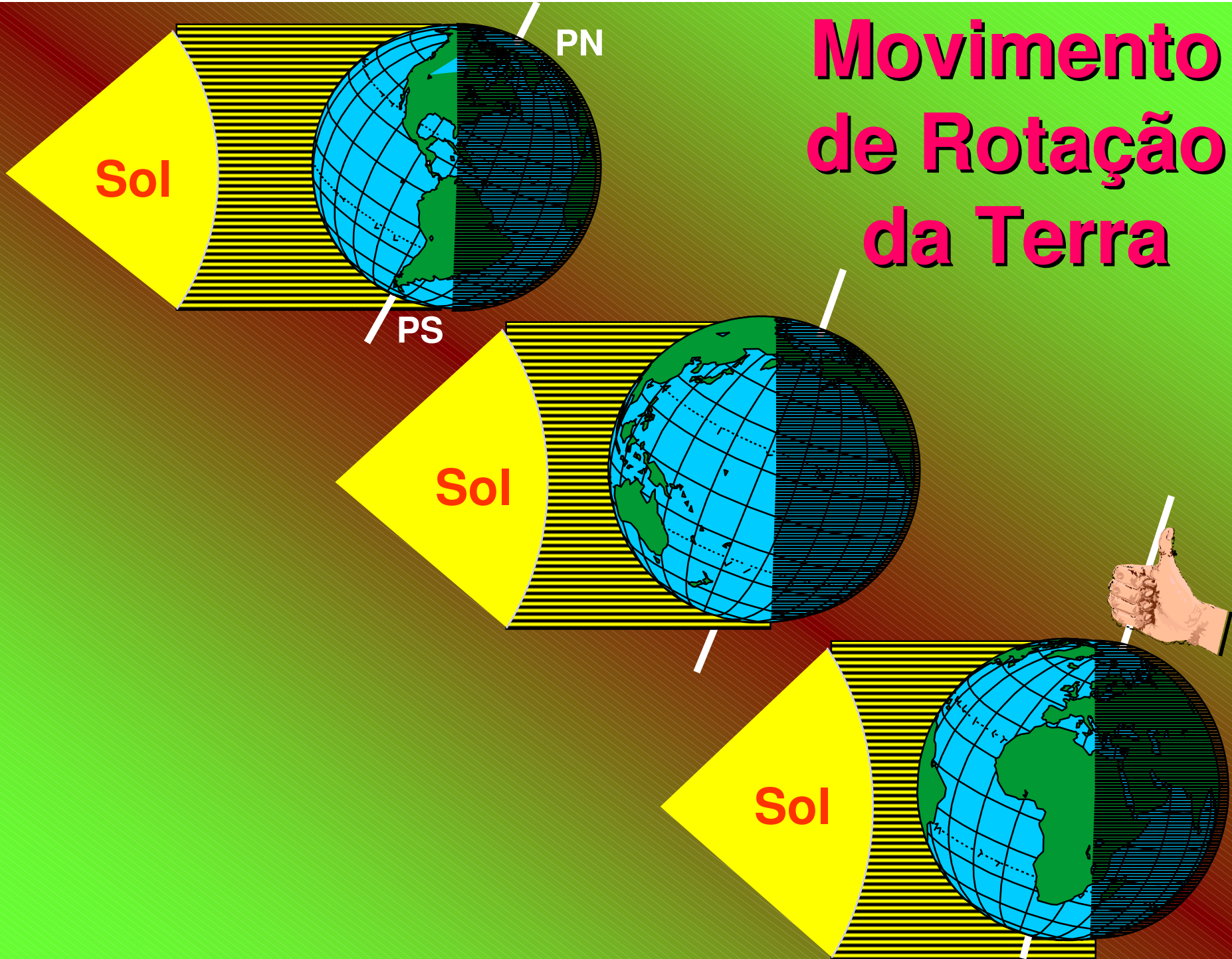
IAG - USP

Dia

Movimento diurno aparente do Sol

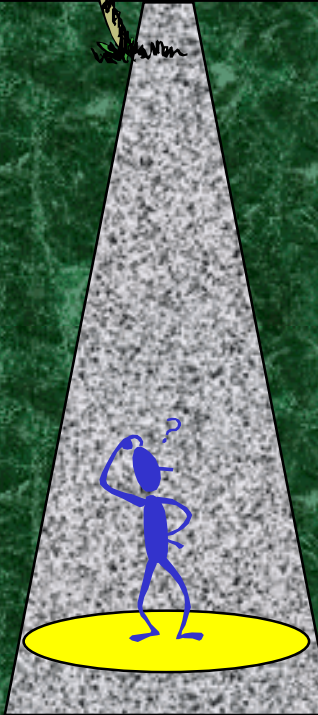


Movimento de Rotação da Terra



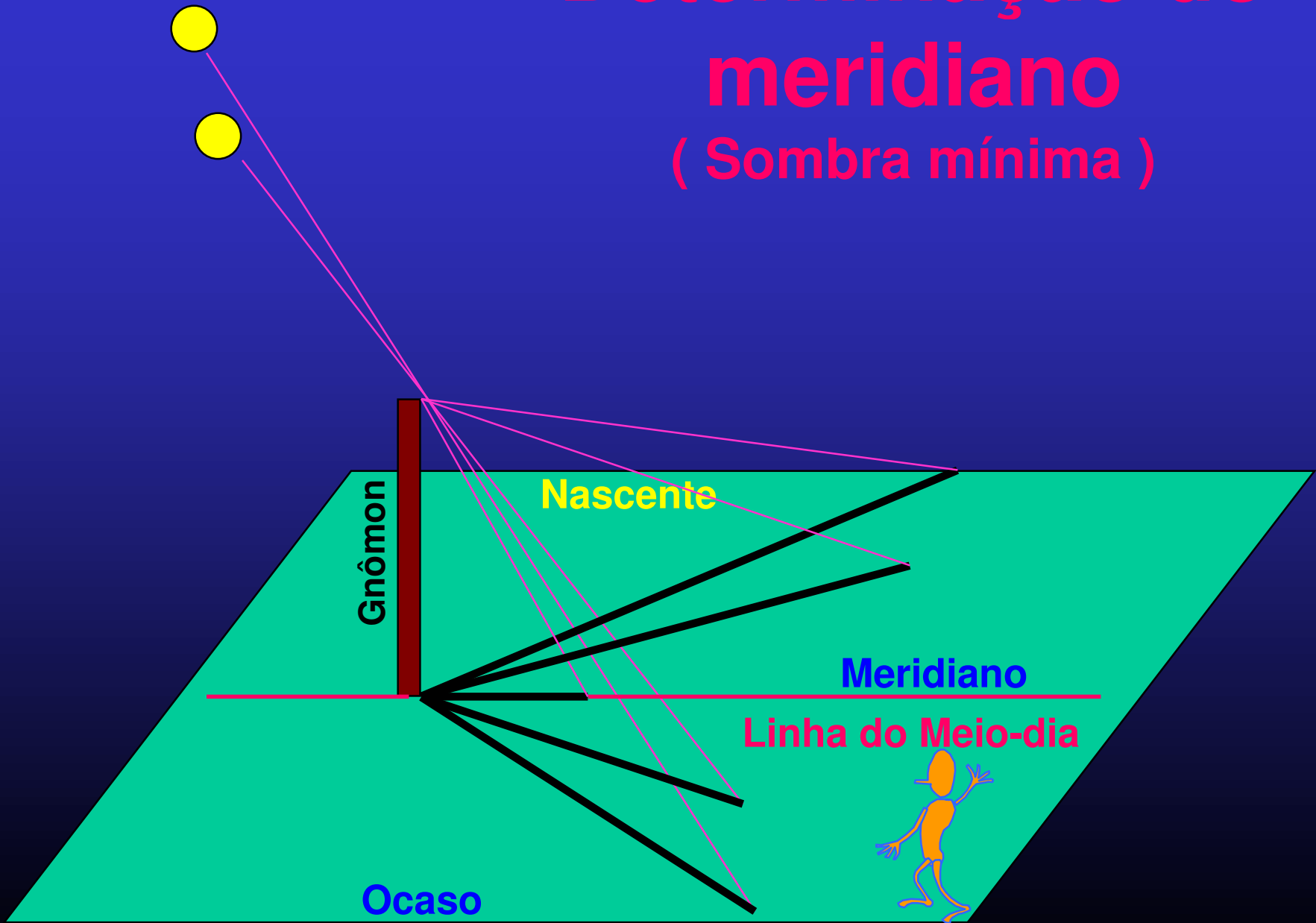
Pontos Cardeais

Nascer do Sol

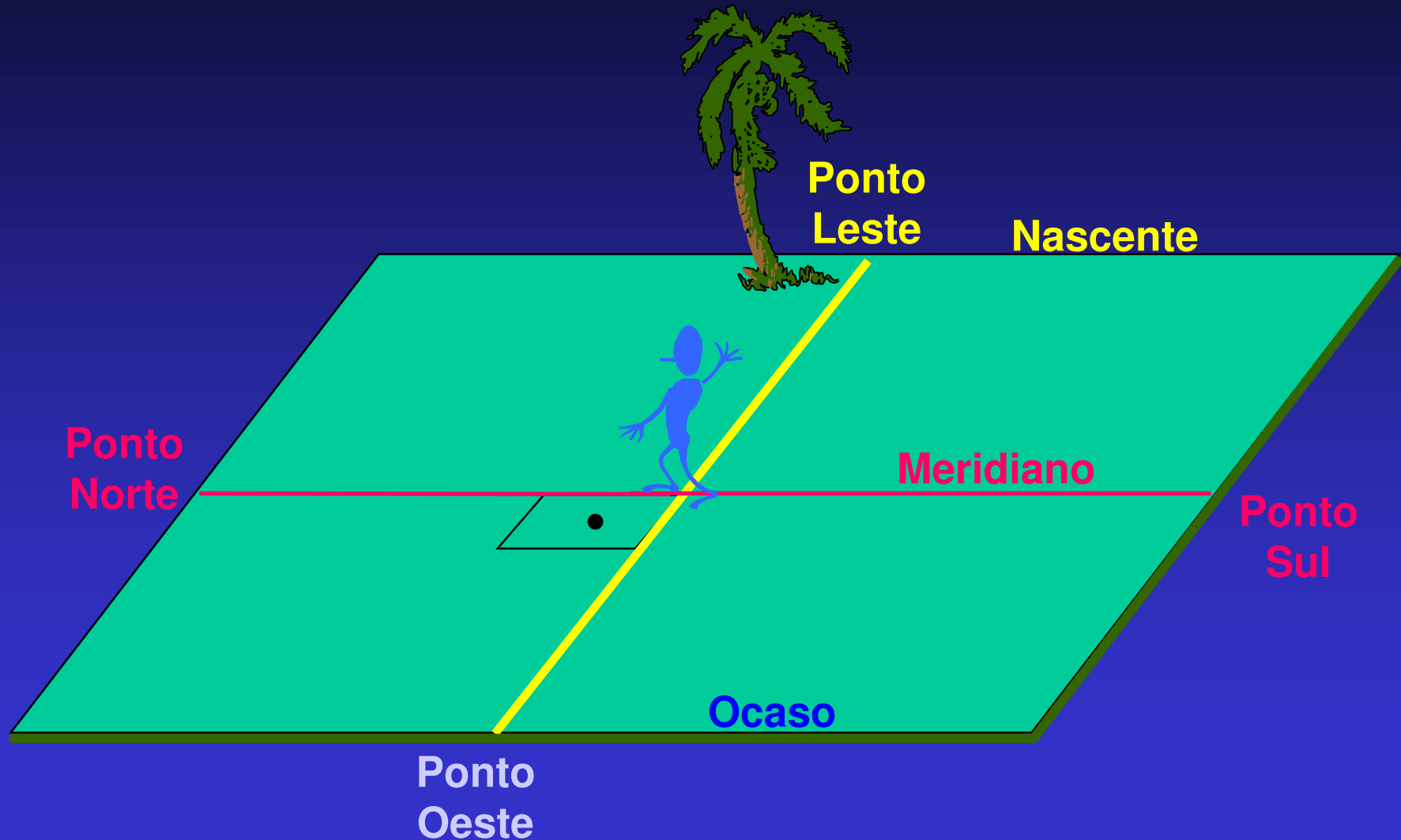


Leste
é o ponto onde
o Sol nasce.
(?!?)

Determinação do meridiano (Sombra mínima)

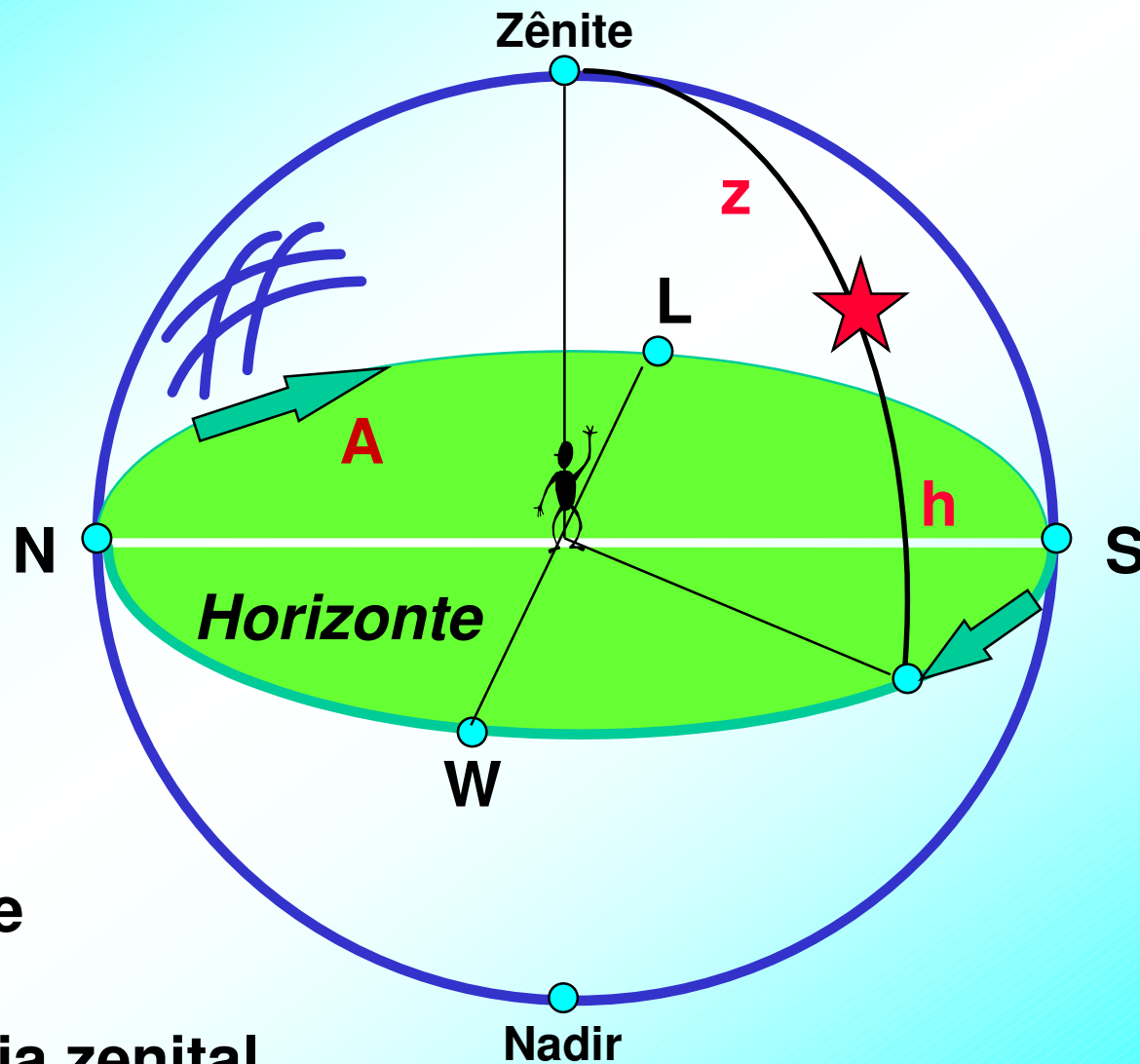


Pontos ou Direções Cardeais



Sistema Altazimutal

Coordenadas Altazimutais



A = azimuth

h = altura

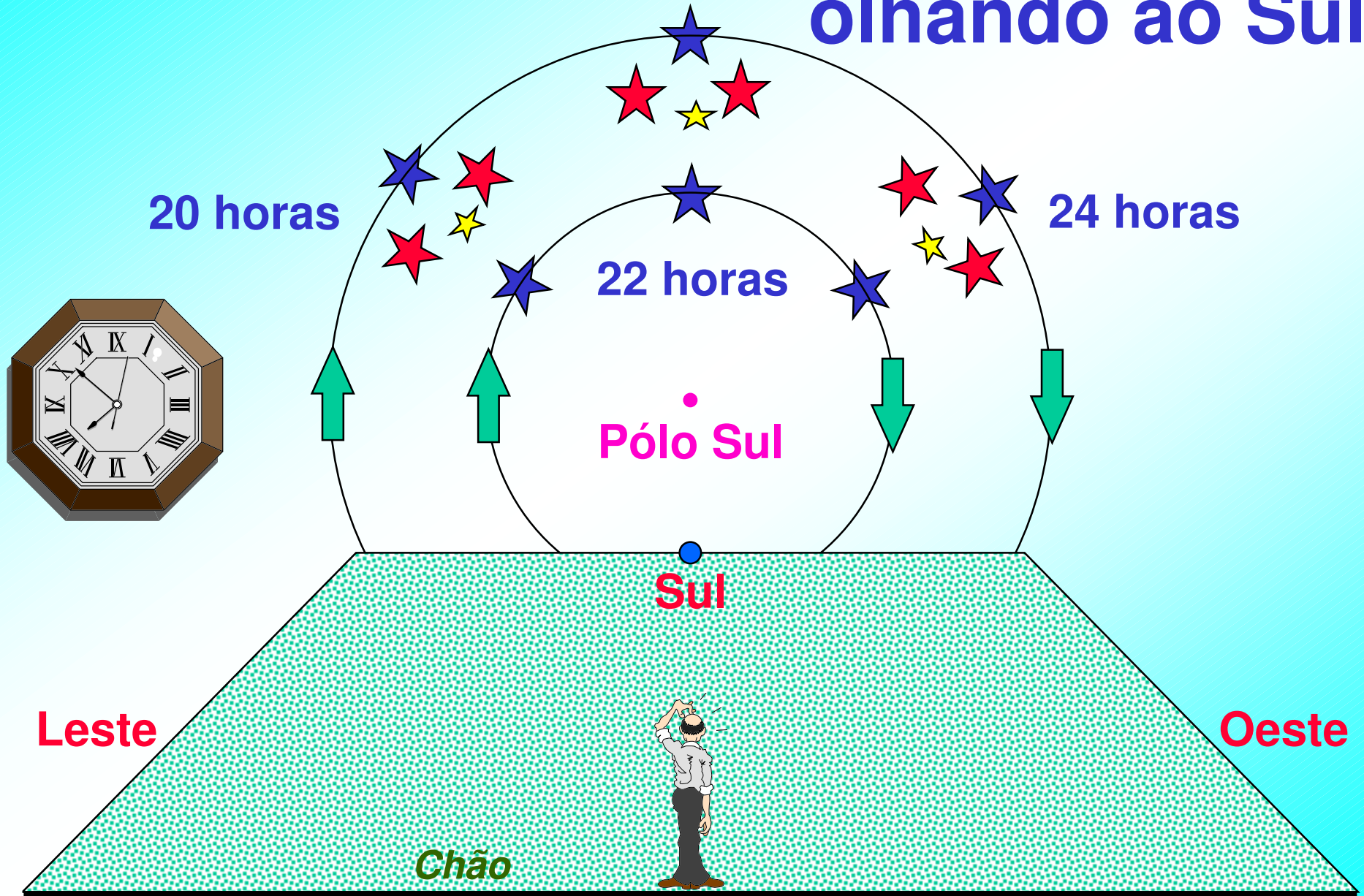
z = distância zenital

★ A,h

★ A,z

A Esfera Celeste

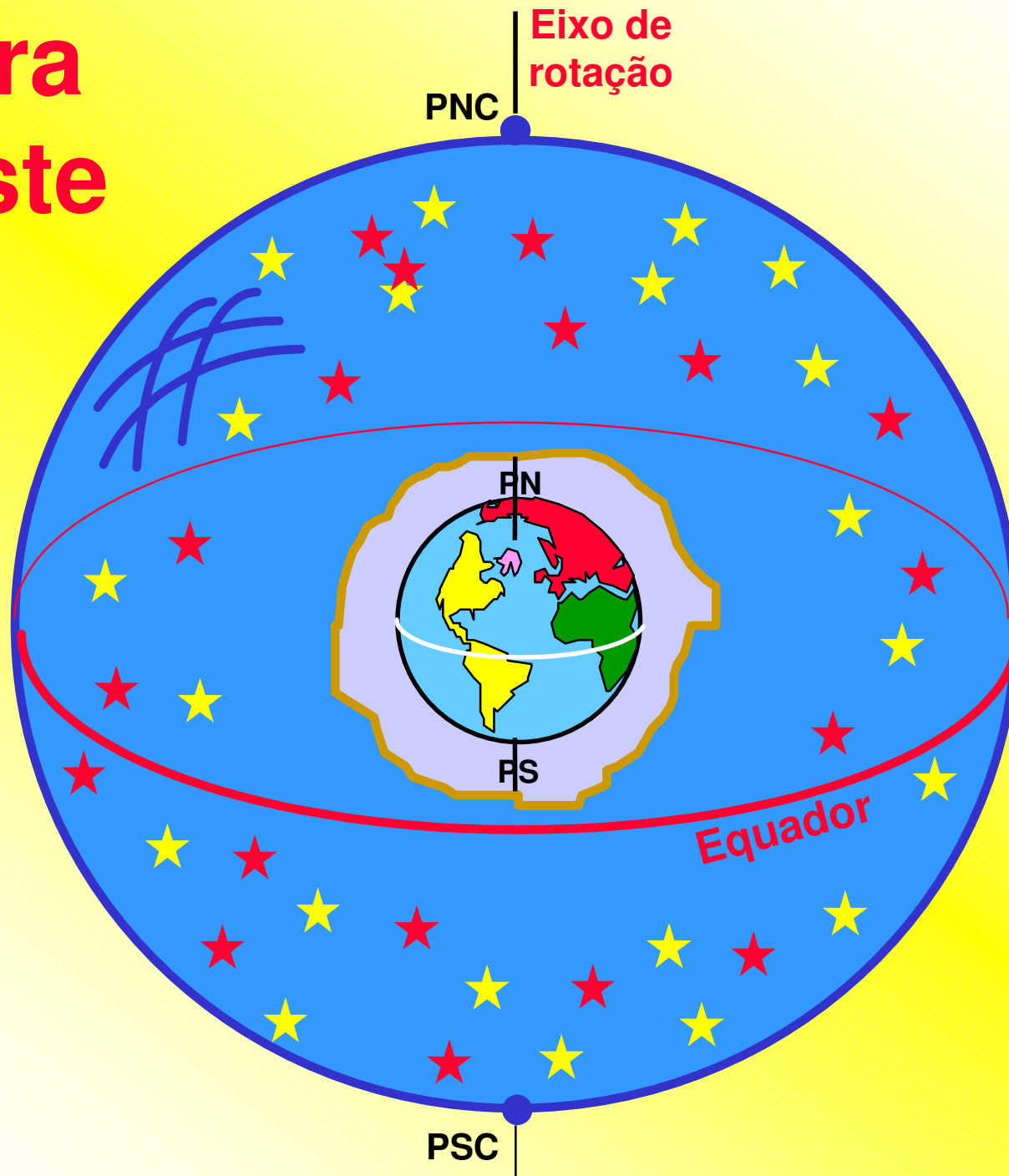
Movimento noturno aparente olhando ao Sul



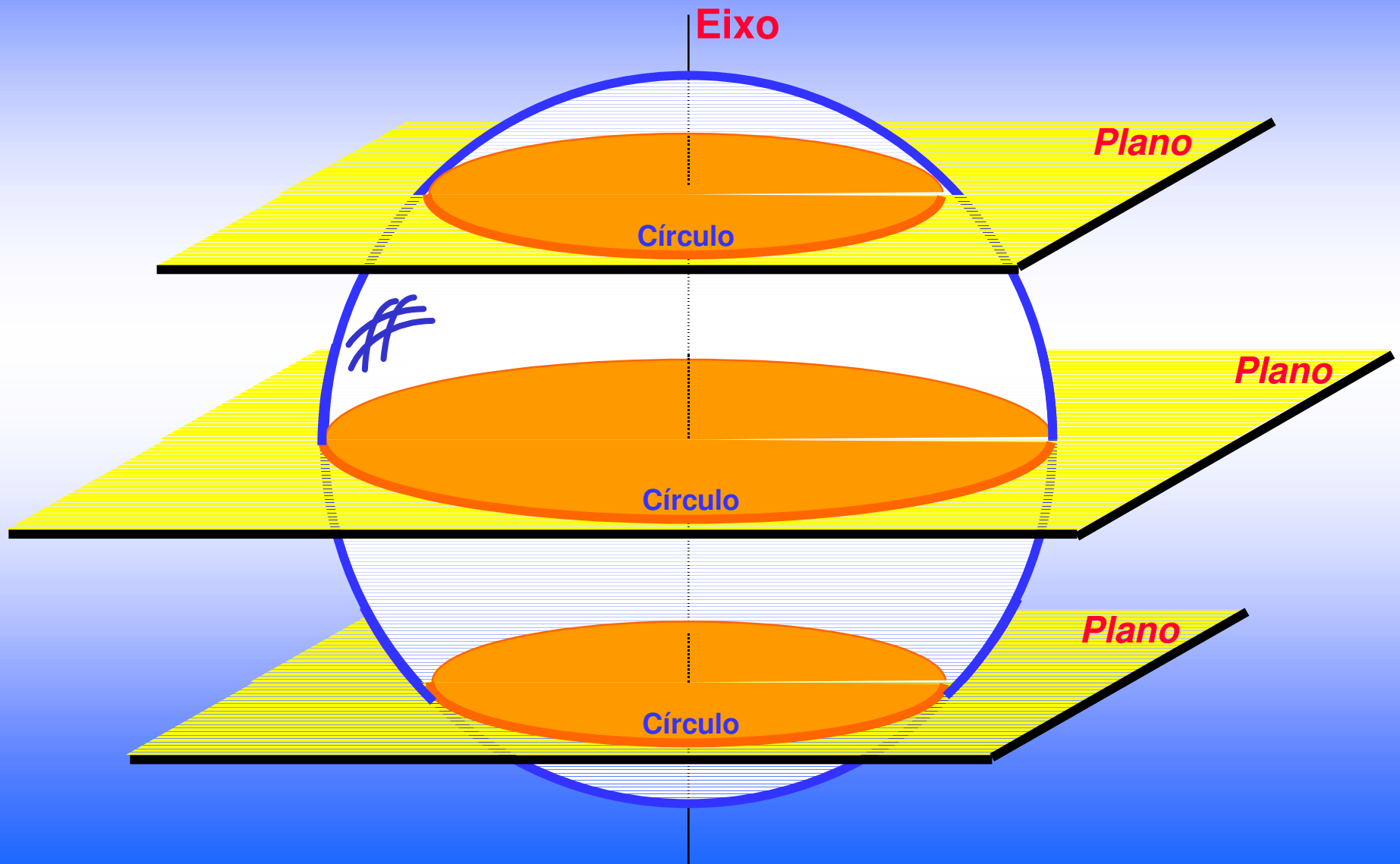
Movimento noturno aparente de uma estrela circumpolar norte



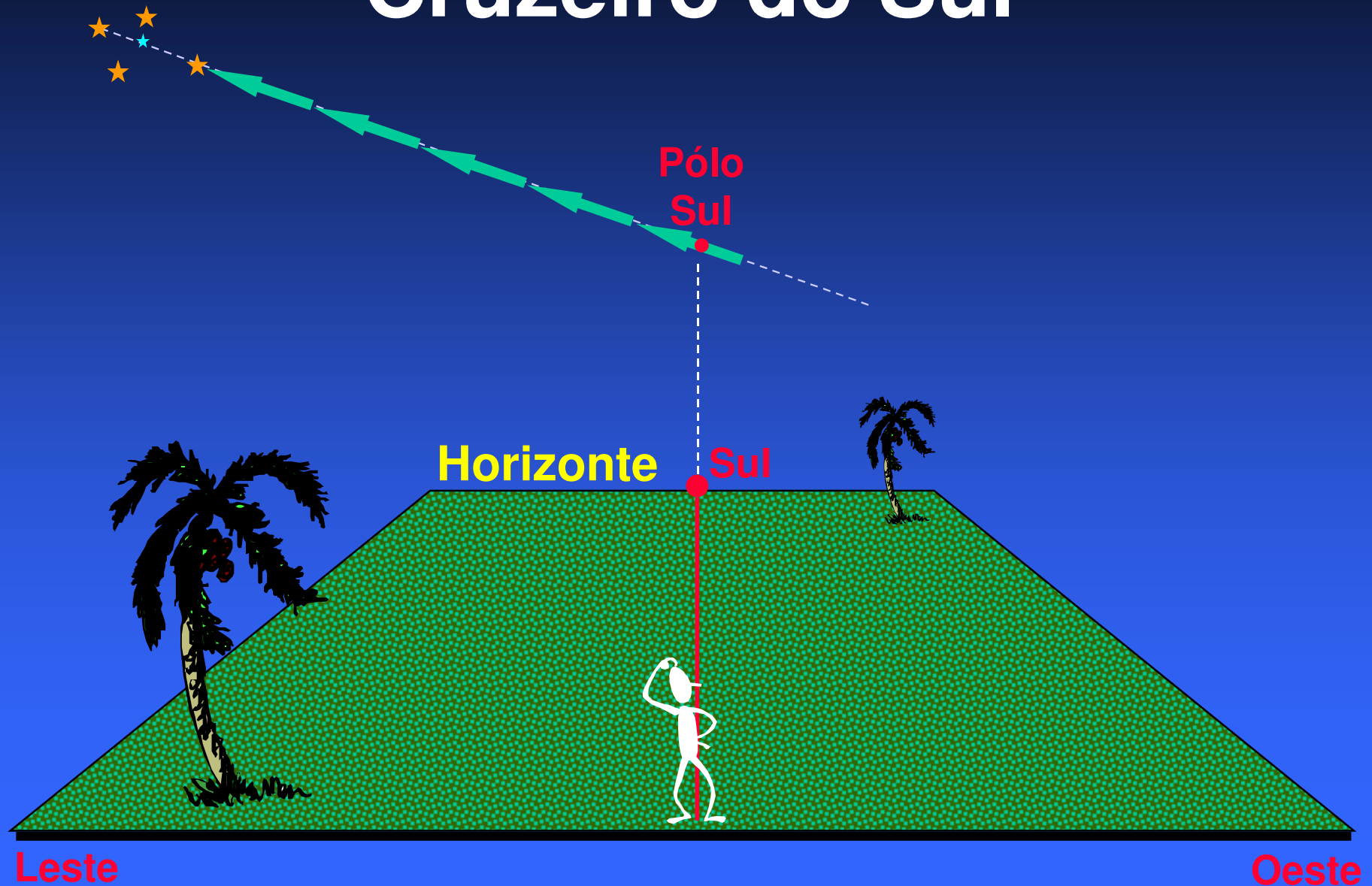
Esfera Celeste



A esfera e os planos paralelos

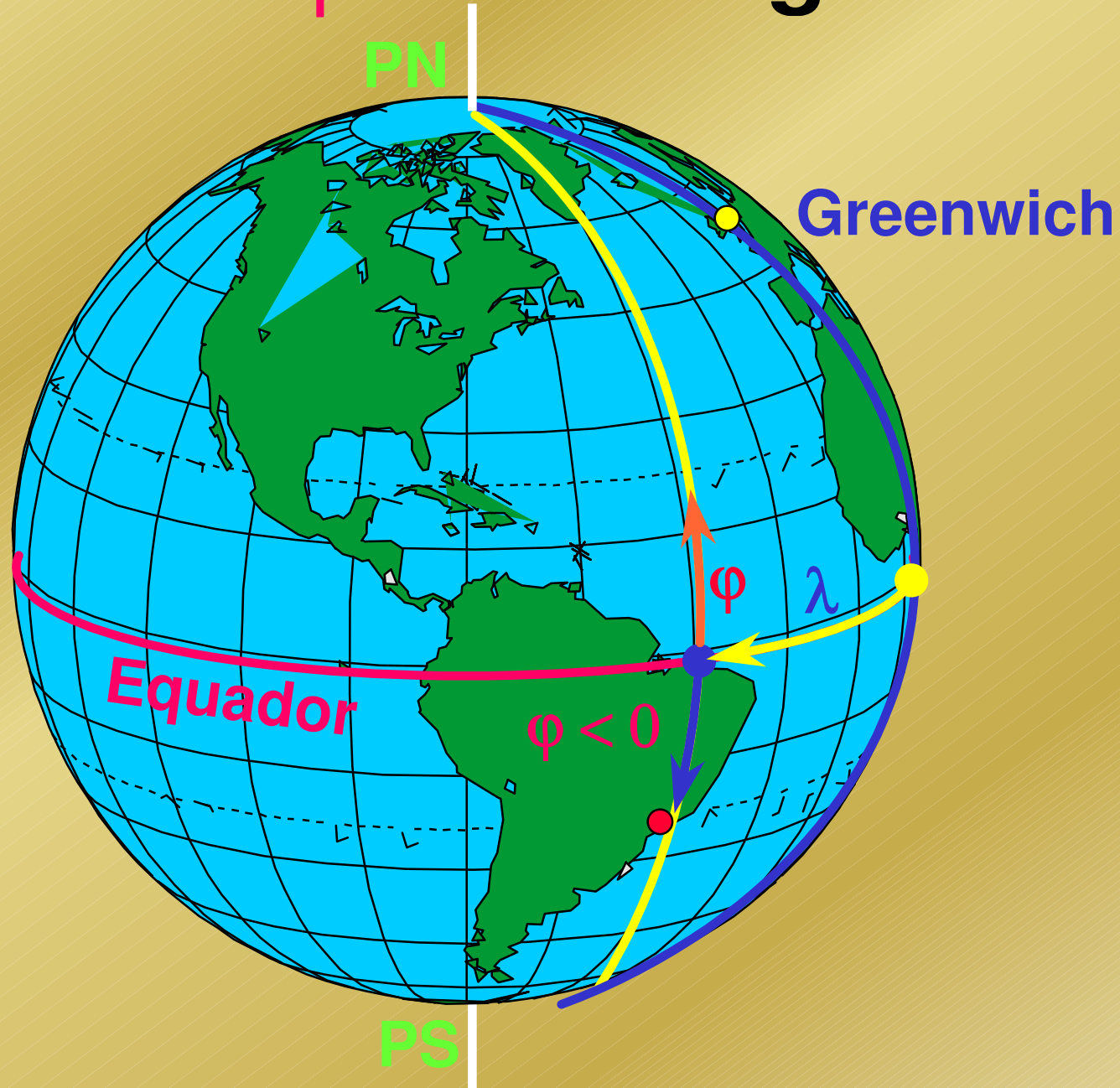


Pontos cardeais a partir do Cruzeiro do Sul



A Esfera Terrestre

Latitude φ e Longitude λ



Sistema Equatorial

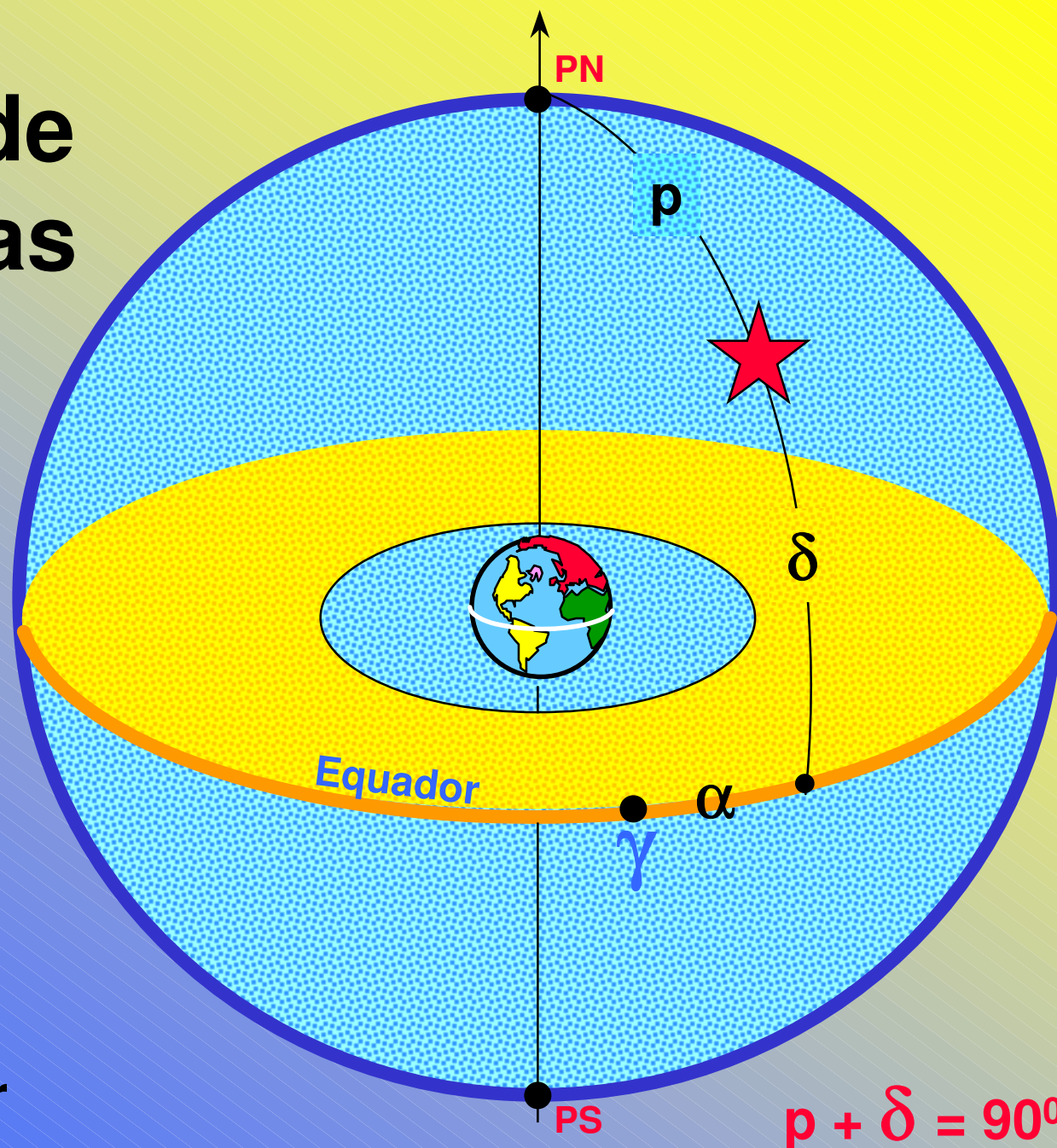
Sistema Equatorial de Coordenadas

★ (α, δ)

α = ascensão reta

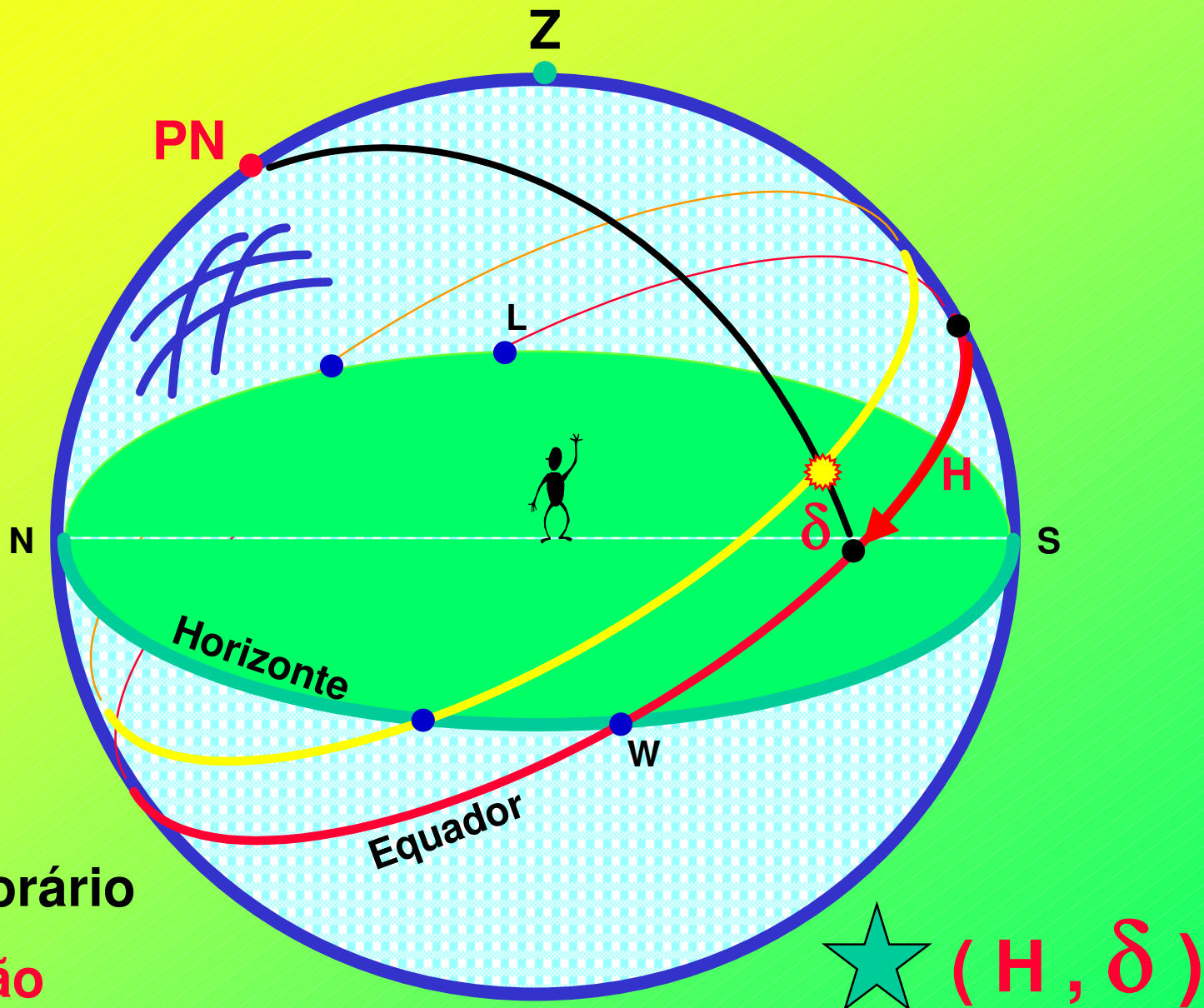
δ = declinação

p = distância polar



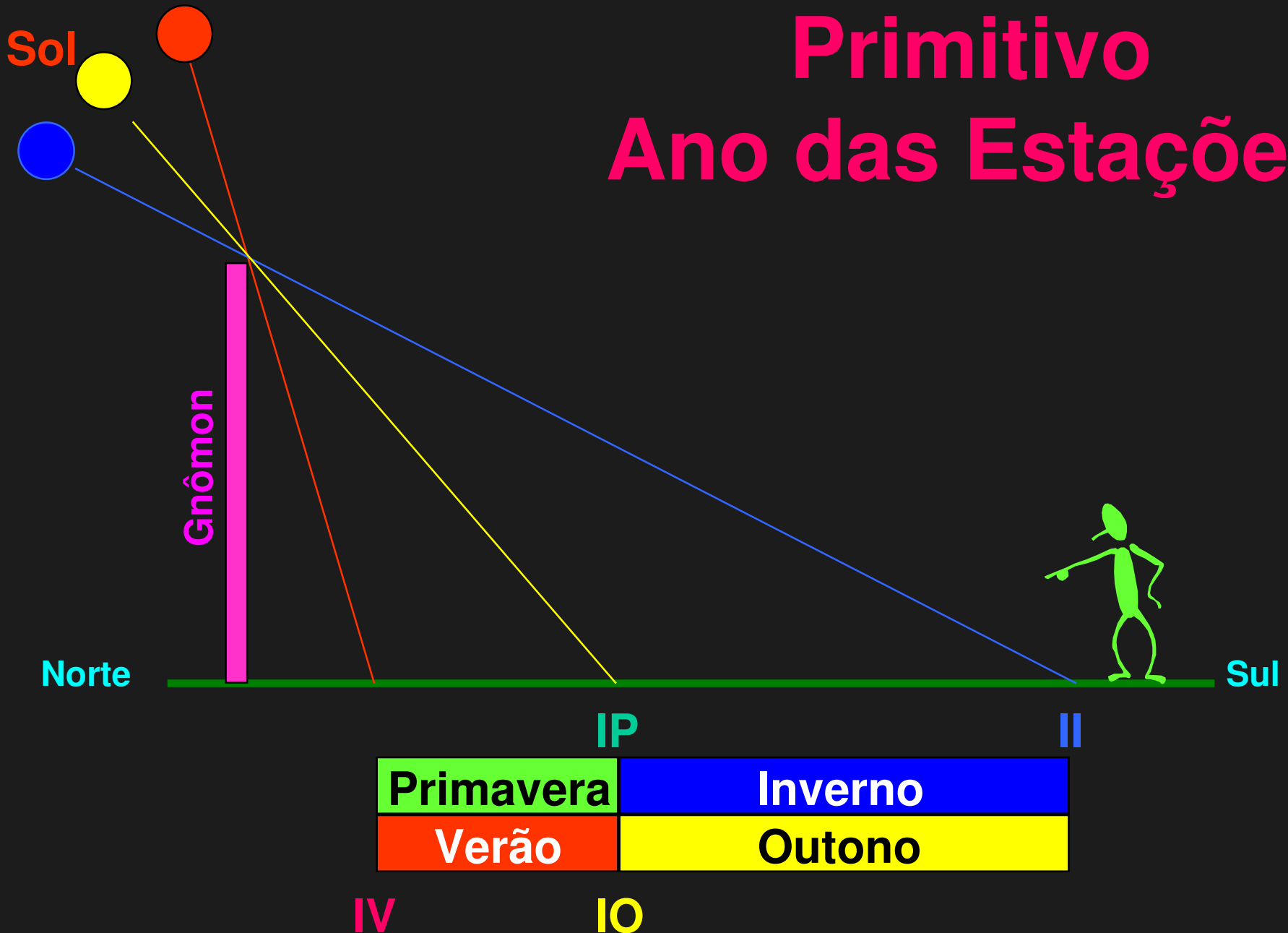
Sistema Horário

Sistema Horário de Coordenadas



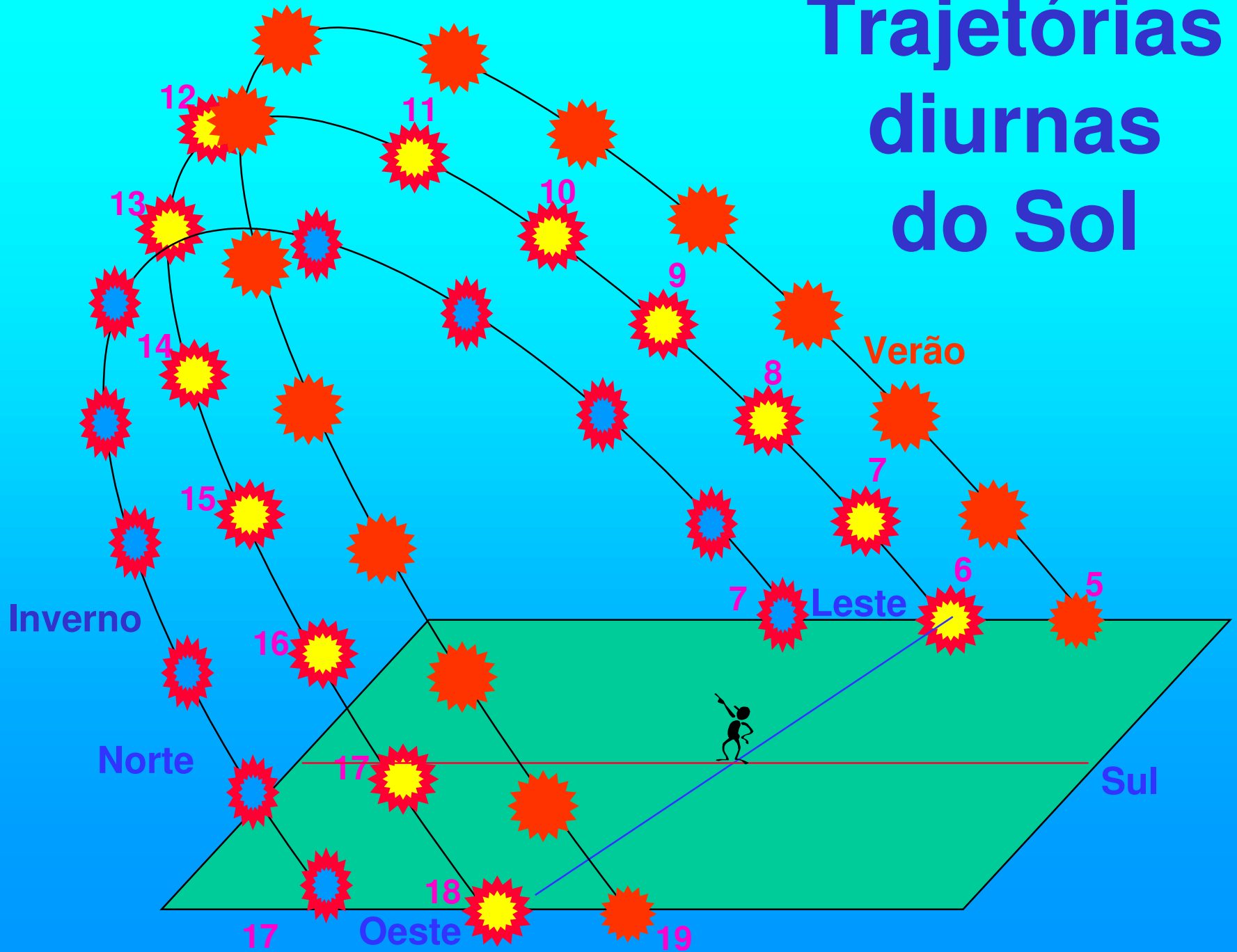
Ano

Primitivo Ano das Estações



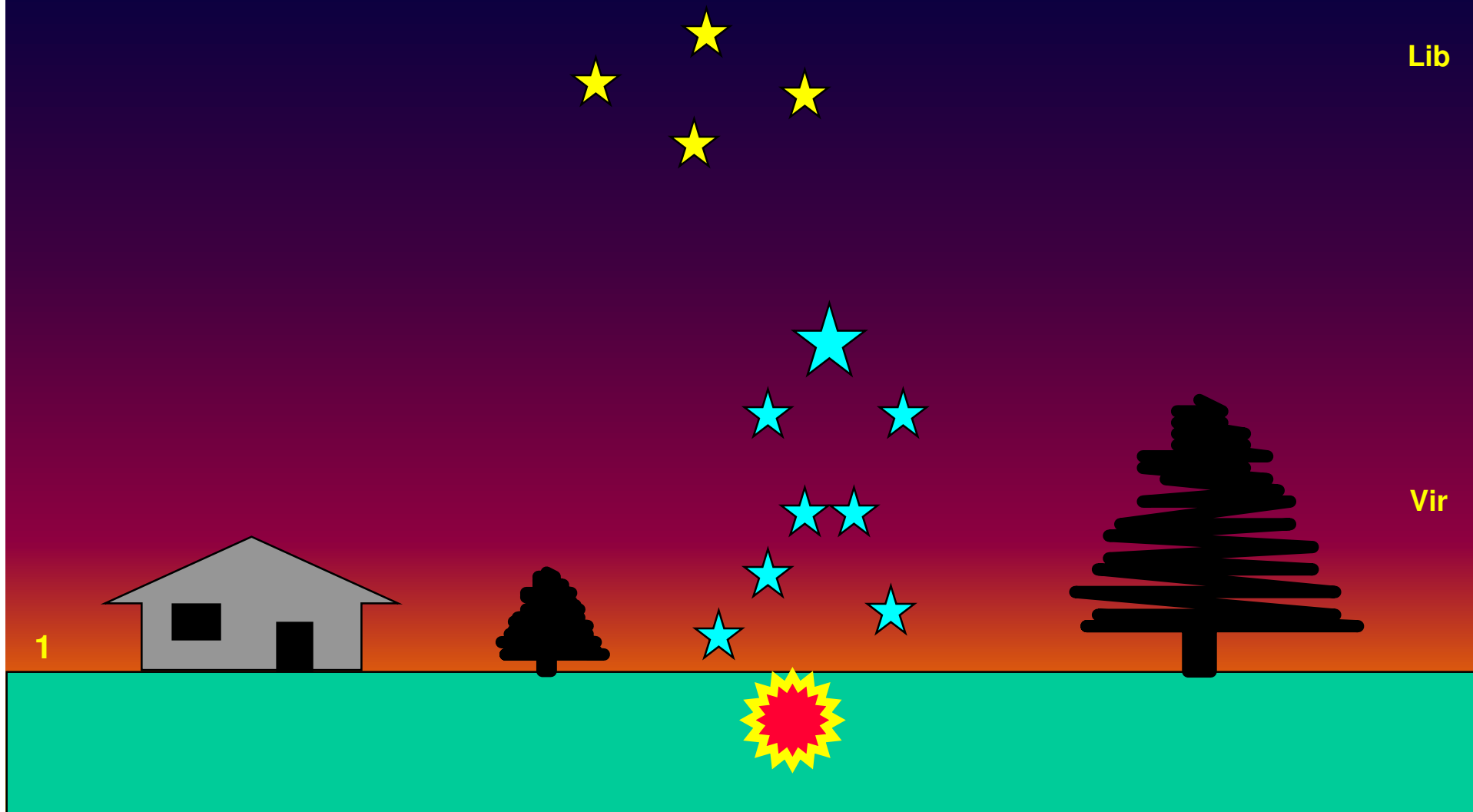
Ano das Estações ~ 365 dias

Trajetoórias diurnas do Sol



Movimento aparente do sol com relação às constelações

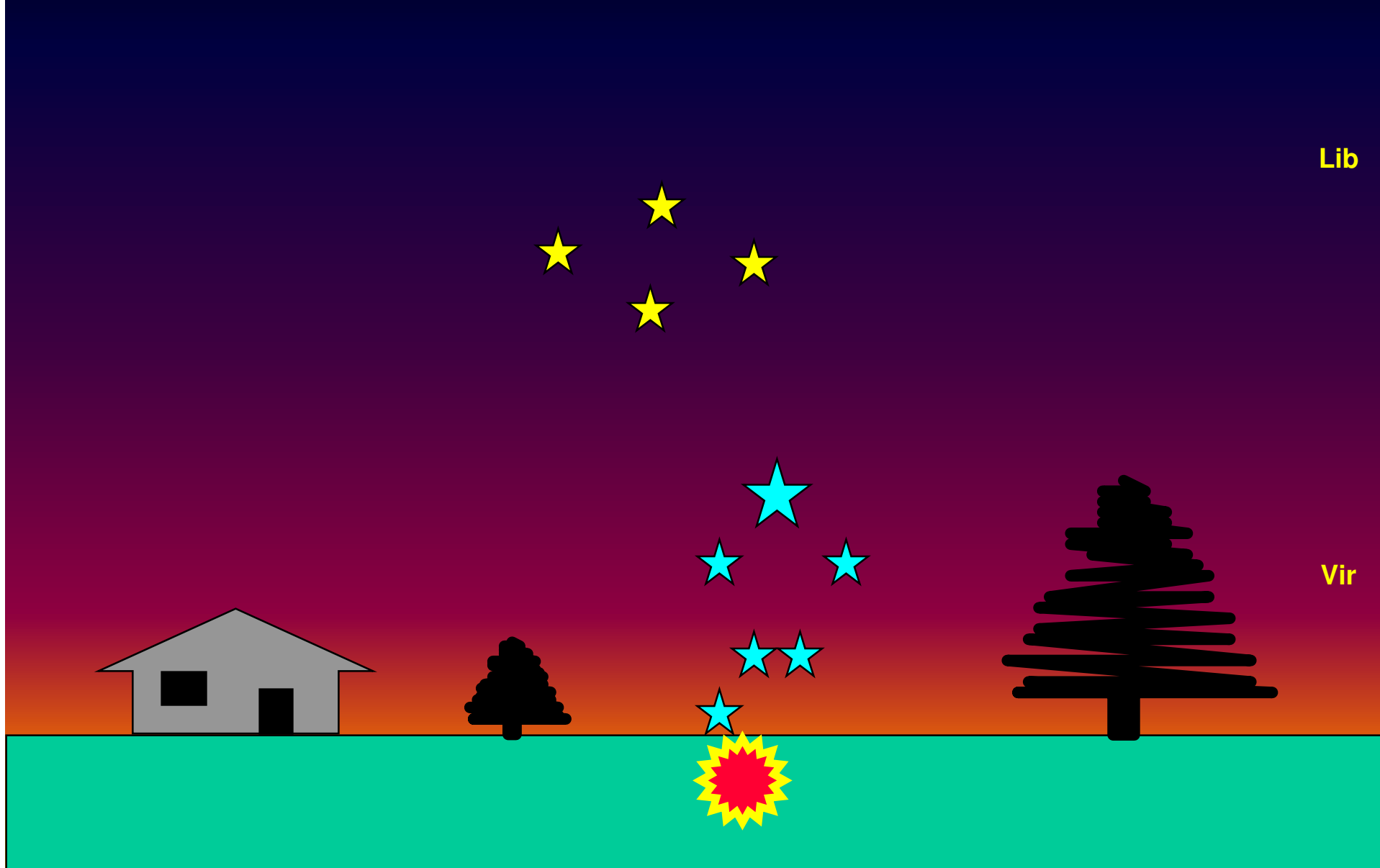
Horizonte visto no crepúsculo



Horizonte visto no crepúsculo



Horizonte visto no crepúsculo



Horizonte visto no crepúsculo

Esc

Lib

Vir



Horizonte visto no crepúsculo

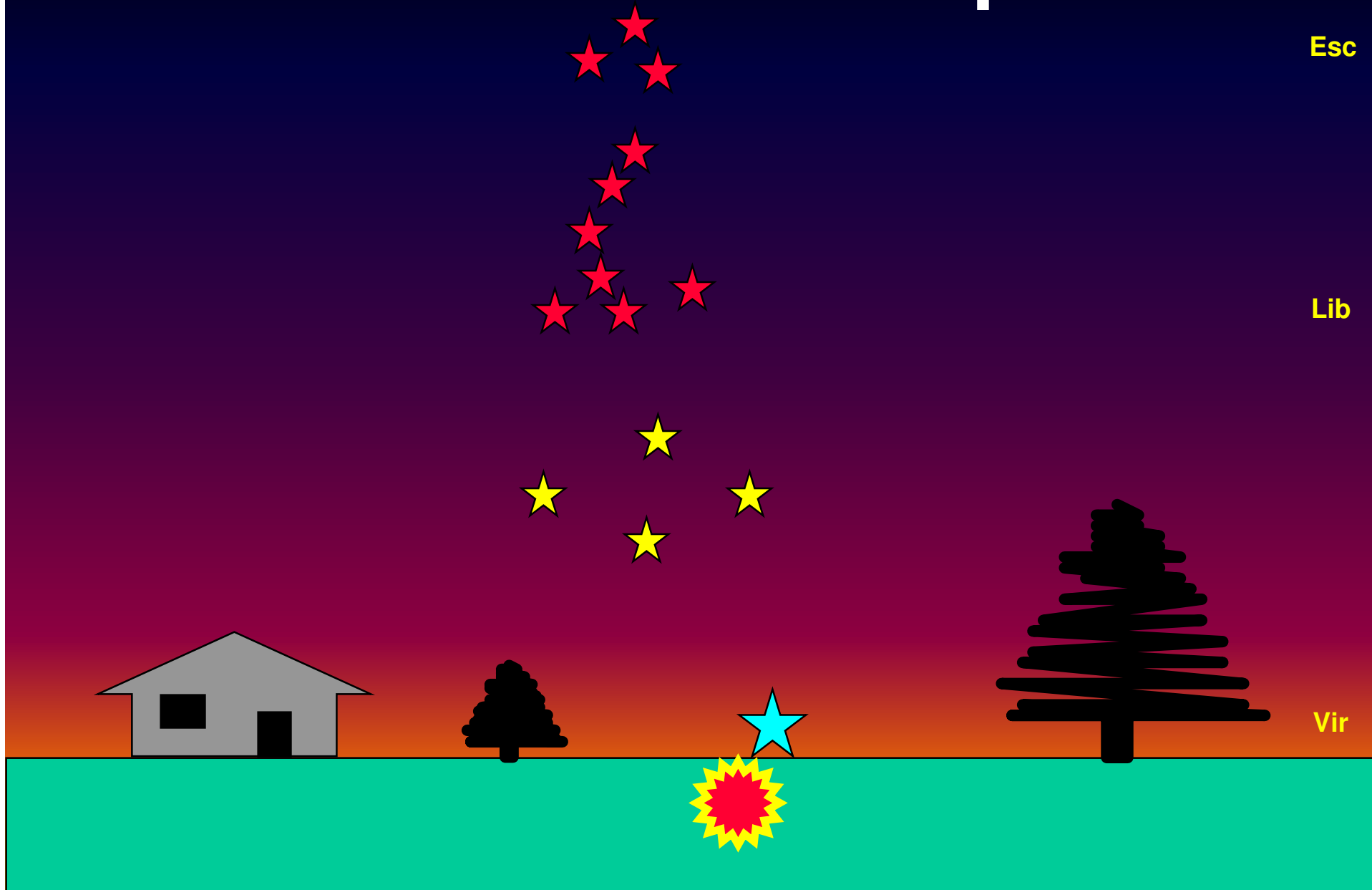
Esc

Lib

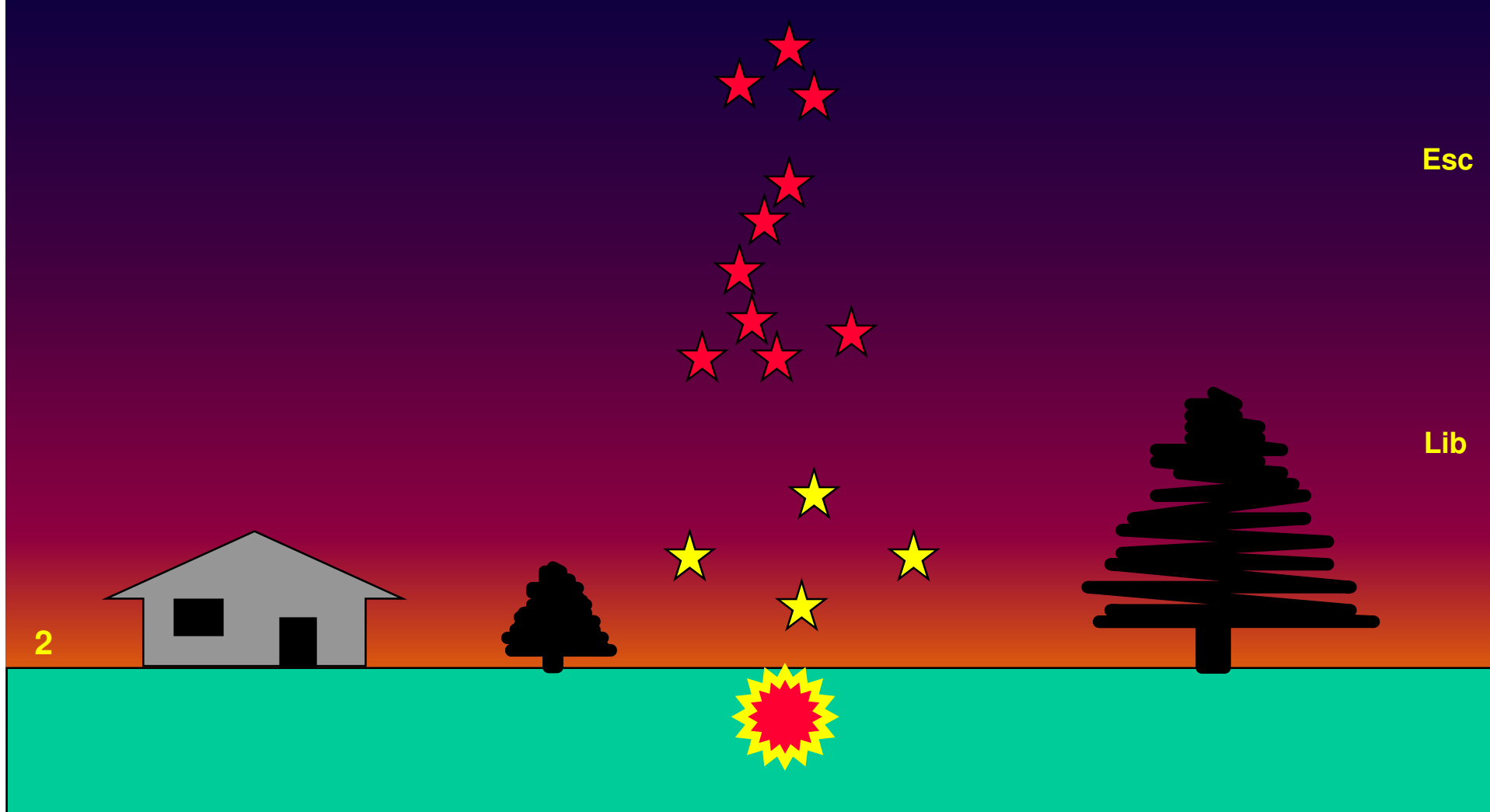
Vir



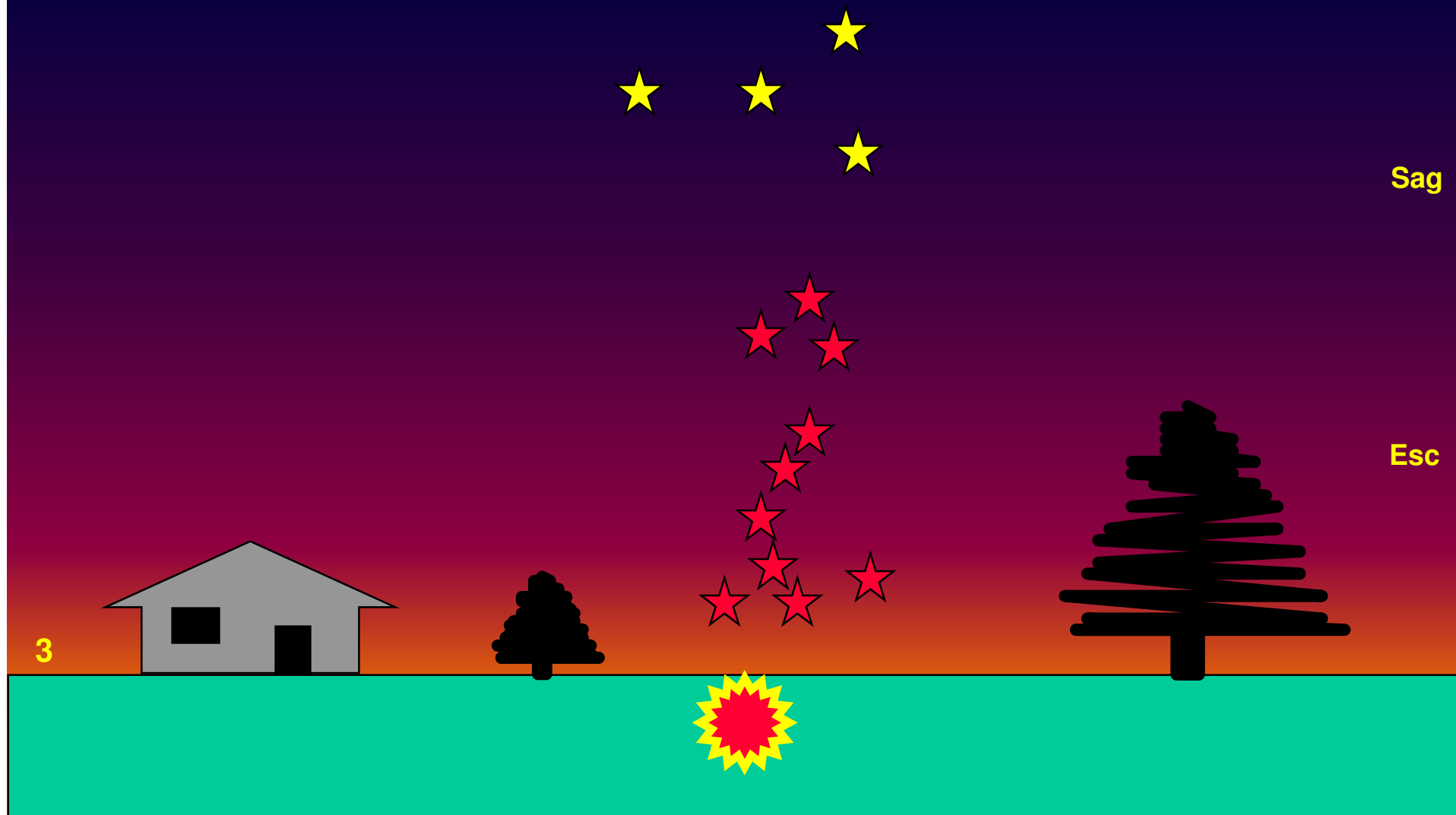
Horizonte visto no crepúsculo



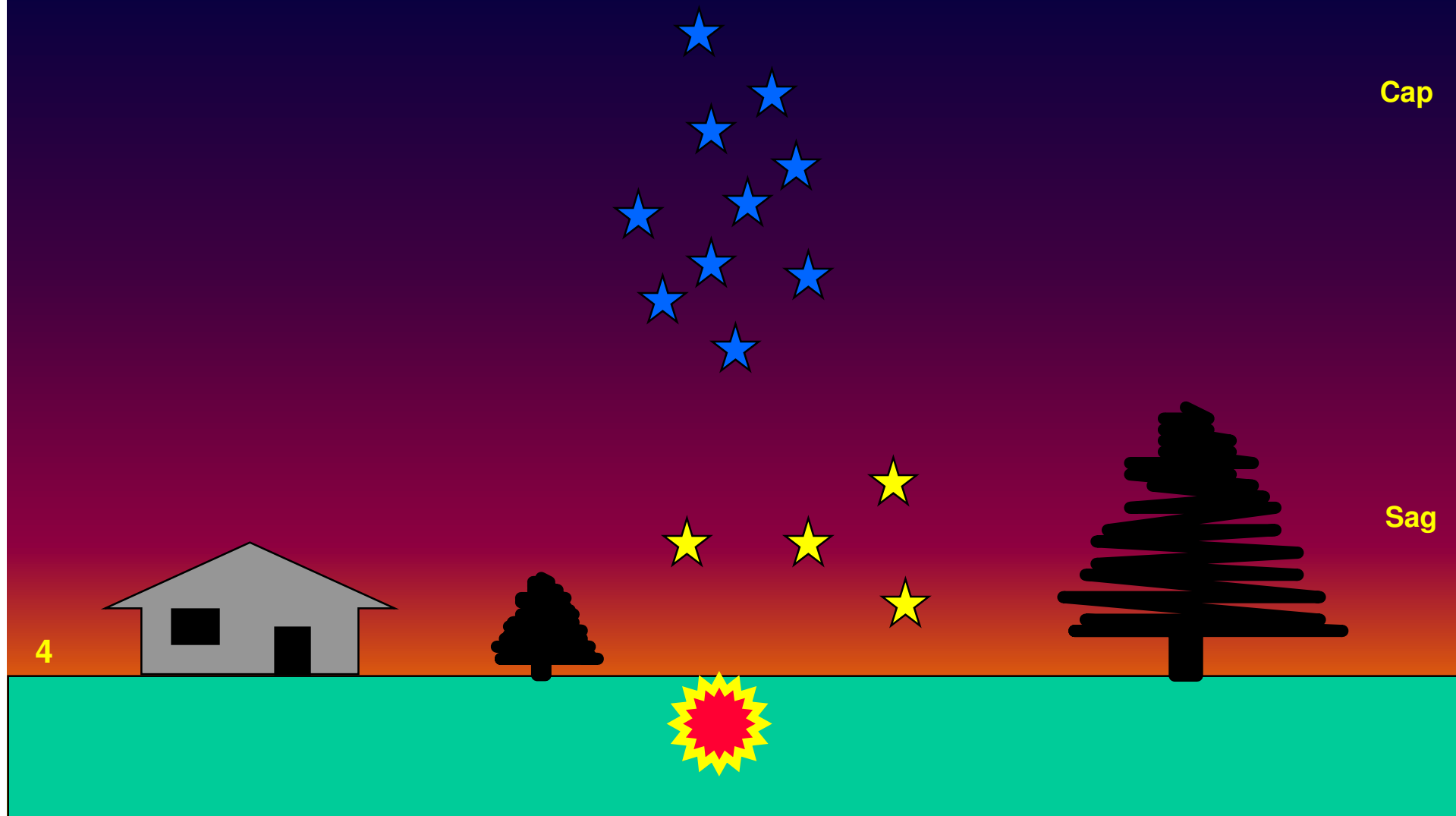
Horizonte visto no crepúsculo



Horizonte visto no crepúsculo



Horizonte visto no crepúsculo



Horizonte visto no crepúsculo



Aqu



Cap

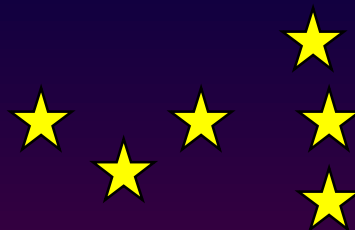
5



Horizonte visto no crepúsculo



Horizonte visto no crepúsculo



Ári

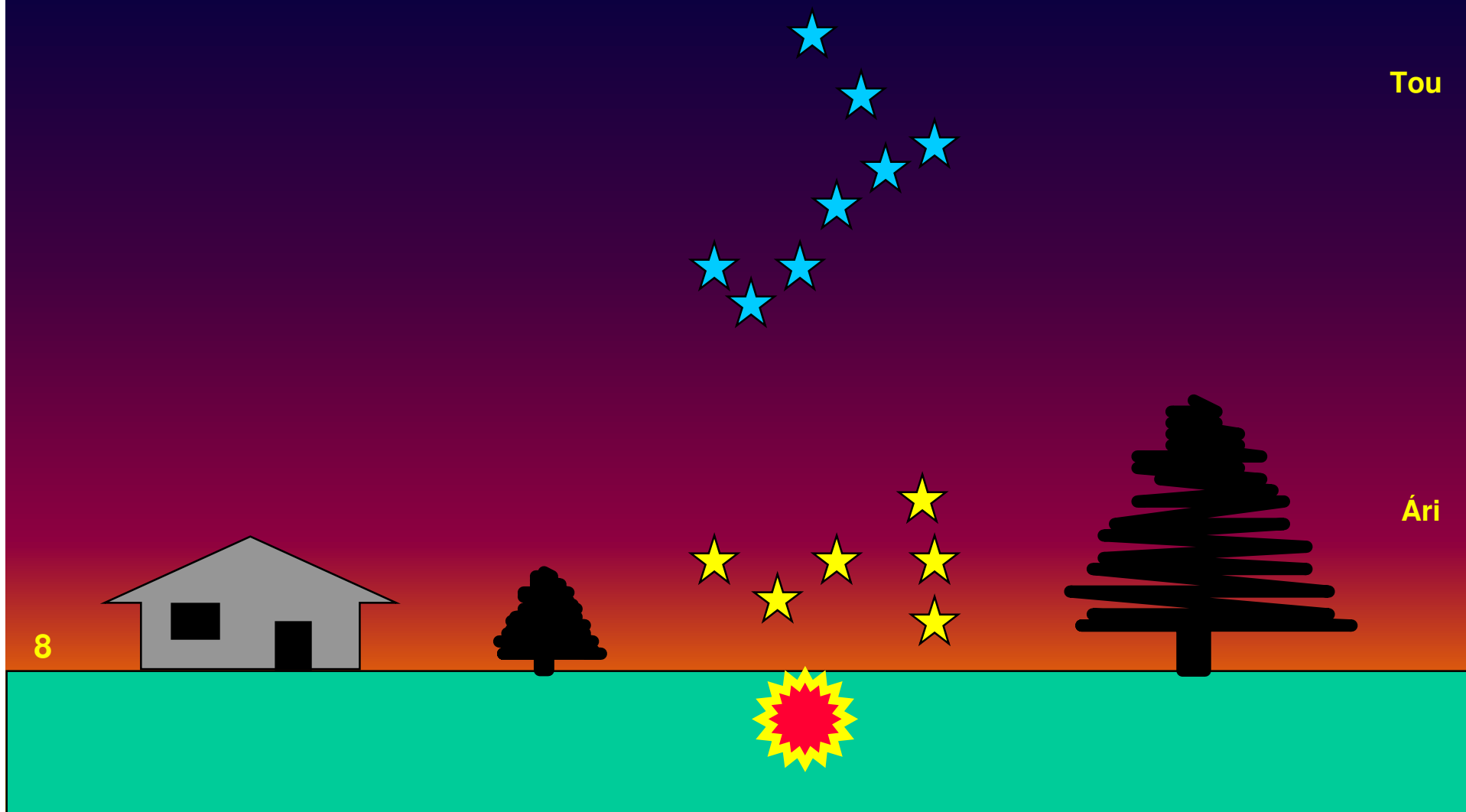


Pei

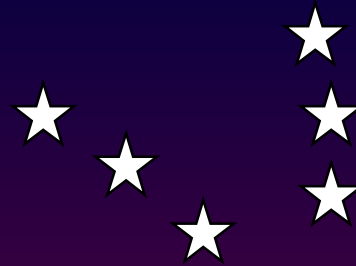
7



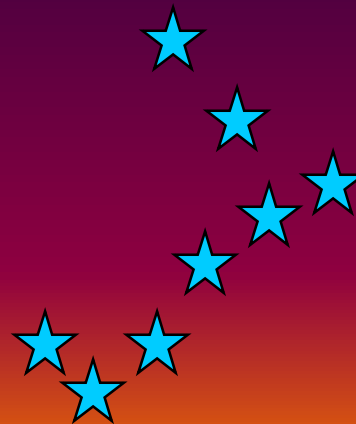
Horizonte visto no crepúsculo



Horizonte visto no crepúsculo

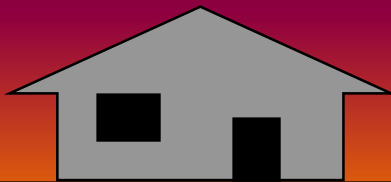


Gêm



Tou

9



Horizonte visto no crepúsculo



Horizonte visto no crepúsculo



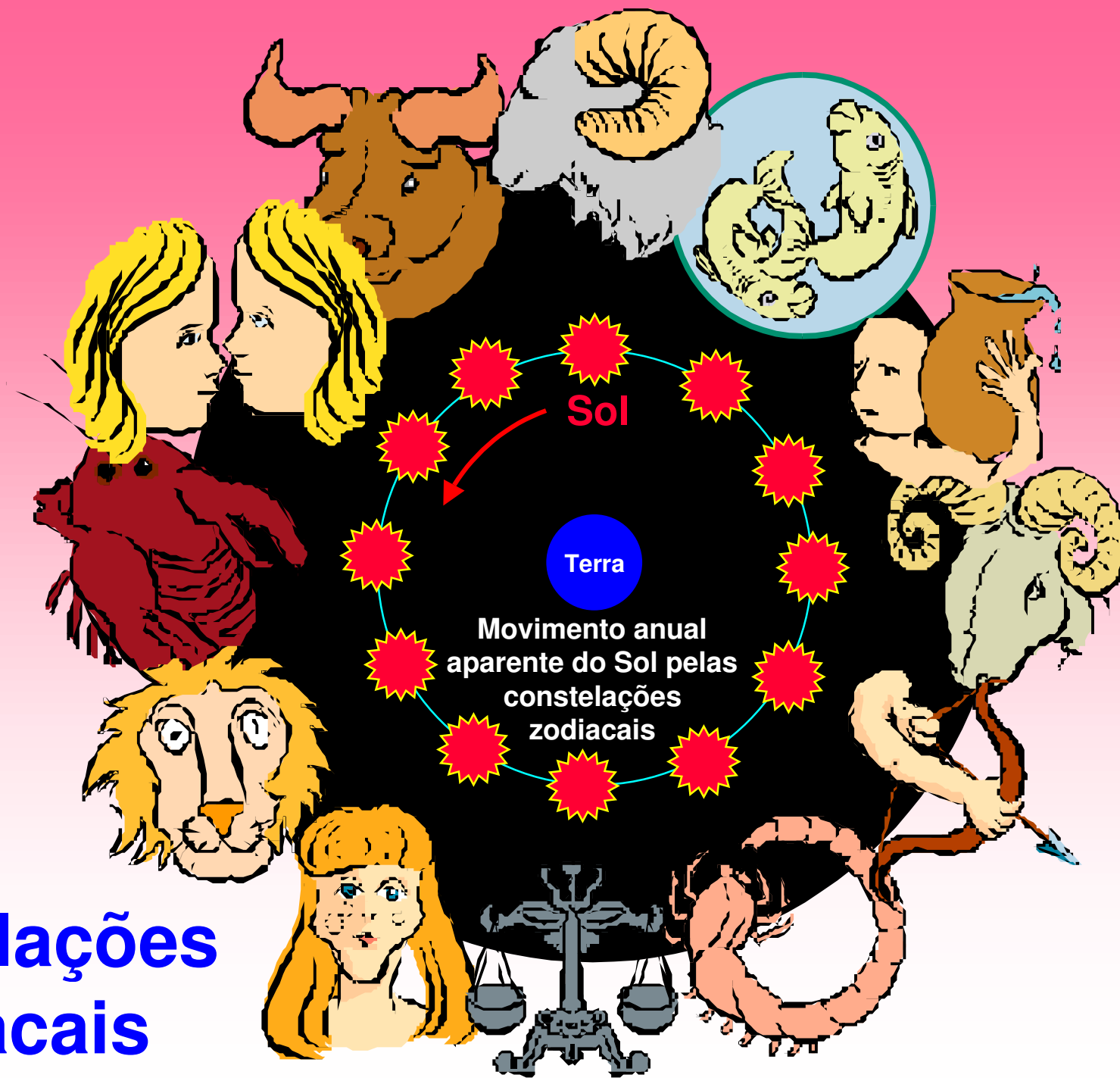
Horizonte visto no crepúsculo



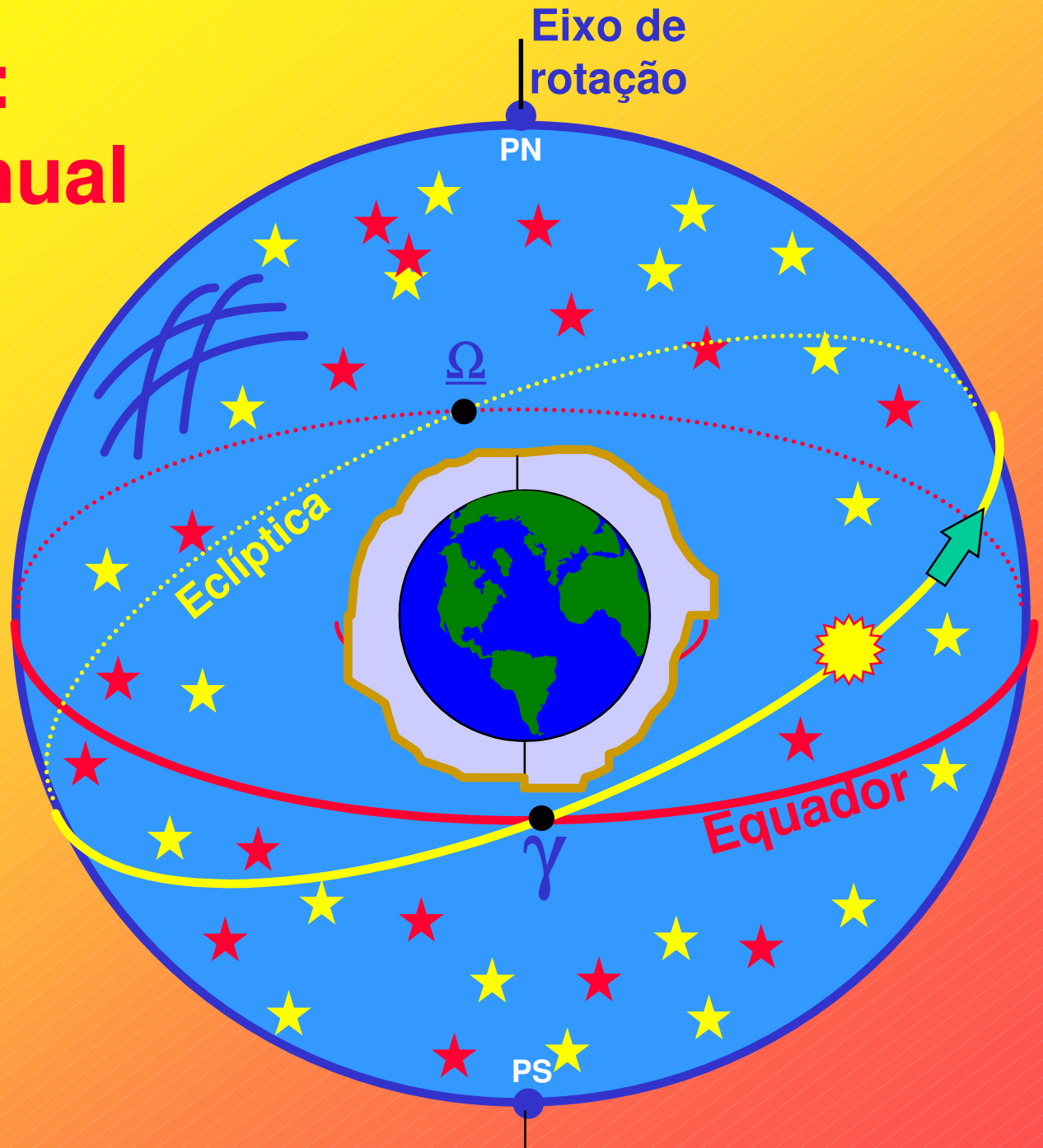
Horizonte visto no crepúsculo



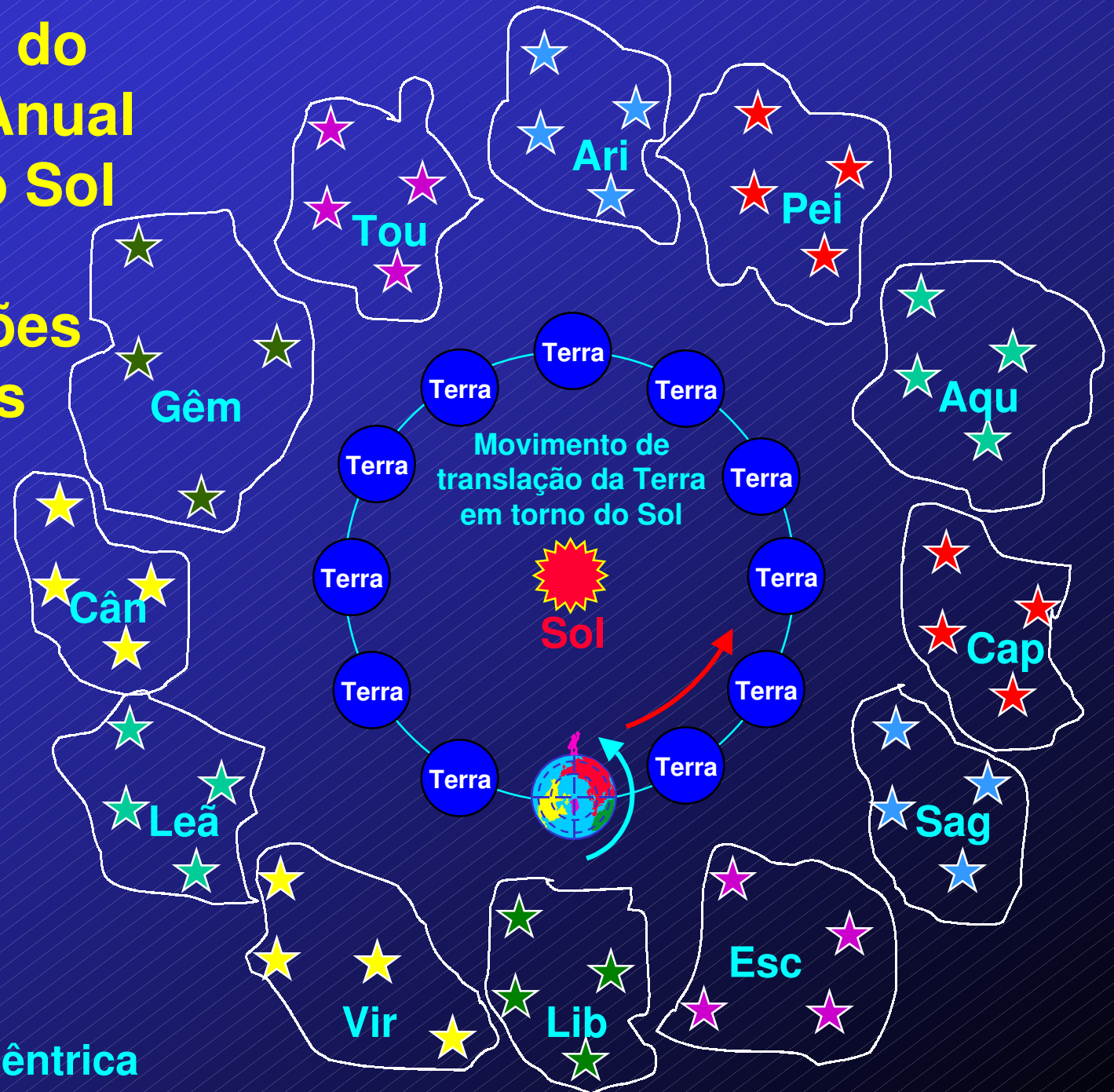
Constelações Zodiacais



Eclíptica: Trajetória anual aparente do Sol



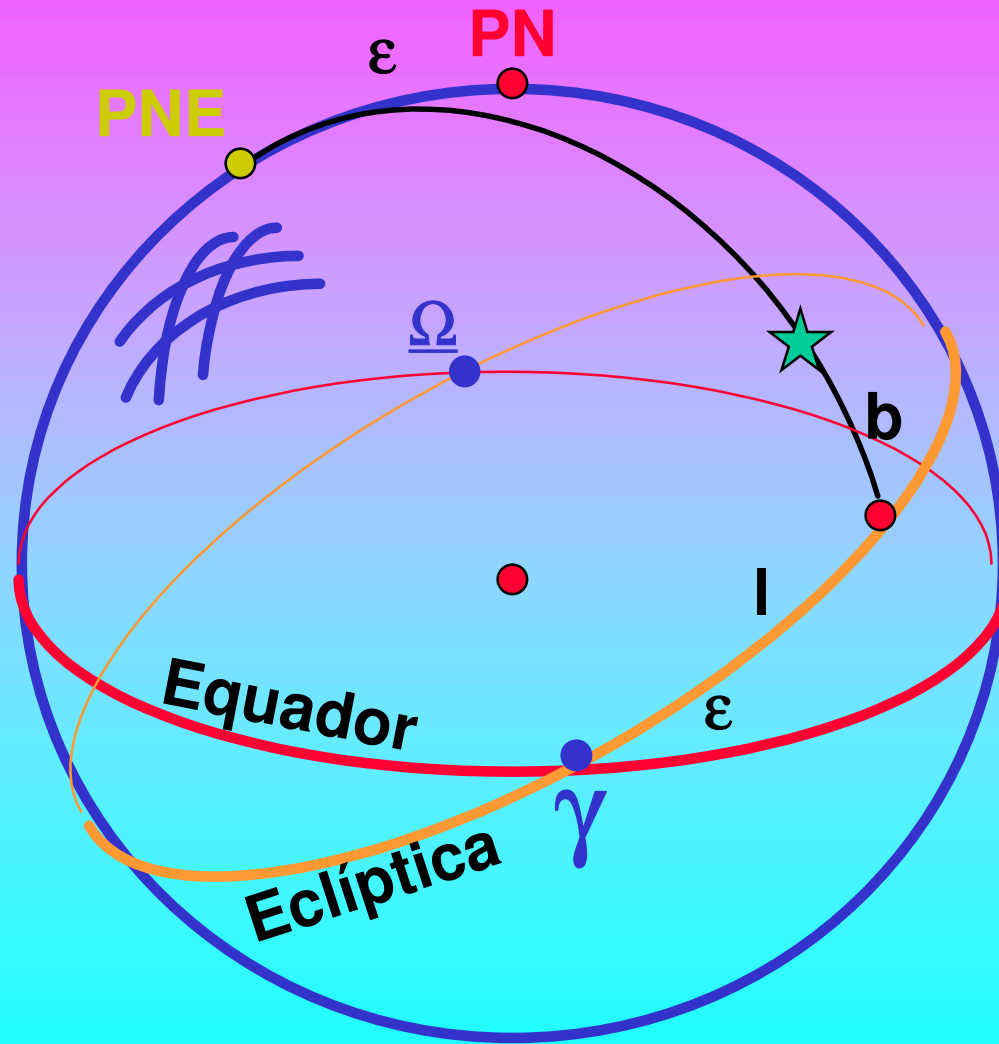
Explicação do Movimento Anual Aparente do Sol pelas Constelações Zodiacais



Visão heliocêntrica

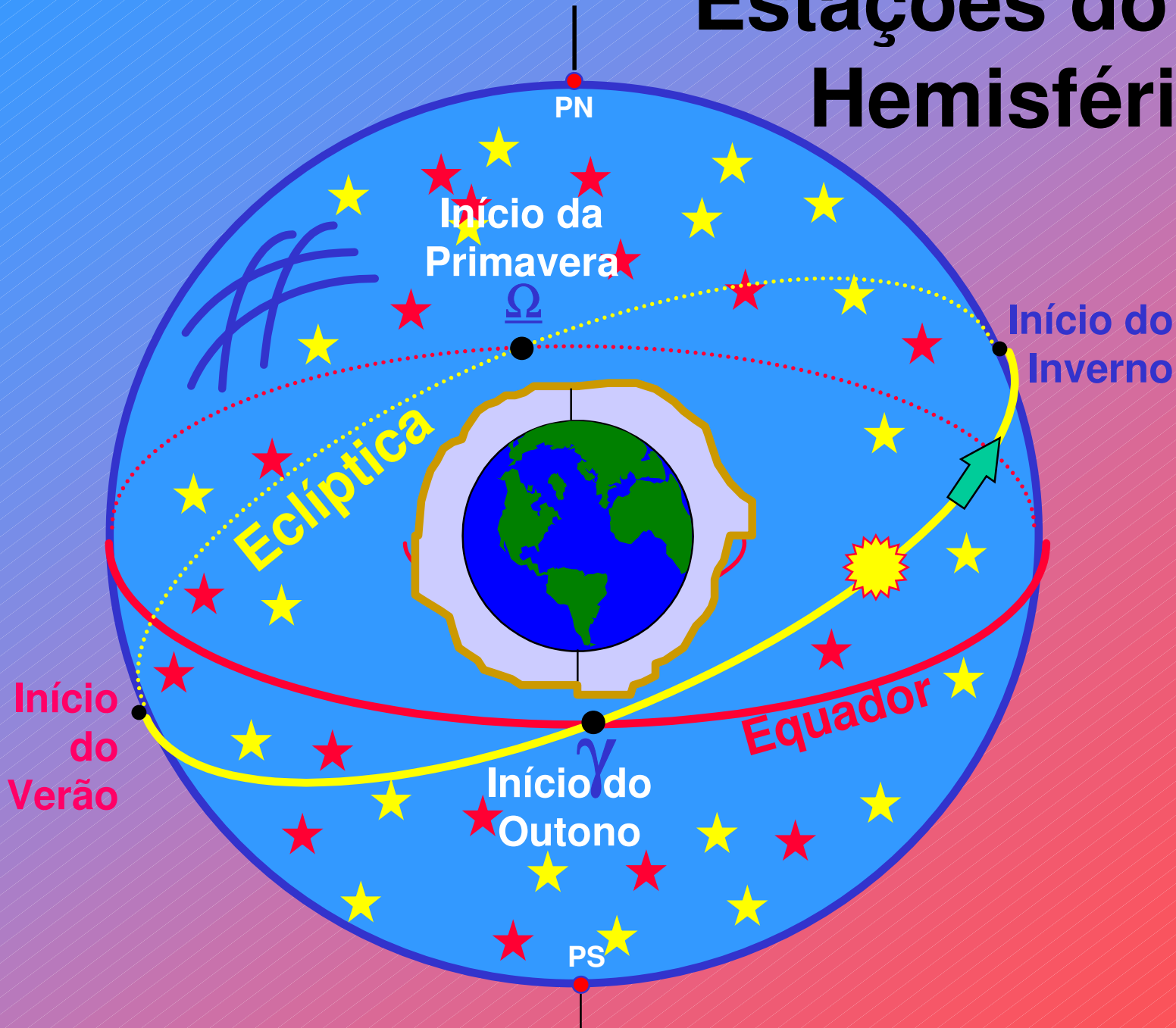
Sistema eclíptico

Coordenadas eclípticas de uma estrela



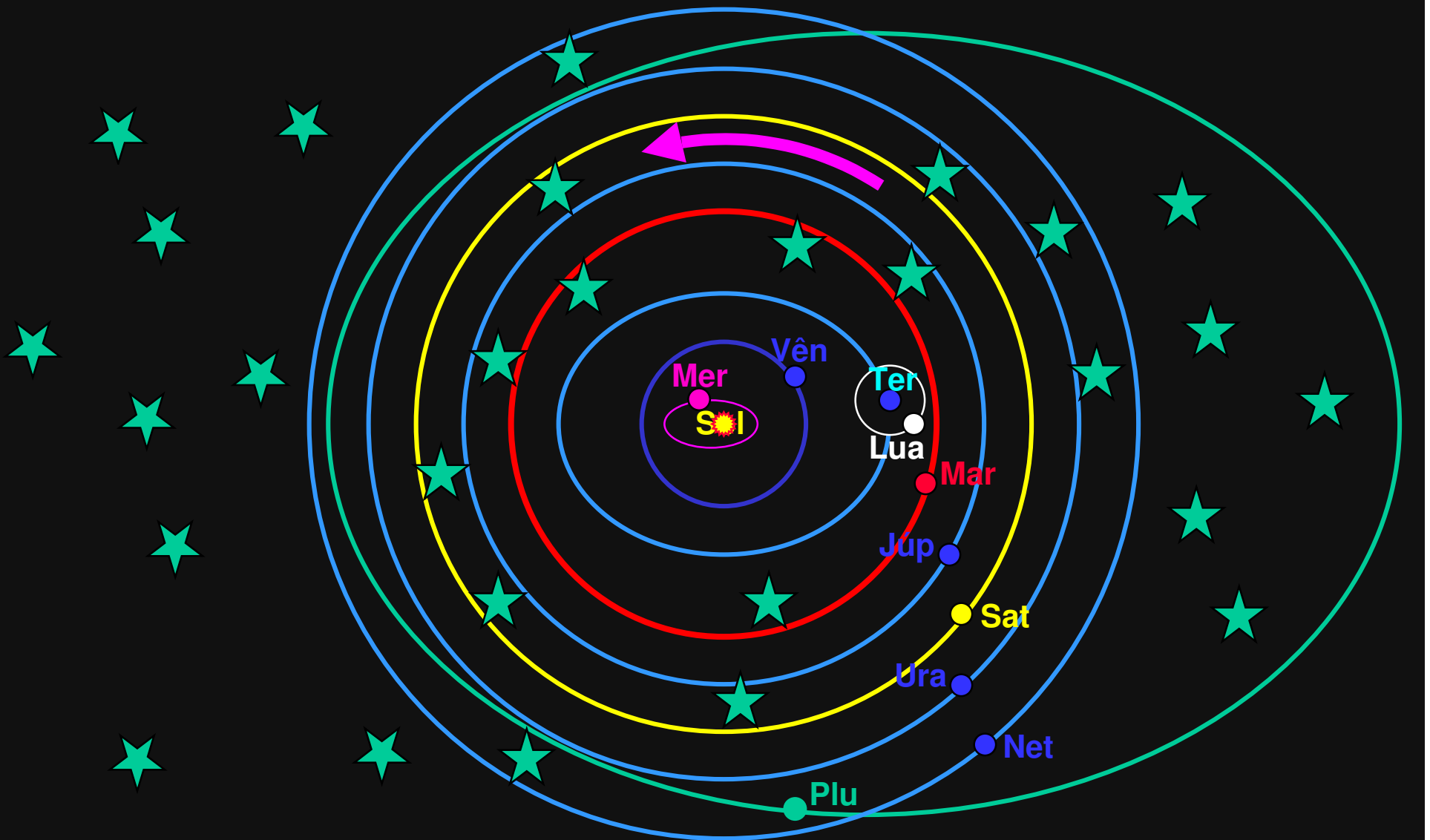
★ (l, b)

Estações do Ano: Hemisfério Sul

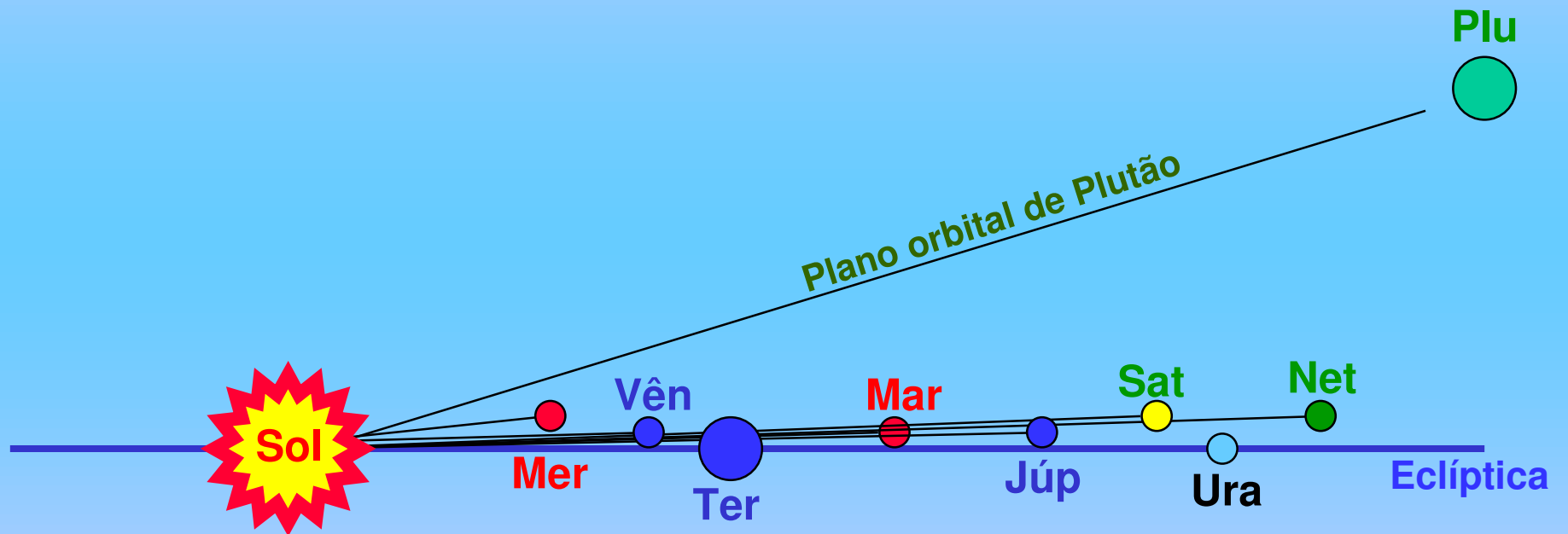


Órbitas planetárias no Sistema Solar

Problema de perspectiva

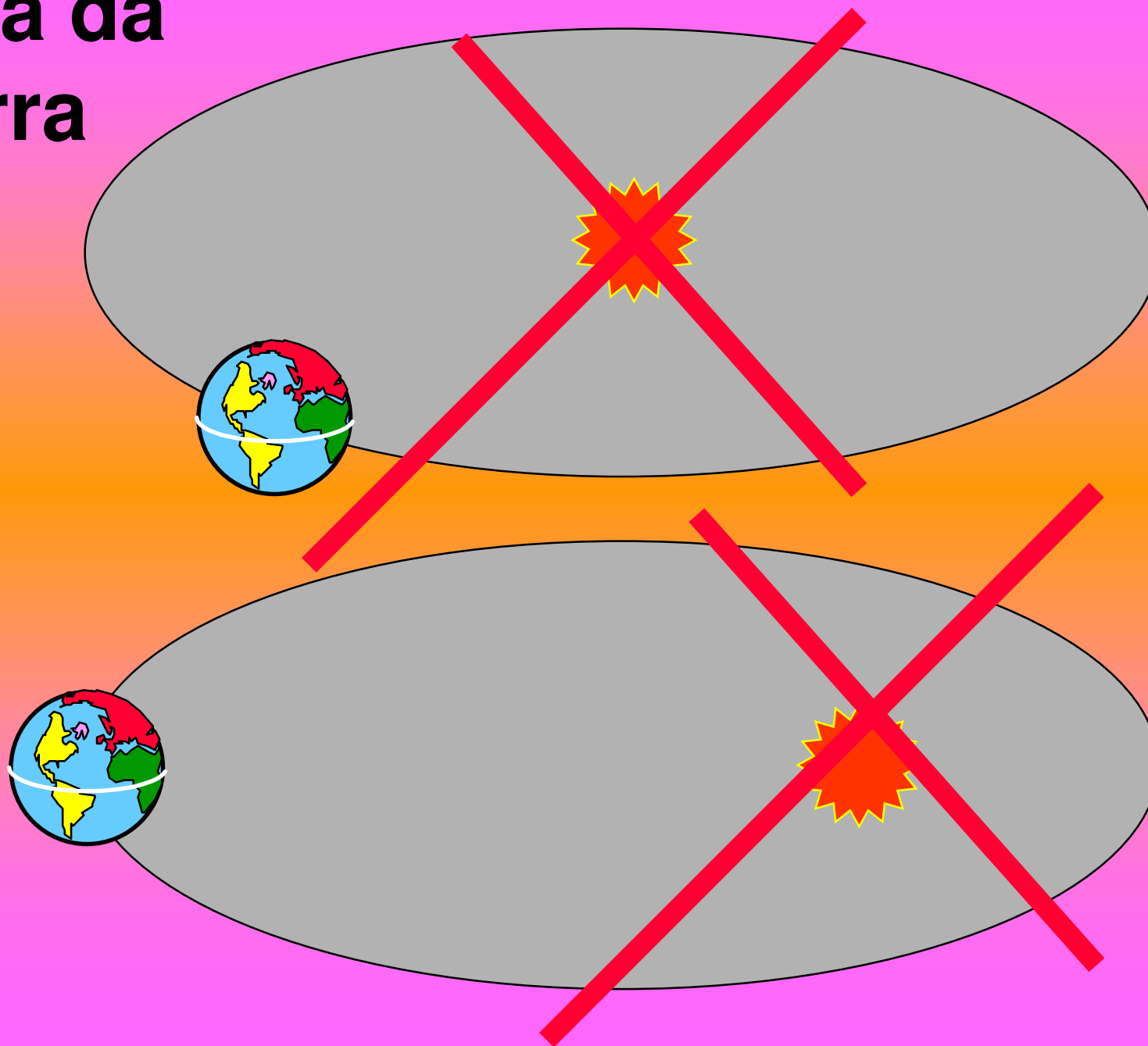


Órbitas não coplanares

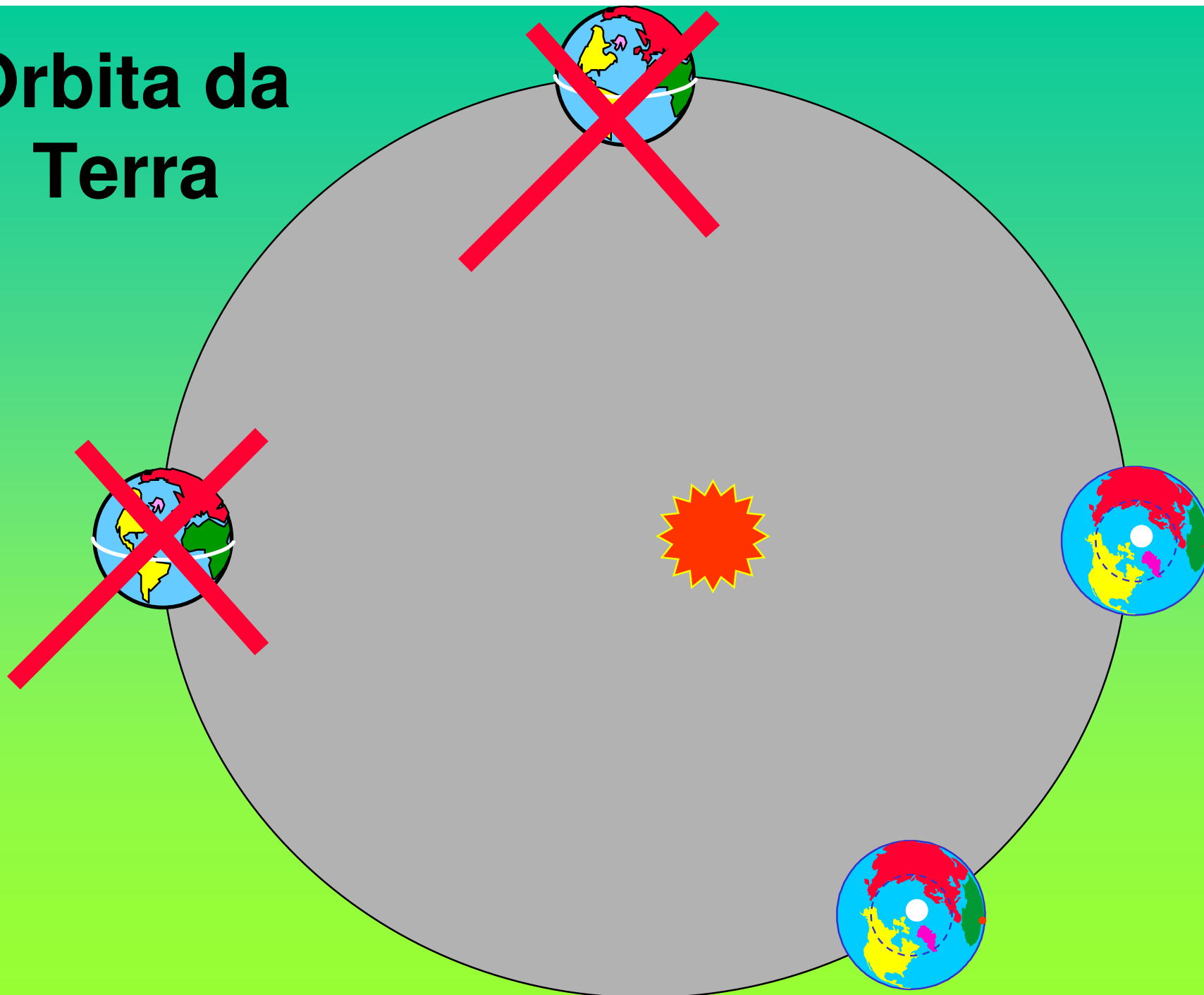


**Qual o motivo das
estações do ano?**

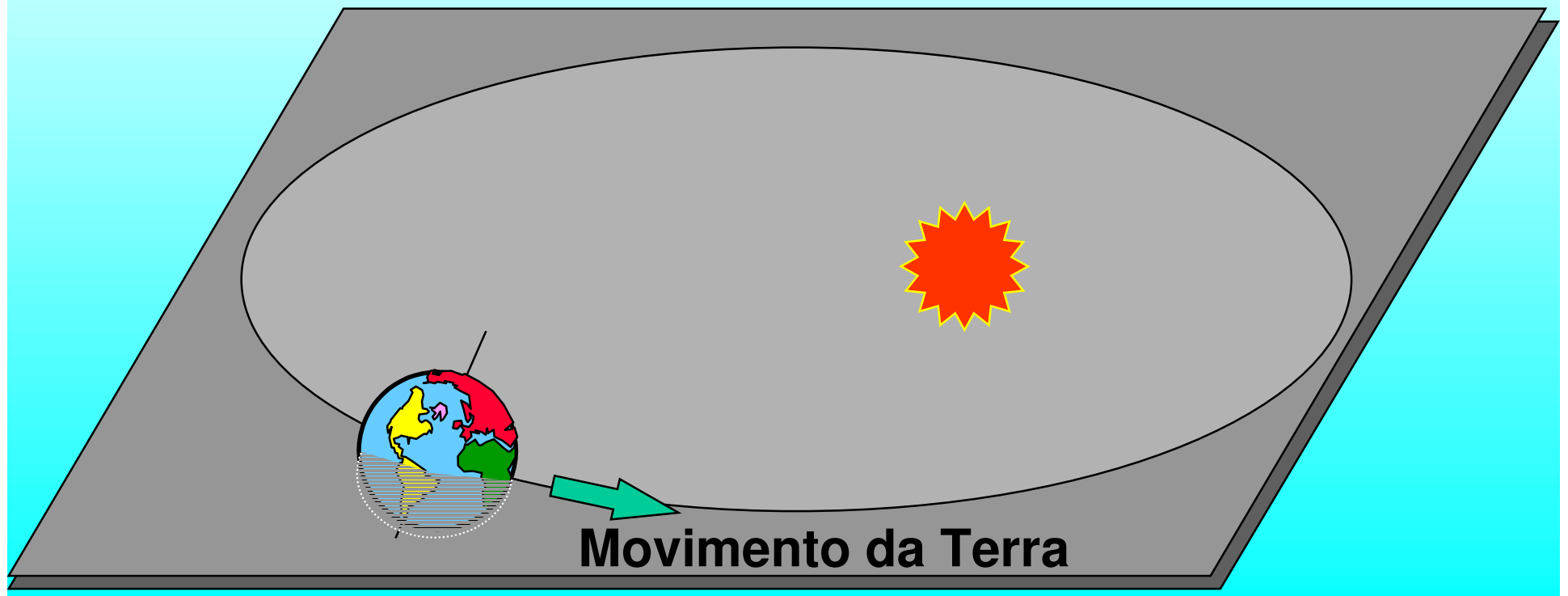
Órbita da Terra



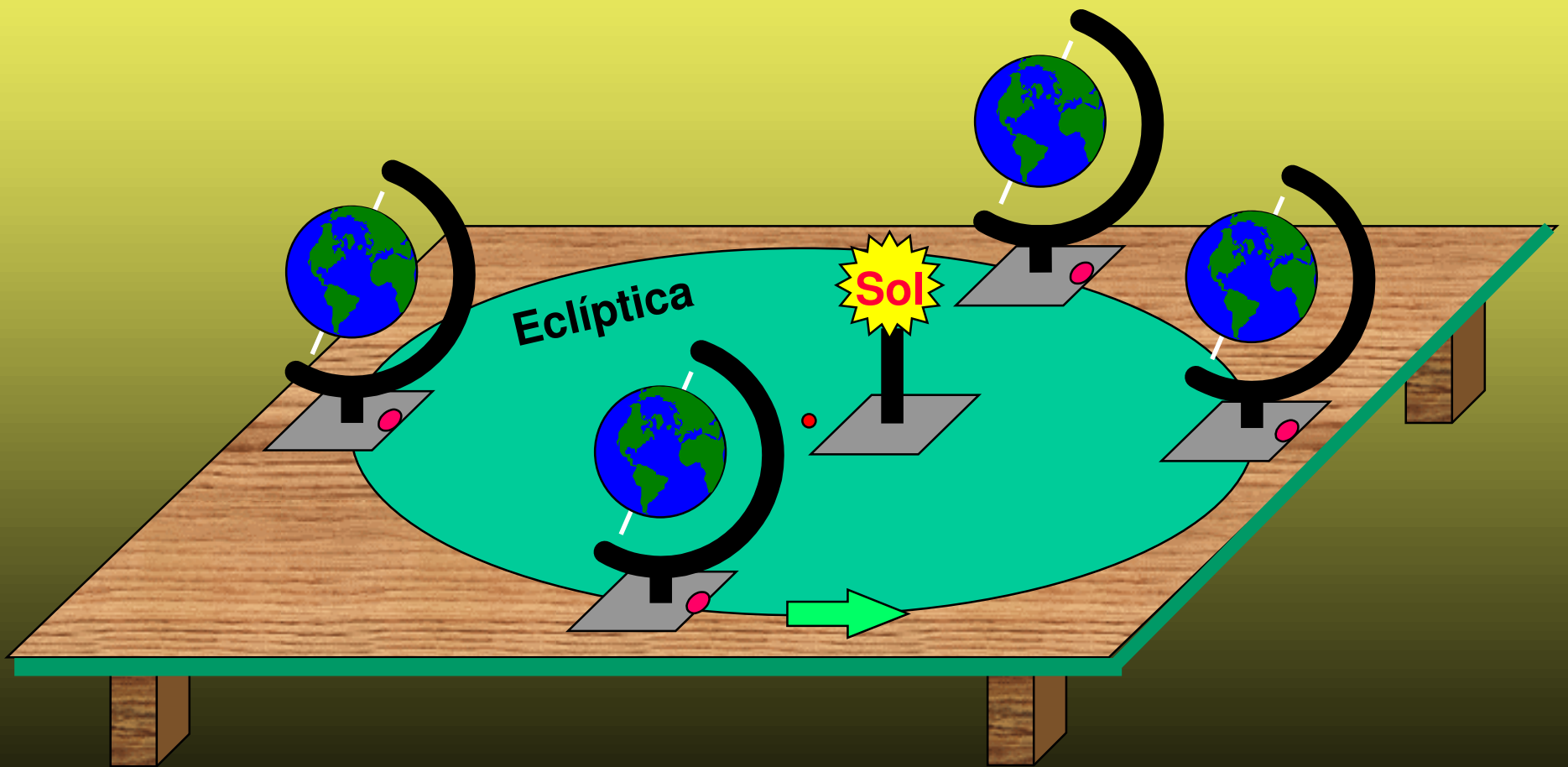
Órbita da Terra



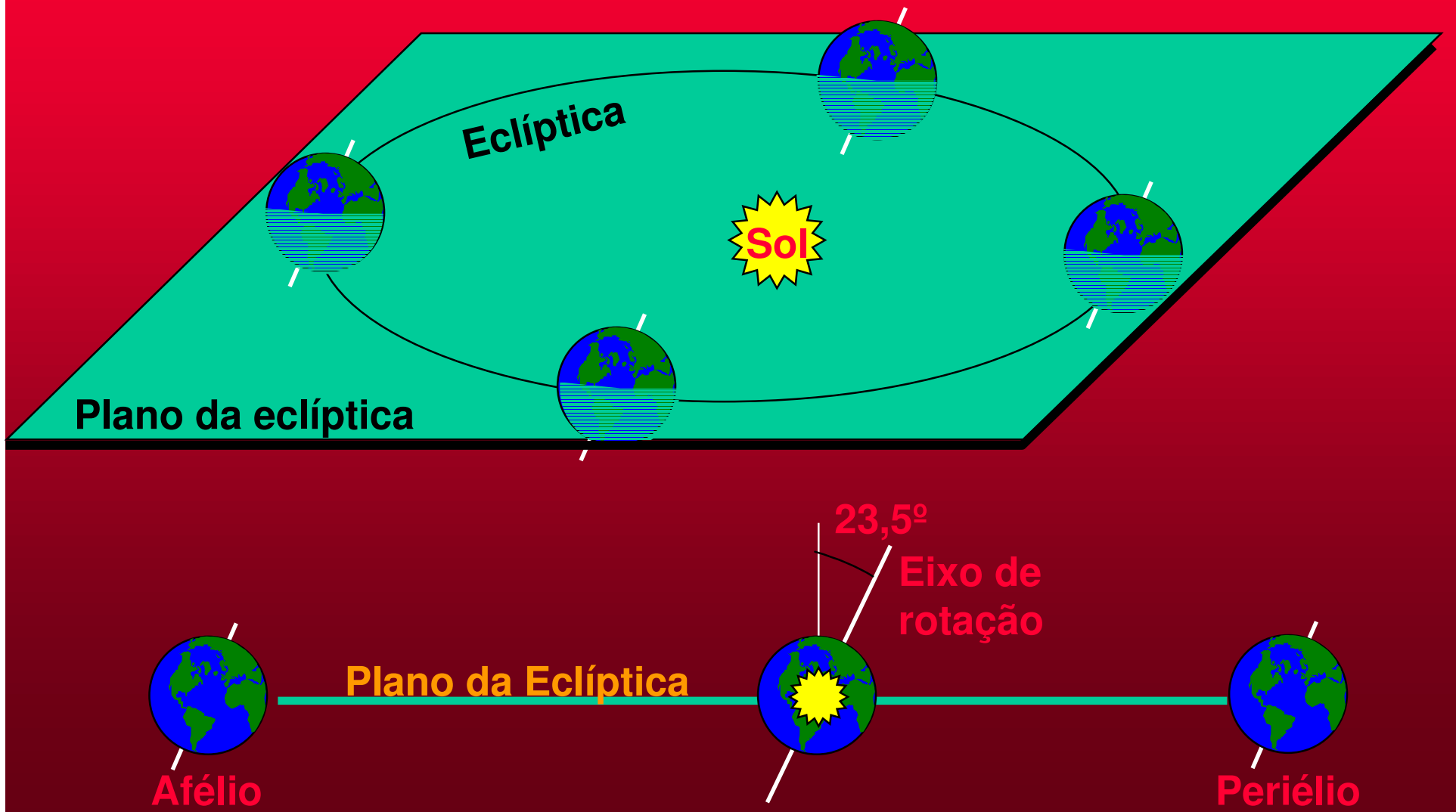
Representação da Órbita da Terra



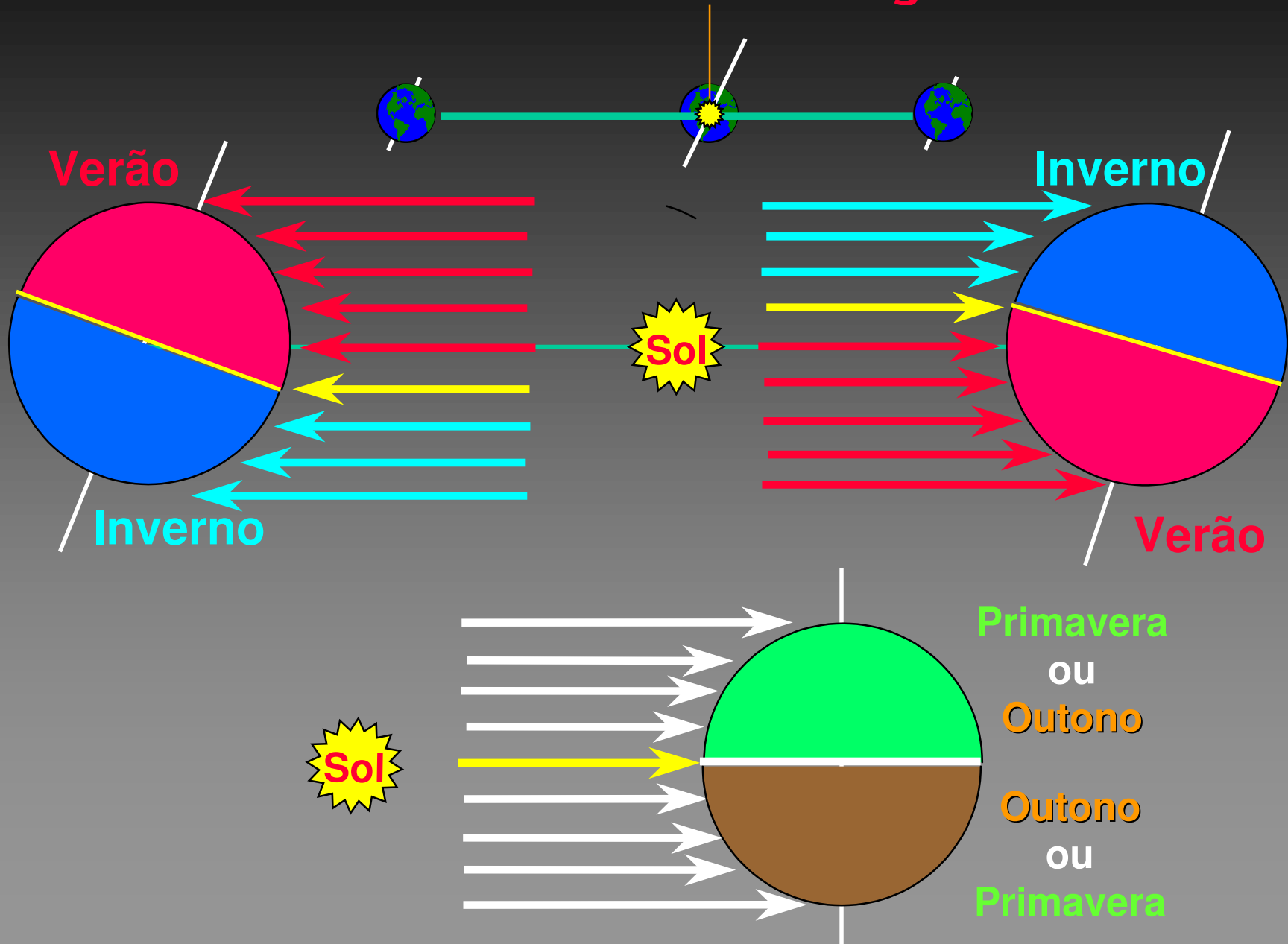
Esquema da Órbita da Terra em torno do Sol



Órbita da Terra em torno do Sol

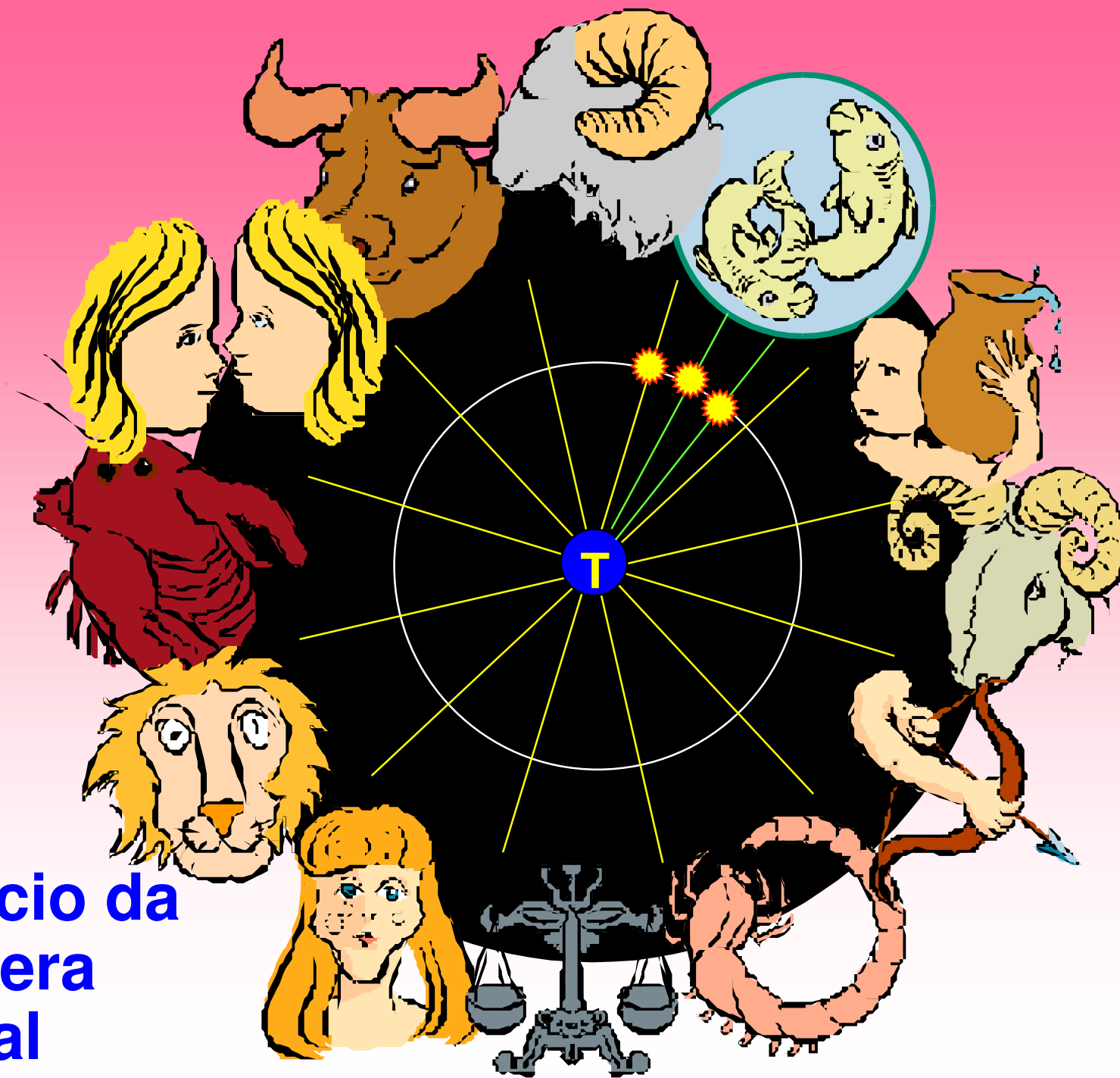


Motivo das Estações

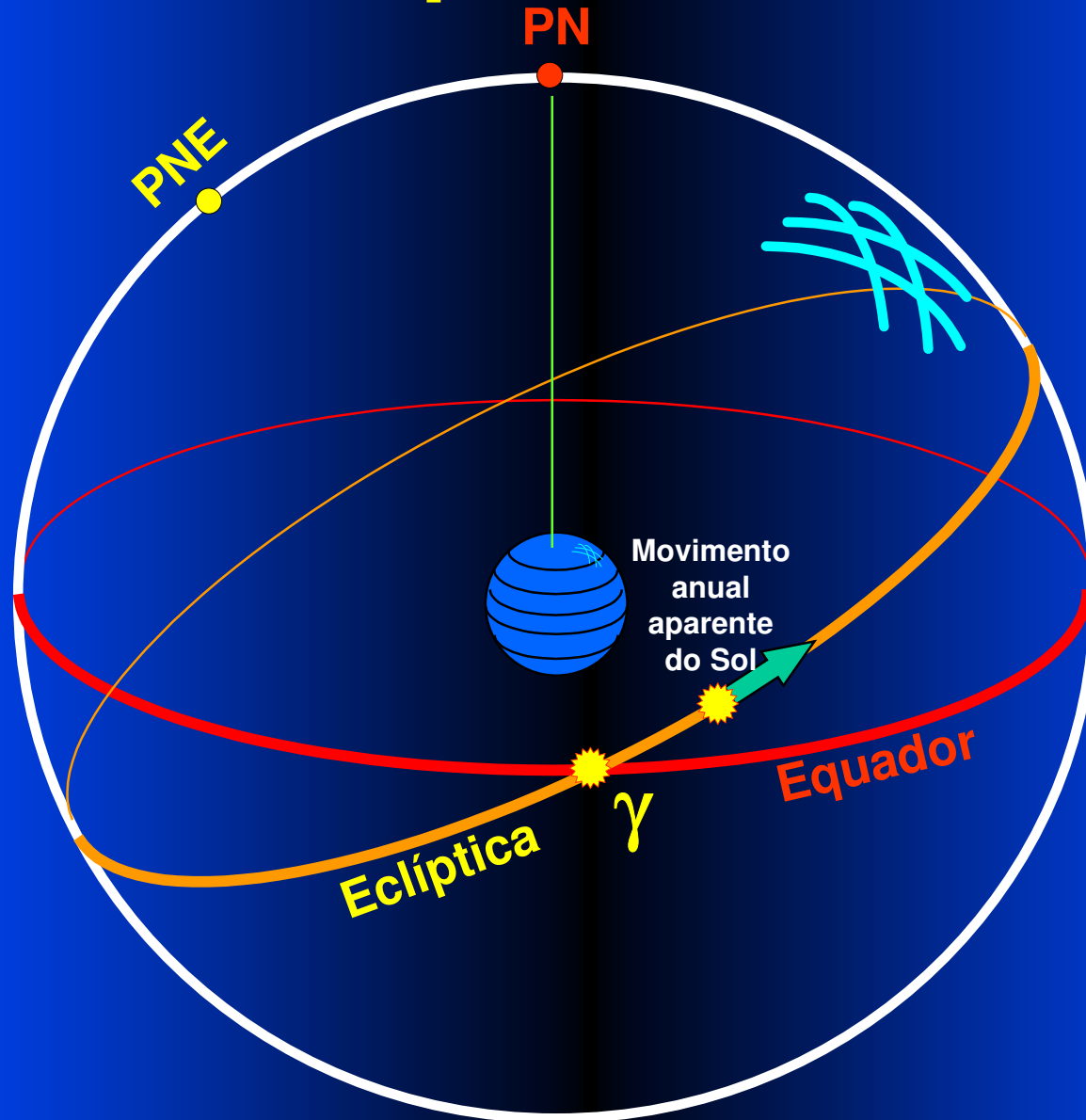


Precessão

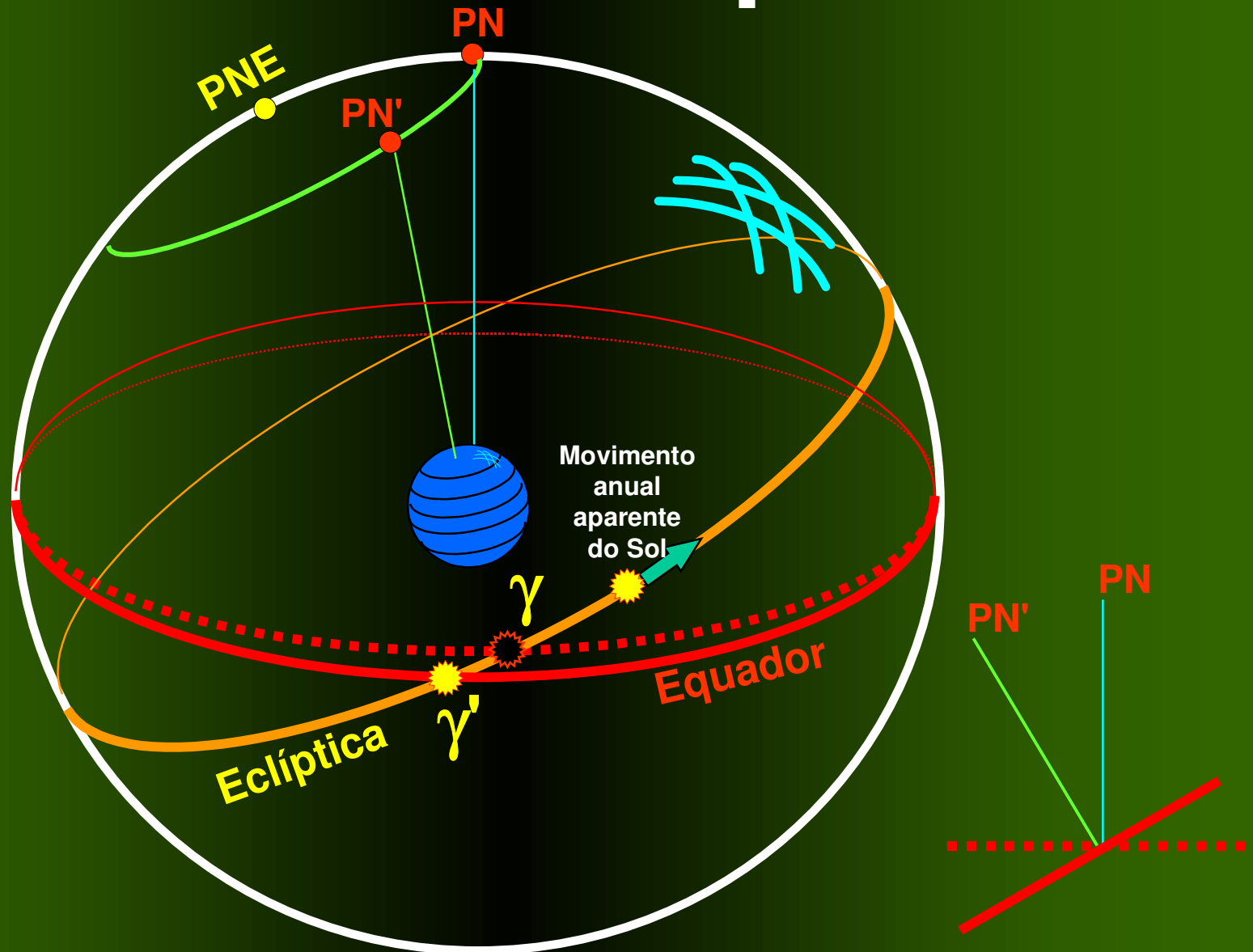
**Sol no início da
primavera
Boreal**



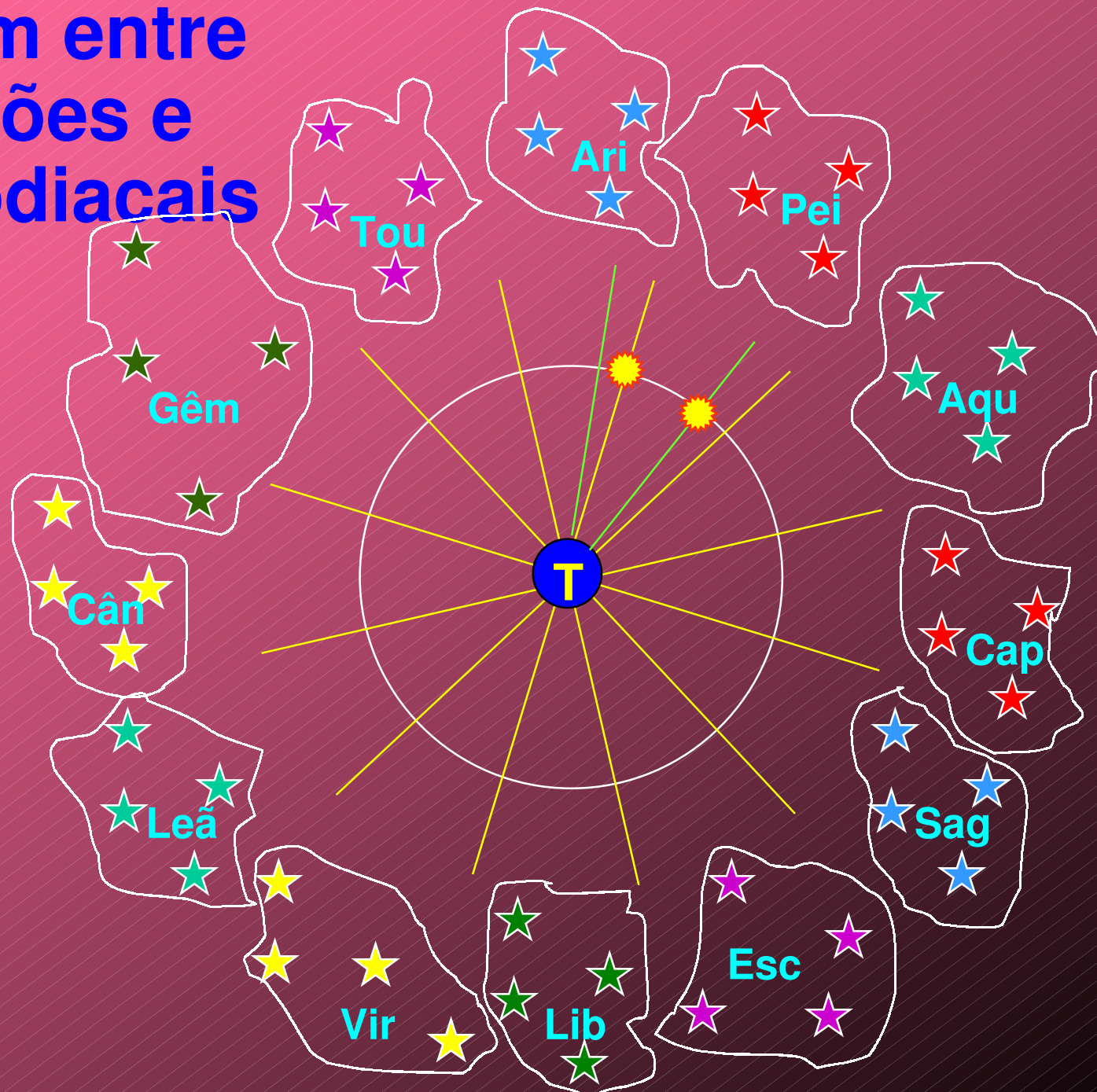
Equinócio da primavera boreal (γ)



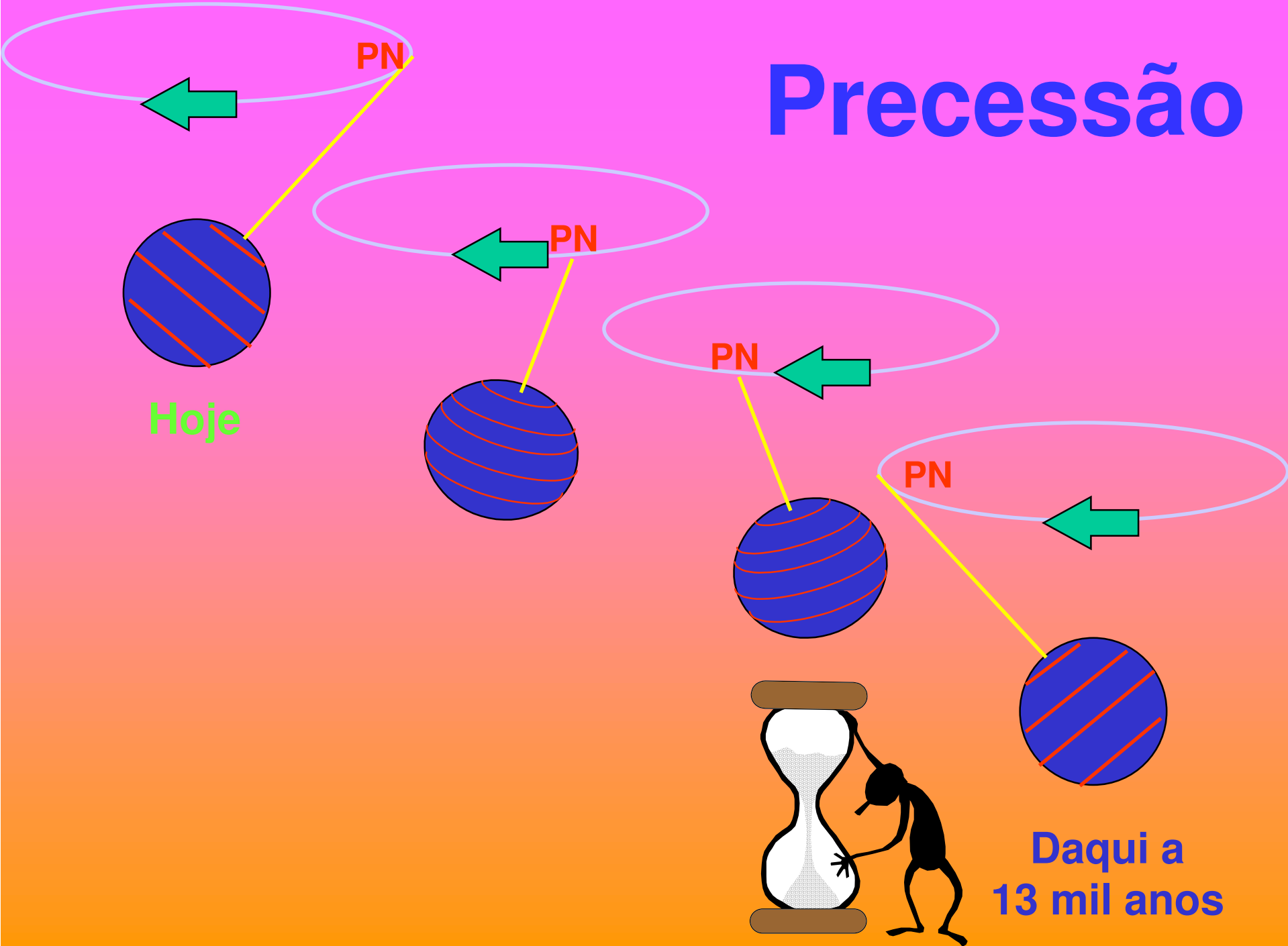
Precessão dos equinócios



Defasagem entre Constelações e Signos Zodiacais

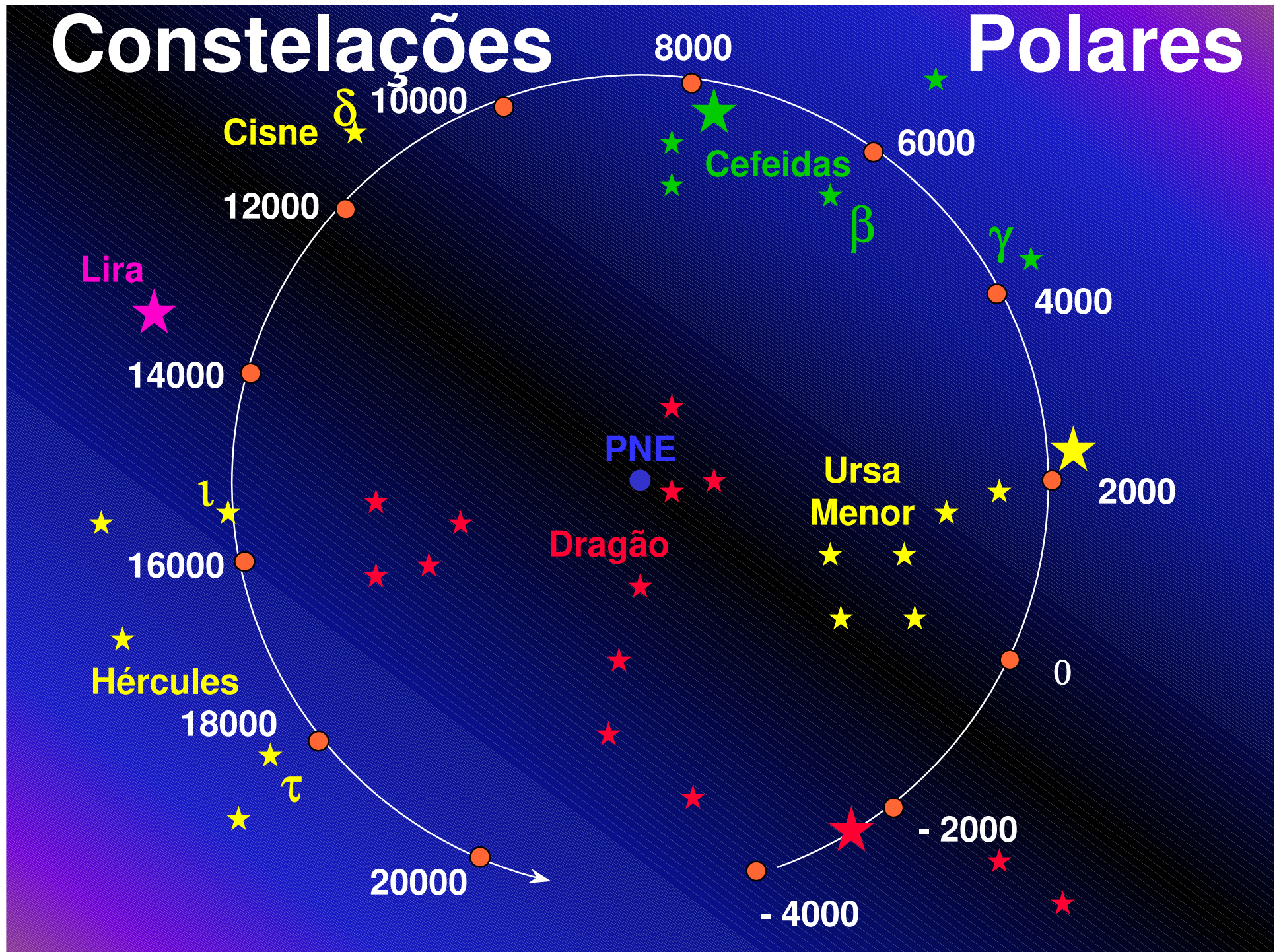


Precessão



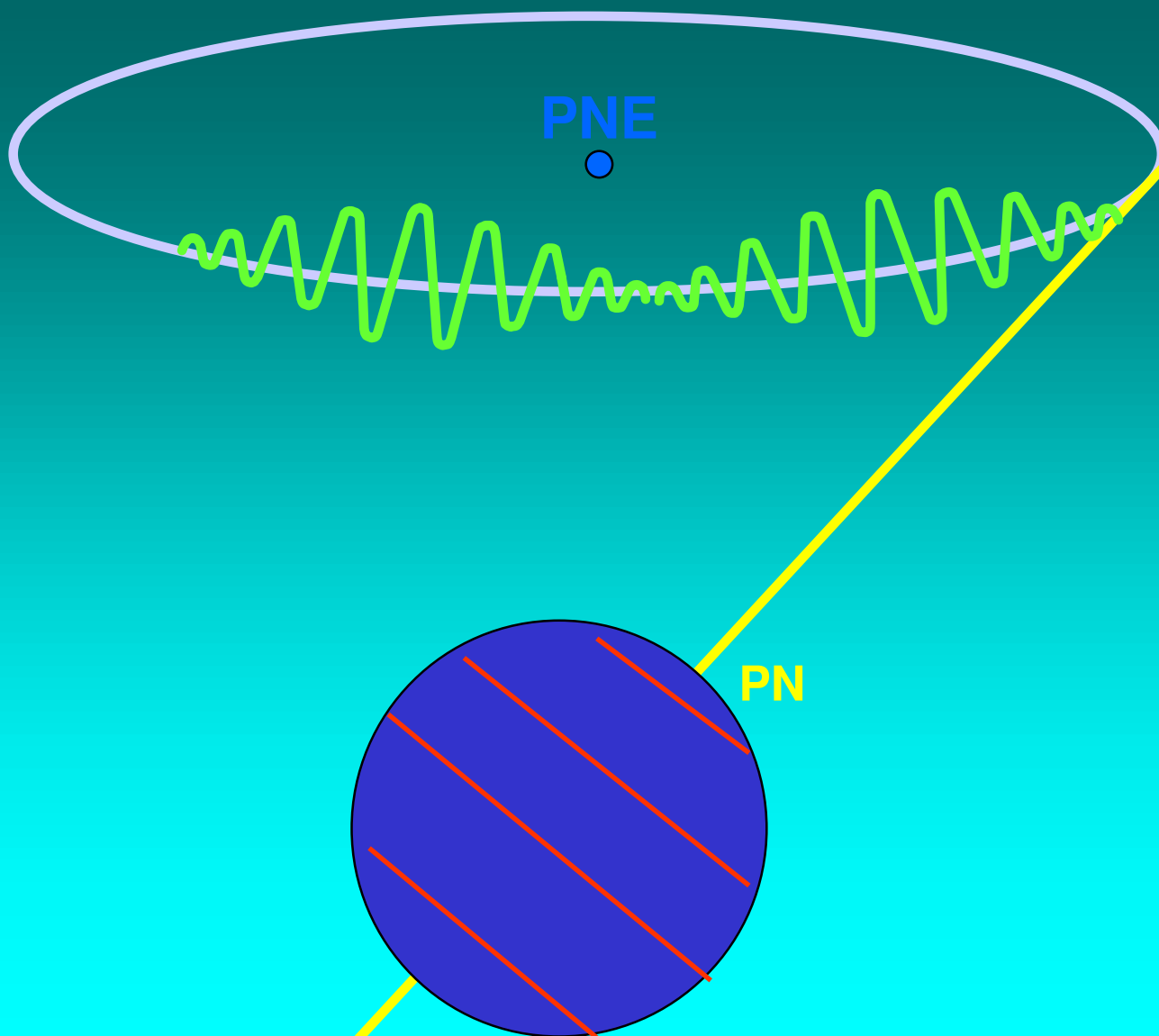
Constelações

Polares



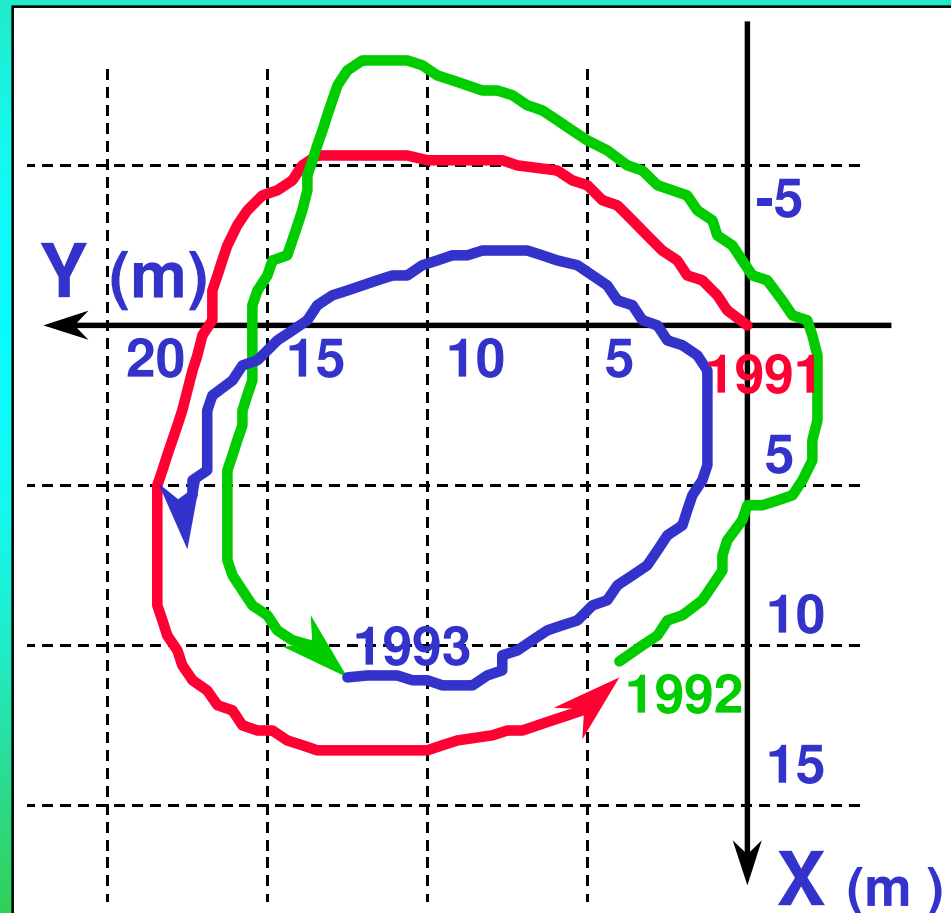
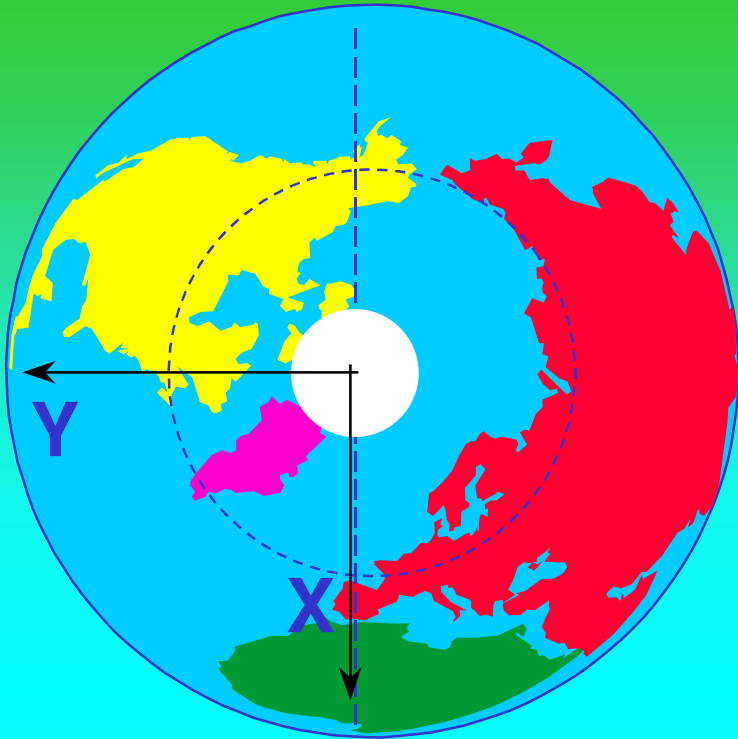
Nutação

Nutação



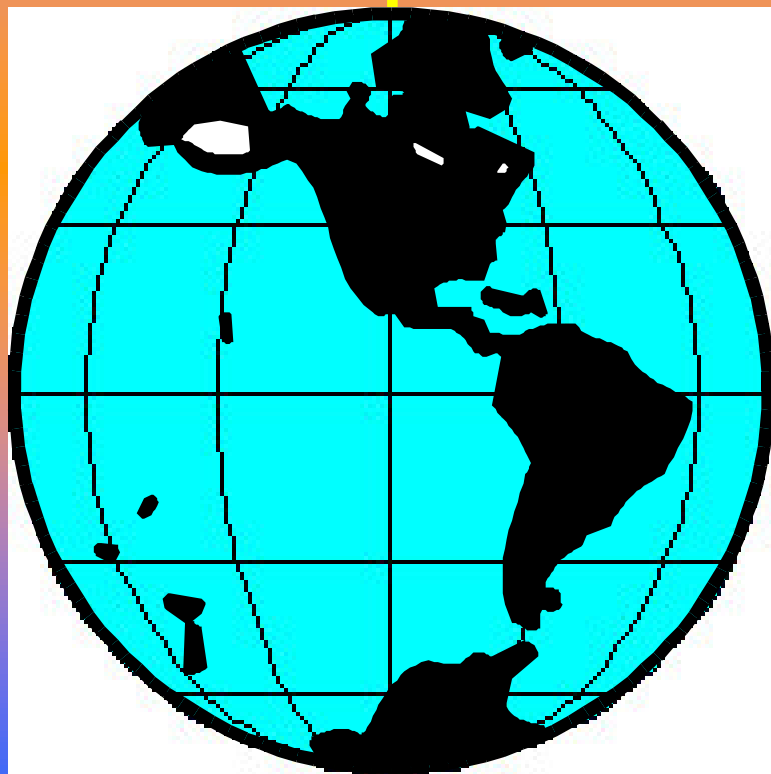
Movimento dos Pólos

Movimento dos pólos

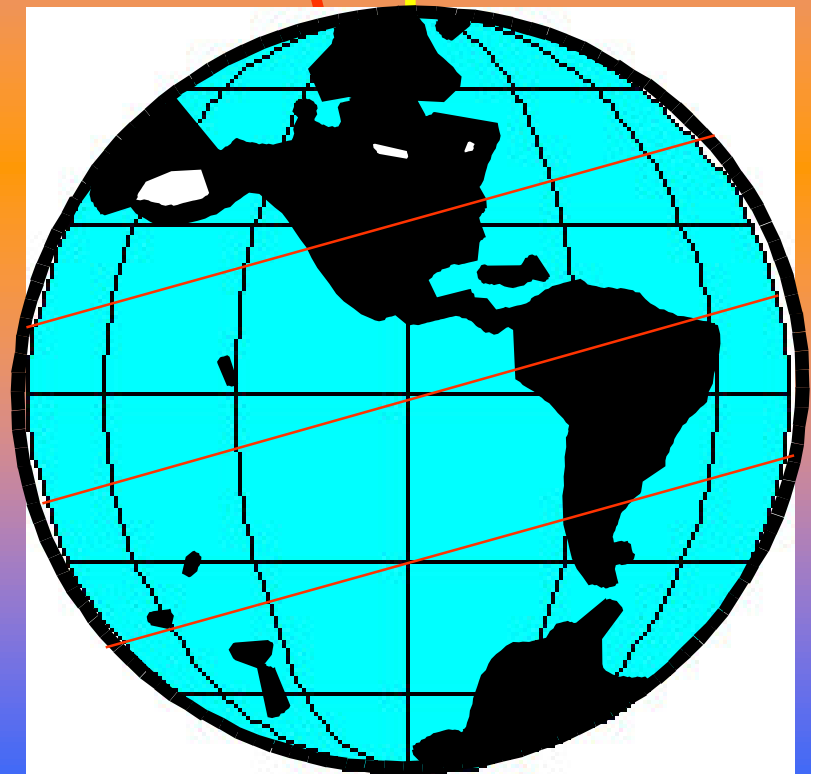


Movimento dos Pólos

Eixo fixo
no espaço

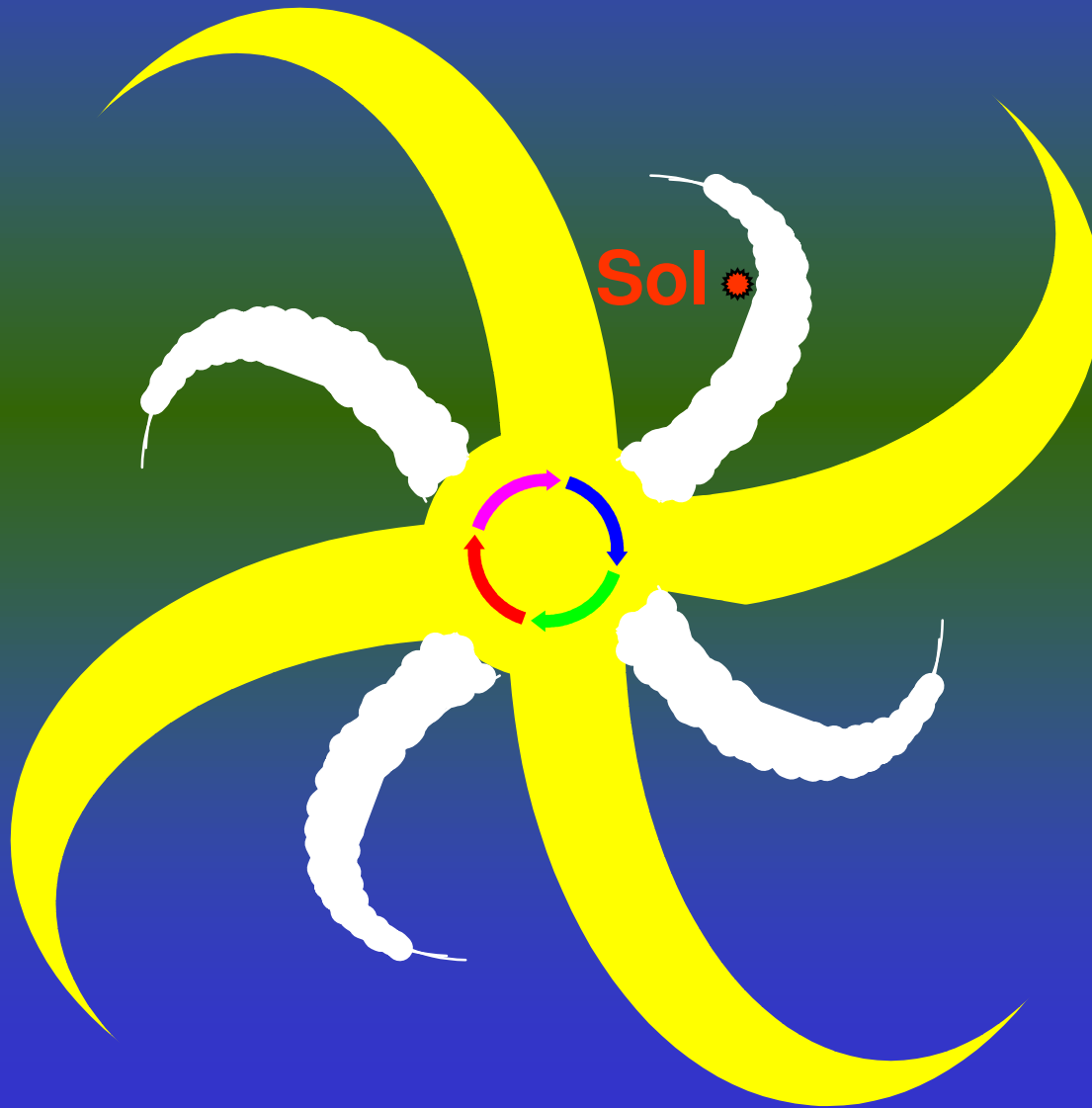


“Eixo” da Terra
“rodada”



Rotação Galáctica

Movimento Galáctico



Nossa
Galáxia

Período:
250 milhões
de anos



Quantos movimentos tem a Terra?

Só UM ...!



O movimento que a Terra tem...!

Componentes do movimento da Terra

λ Rotação

λ Translação

λ Precessão

λ Nutação

λ Movimento dos pólos

λ Movimento de rotação galáctica

λ ...

Fim