# AGA0106
# Astronomia de Posição

Prof. Rogério Monteiro

# A esfera celeste e as coordenadas astronômicas - Sistema equatorial

Agradecimentos: Prof. Roberto Boczko

Aula A03

# Tópicos da aula

- Revisão: sistema horizontal
- Tipos de meridiano
- Vantagens e desvantagens do sistema horizontal
- Latitude astronômica
- Manipulações com ângulos
- Sistema equatorial de coordenadas

# Sistema horizontal (revisão)

**meridiano local**

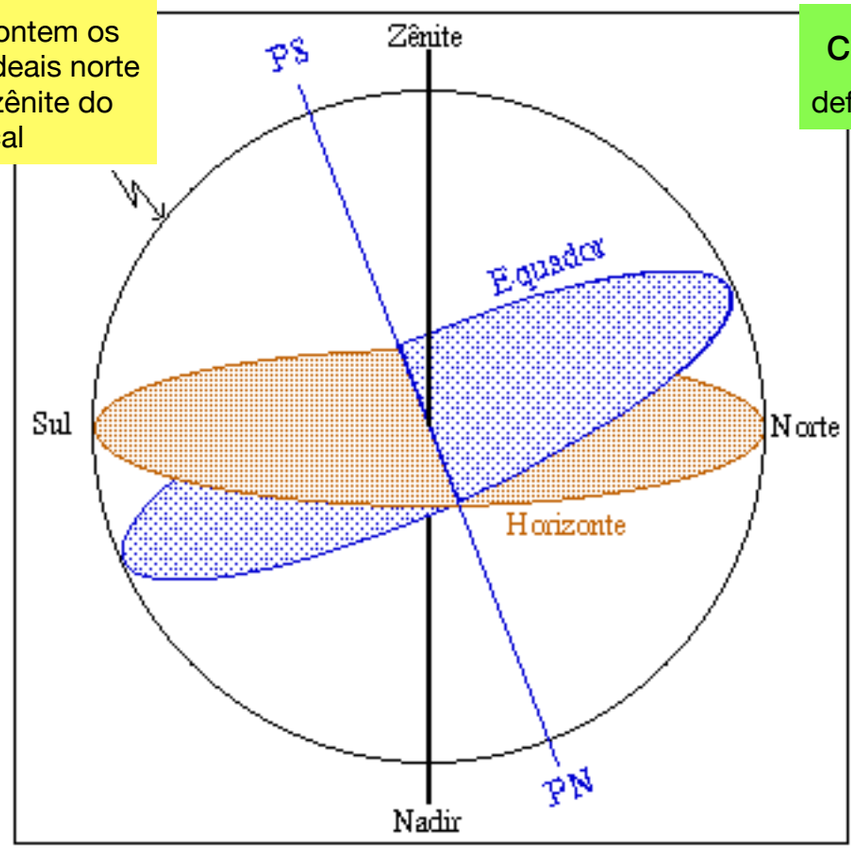
linha de contem os pontos cardeais norte e sul e o zênite do local

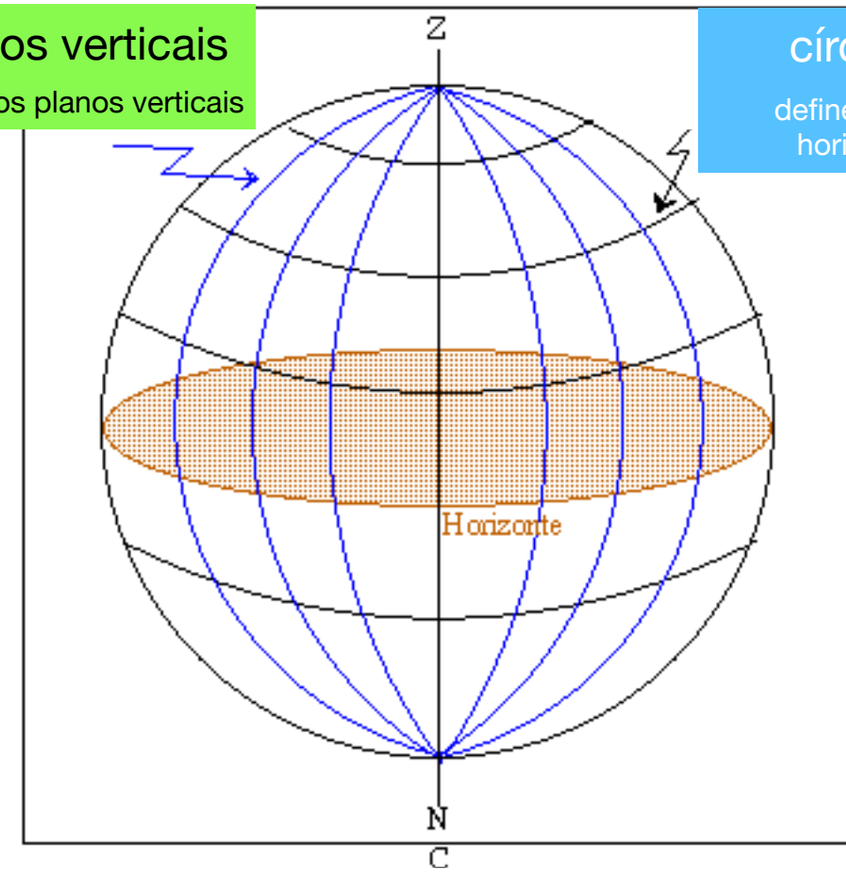
**círculos verticais**

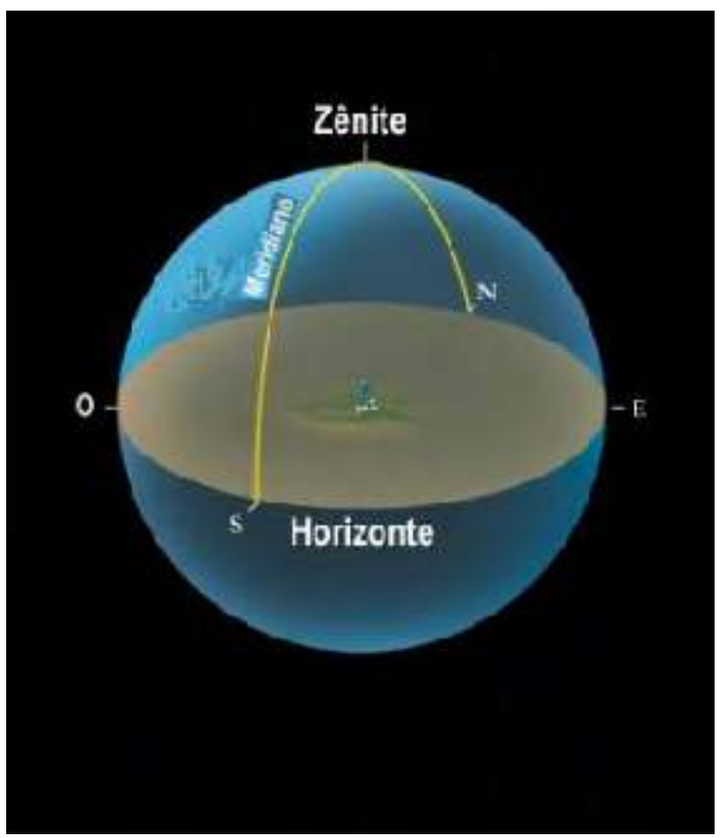
definem os planos verticais

**círculos de altura**

definem planos paralelos ao horizonte (almucântaras)



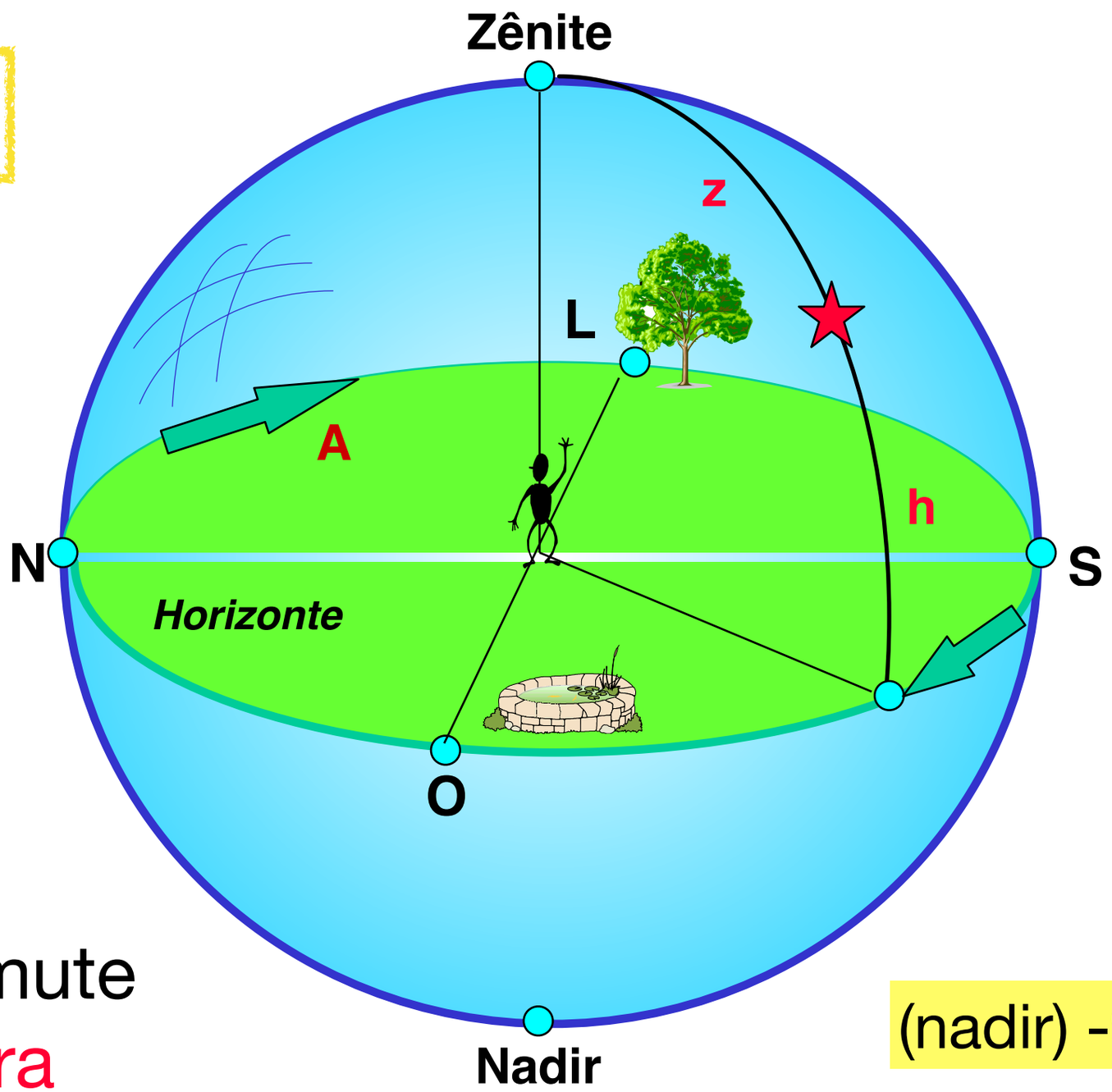



# Sistema horizontal (altazimutal)

★ A,h

★ A,z




A = azimute

h = altura

z = distância zenital

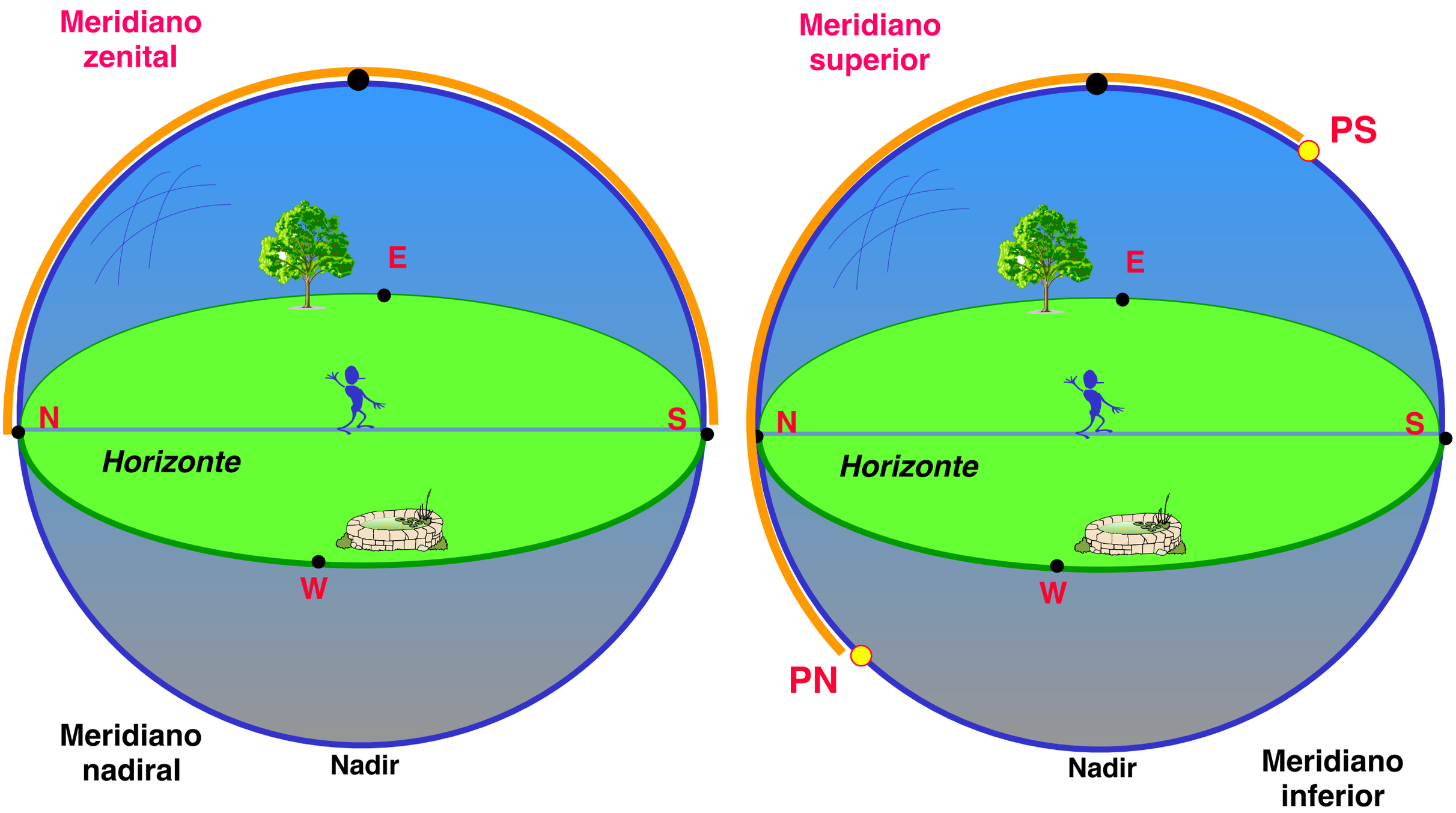
$0^o \leq A < 360^o$

(nadir) $-90^o \leq h \leq +90^o$ (zênite)

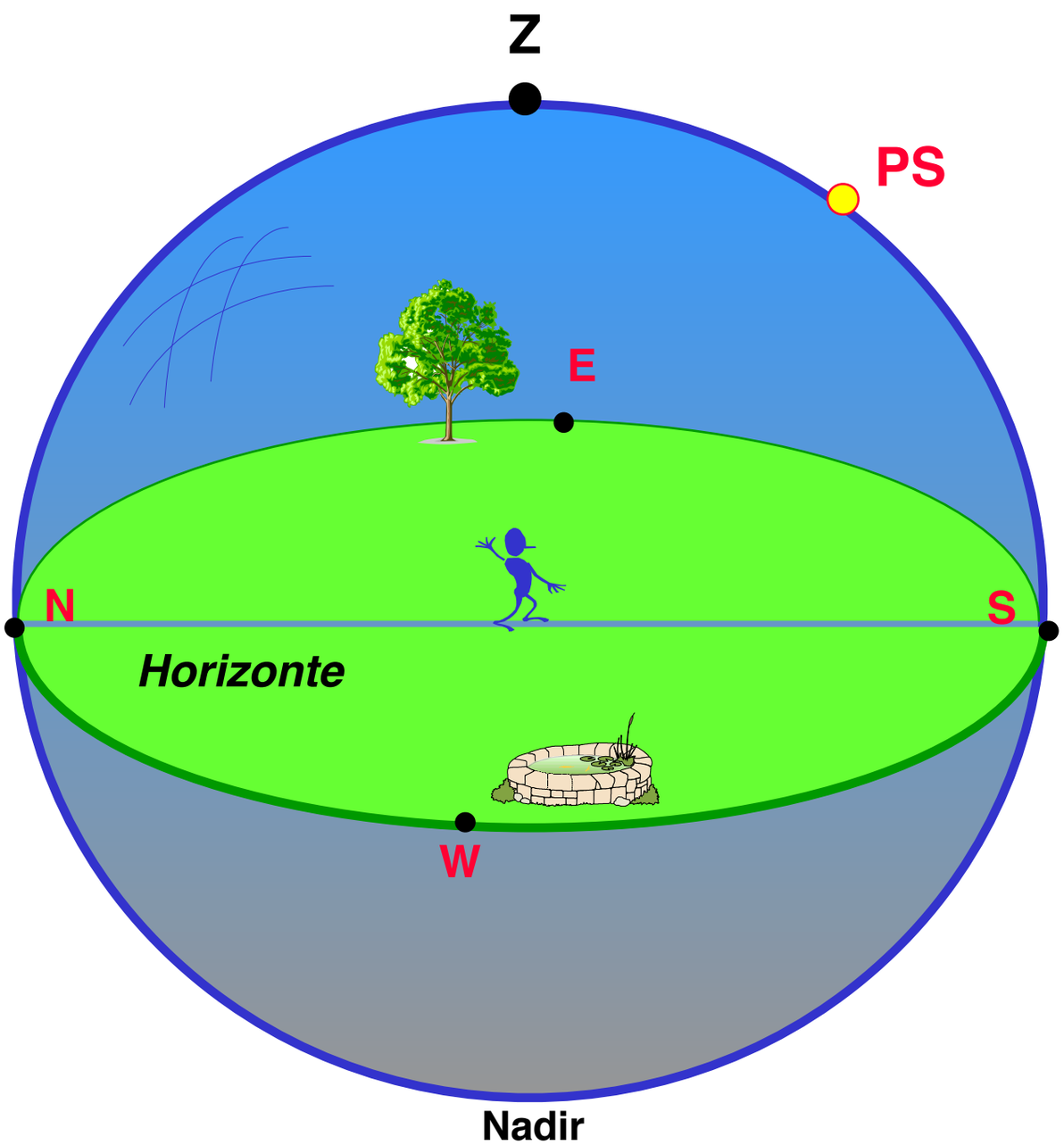
(zênite) $0^o \leq z \leq 180^o$ (nadir)

# Classificação dos meridianos

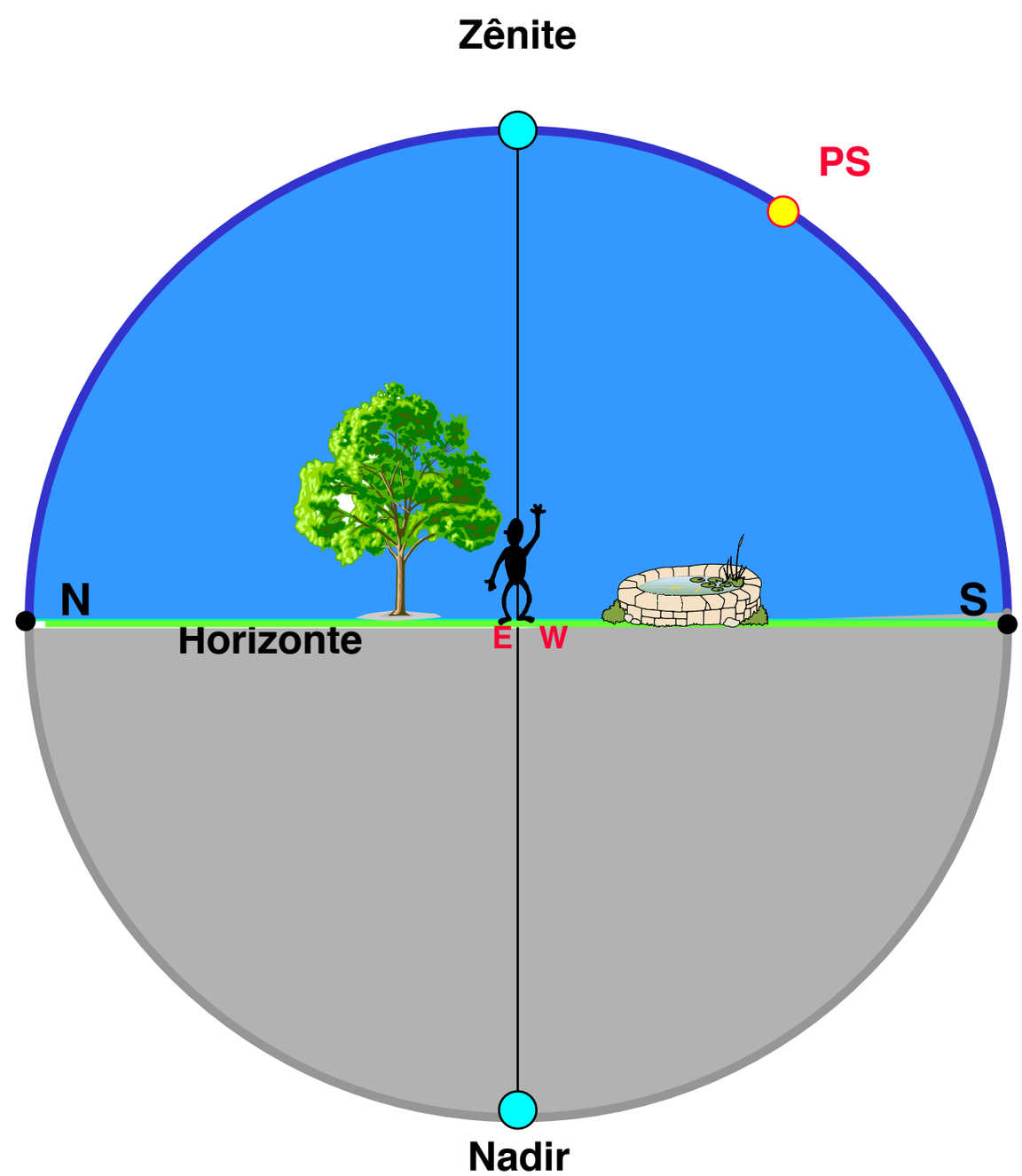
# Tipos de meridiano



# Projeção no meridiano local

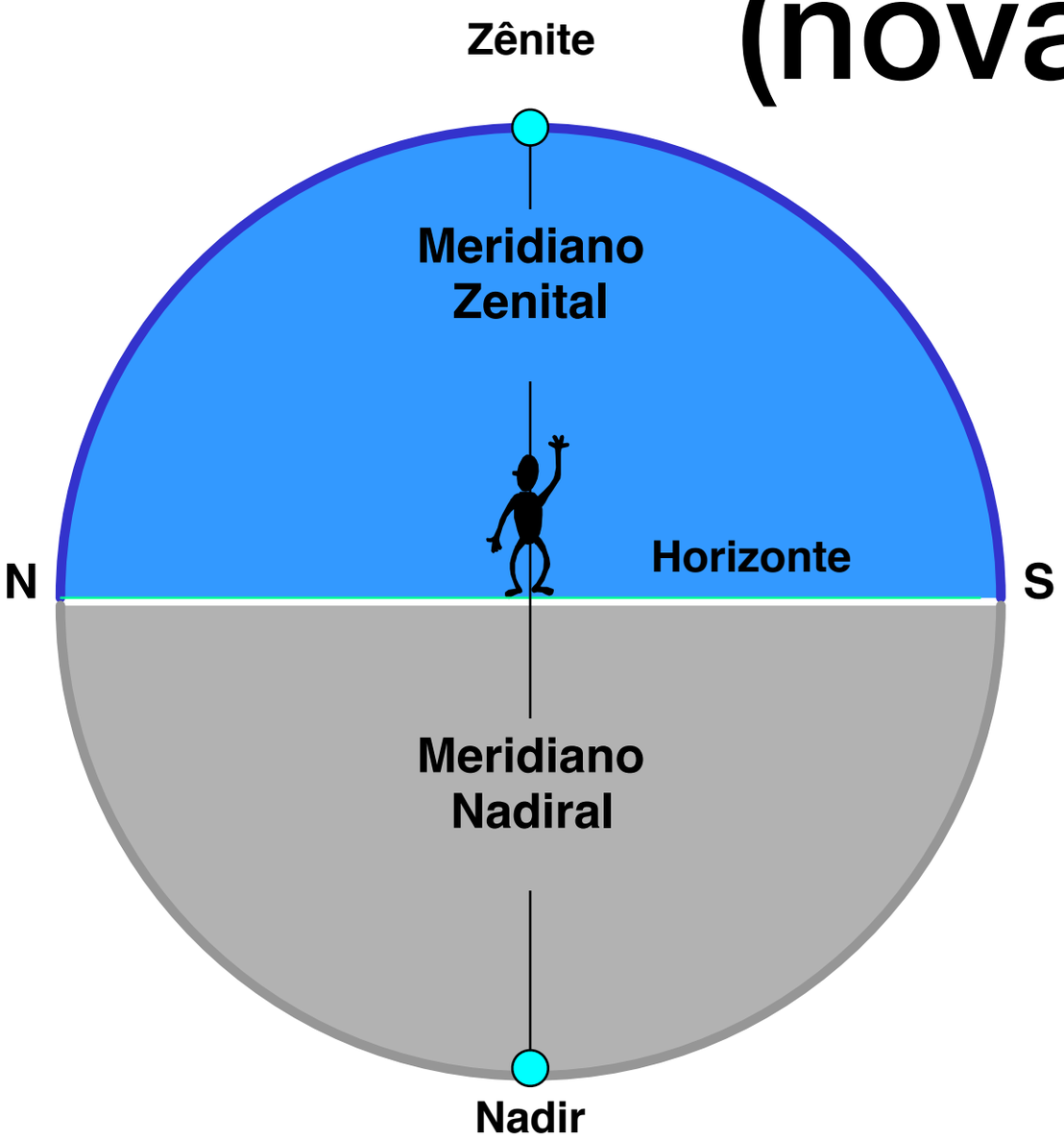


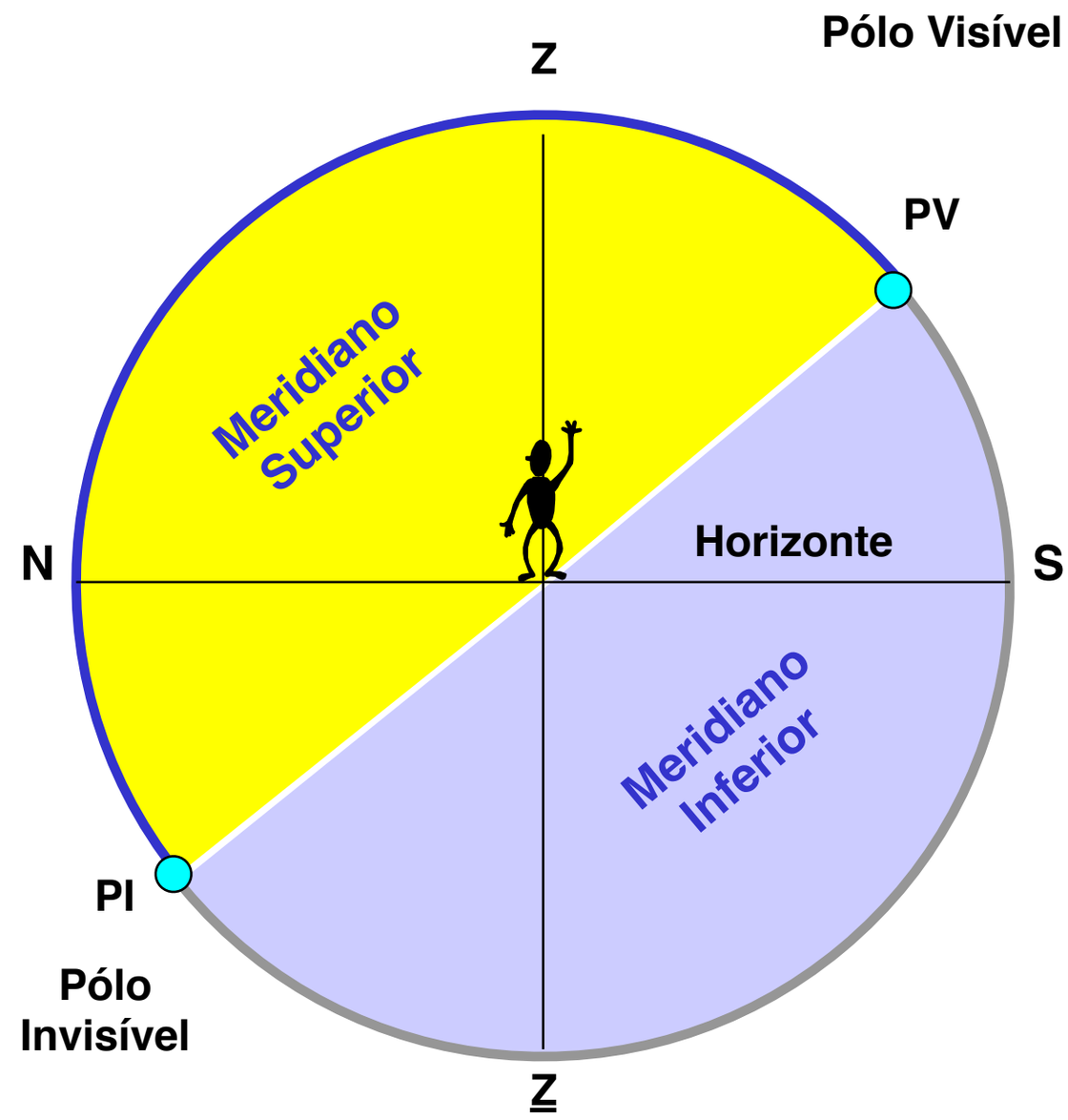

3D




2D

# Tipos de meridiano (novamente)

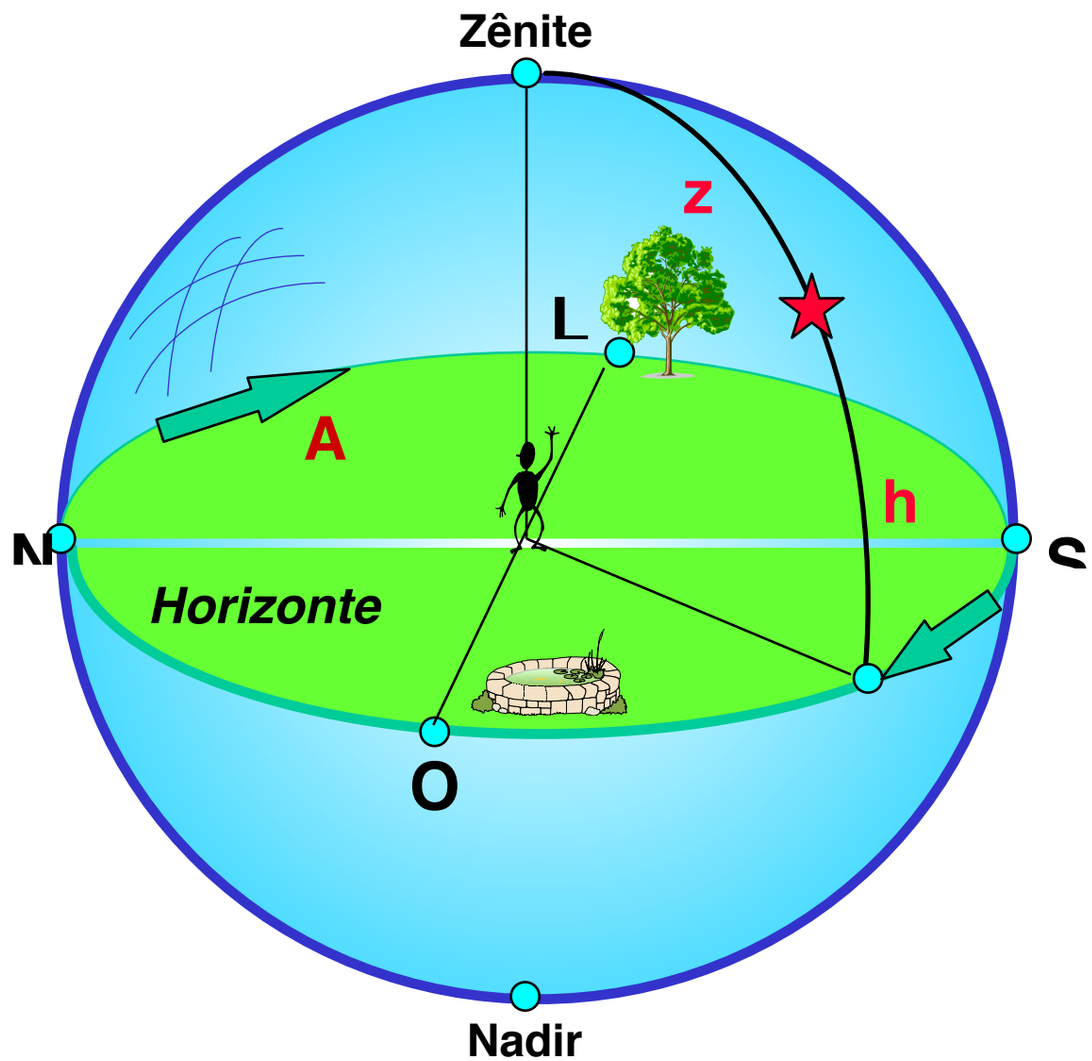


# Vantagens e desvantagens do sistema horizontal

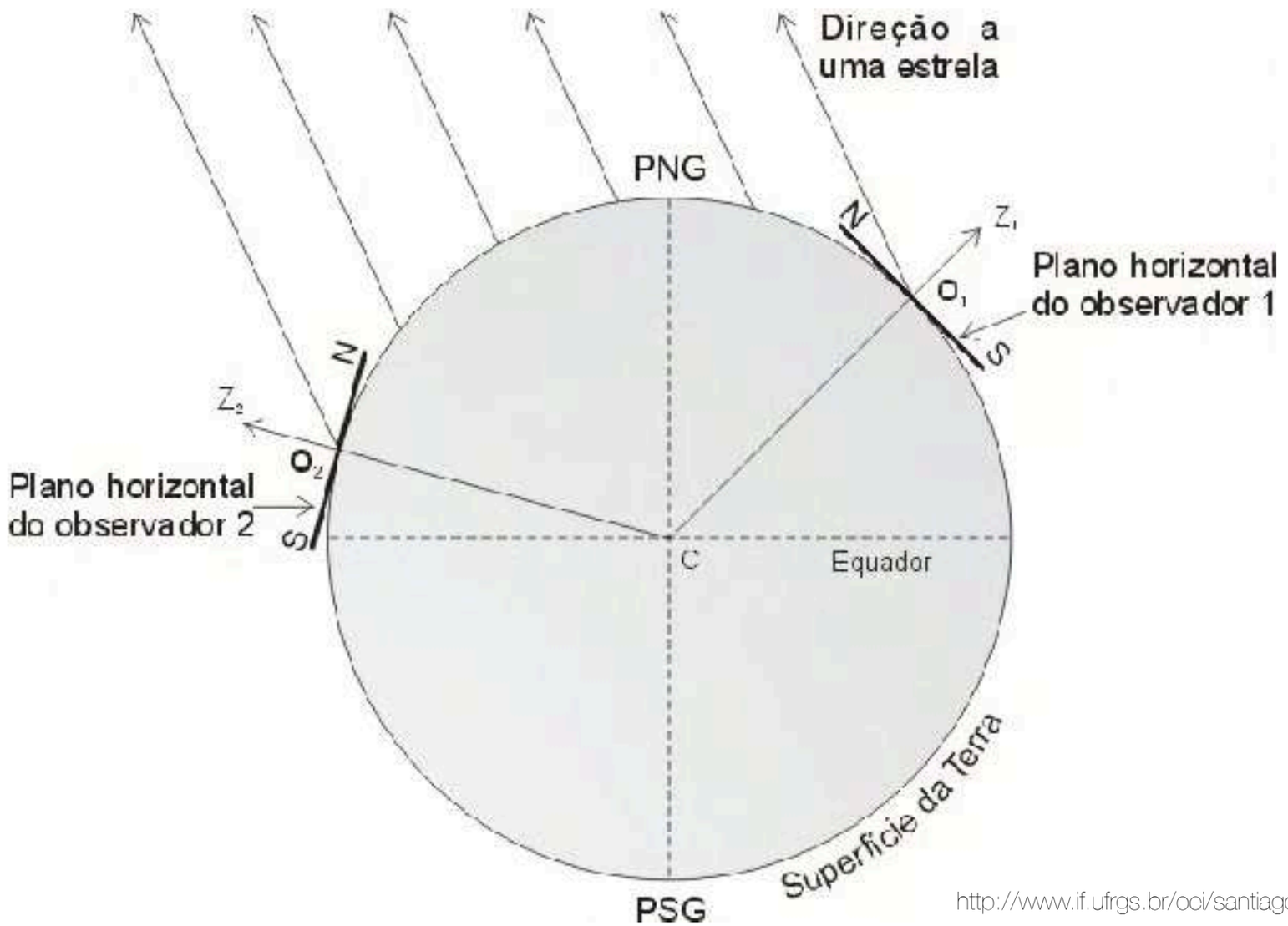
# Vantagem do sistema horizontal

- As coordenadas (A, h) são de simples visualização;



# Desvantagem do sistema horizontal

A direção da vertical e do plano horizontal **mudam** com a posição no observador na Terra

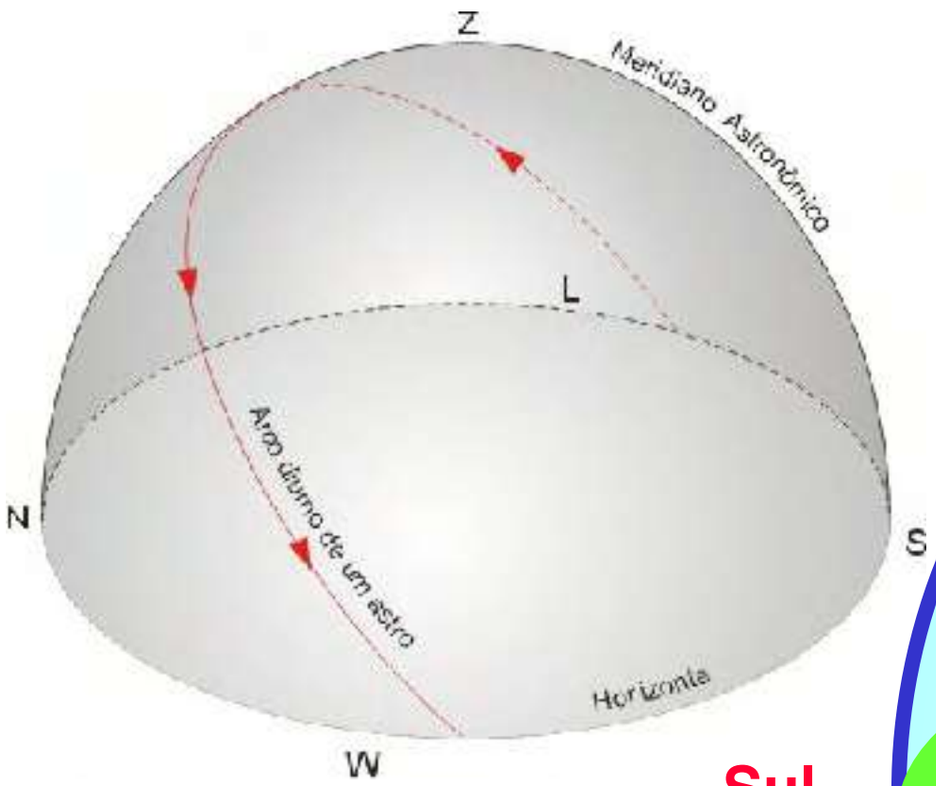



http://www.if.ufrgs.br/oei/santiago/fis2005/textos/horizcrds.htm

A direção à fonte **não** depende da posição do observador, mas a direção da vertical depende.

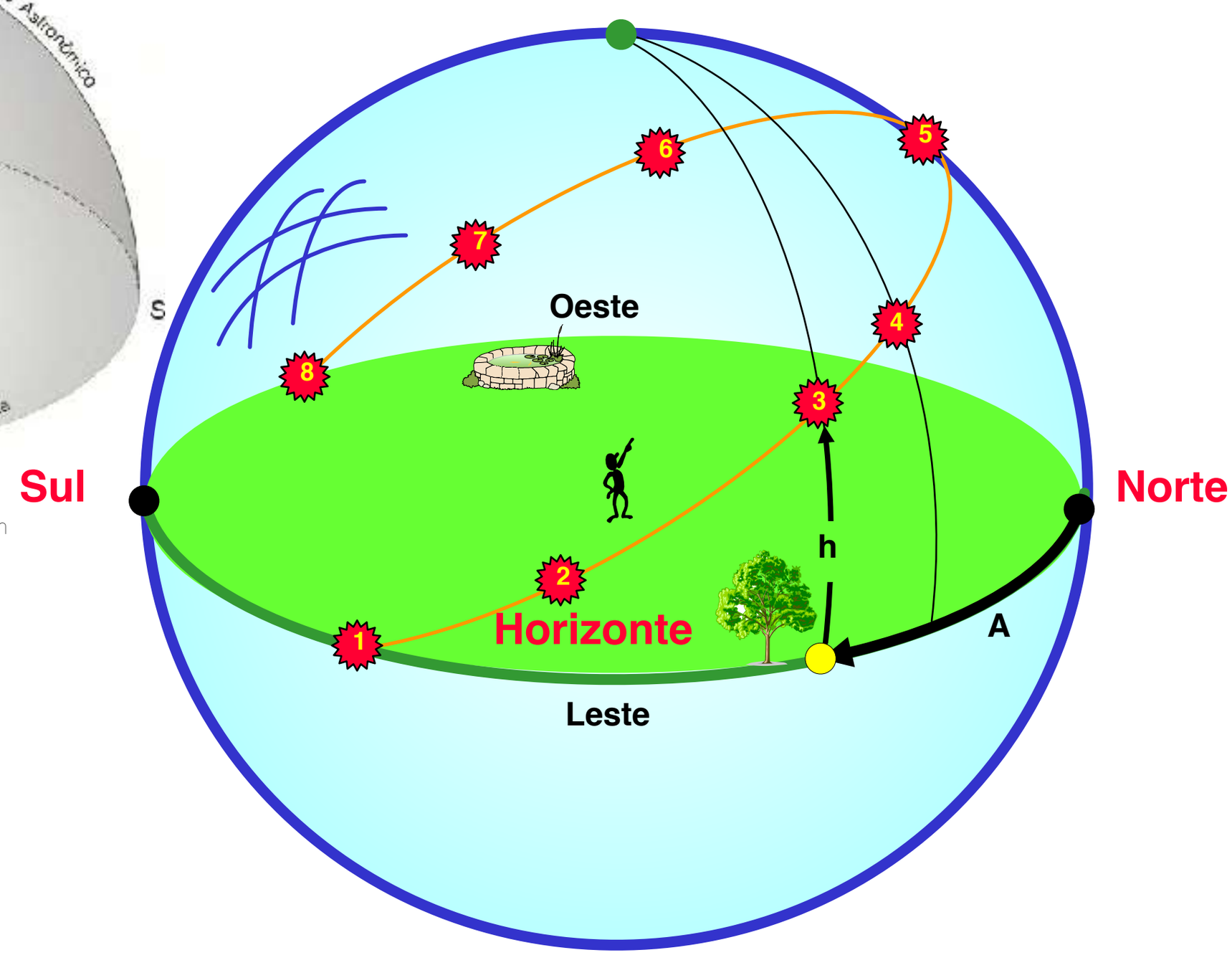
# Desvantagem do sistema horizontal

Movimento diurno de um astro celeste




http://www.if.ufrgs.br/oei/santiago/fis2005/textos/horizcrds.htm

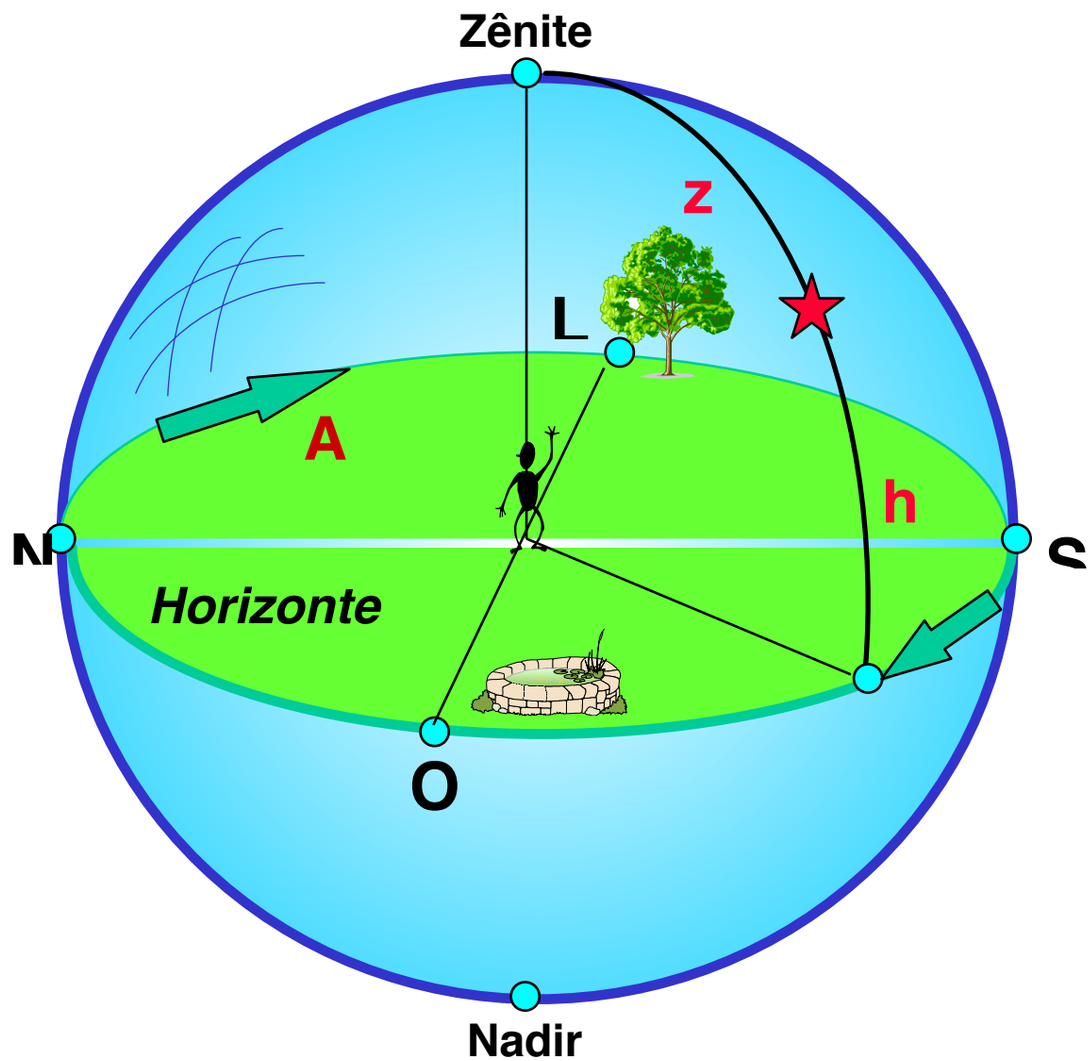
Movimento diurno do Sol




$$(A,h) = f(t)$$

# Desvantagem do sistema horizontal

- Depende da localização do observador na Terra;
- As coordenadas (A, h) variam em função do tempo.



# Latitude astronômica

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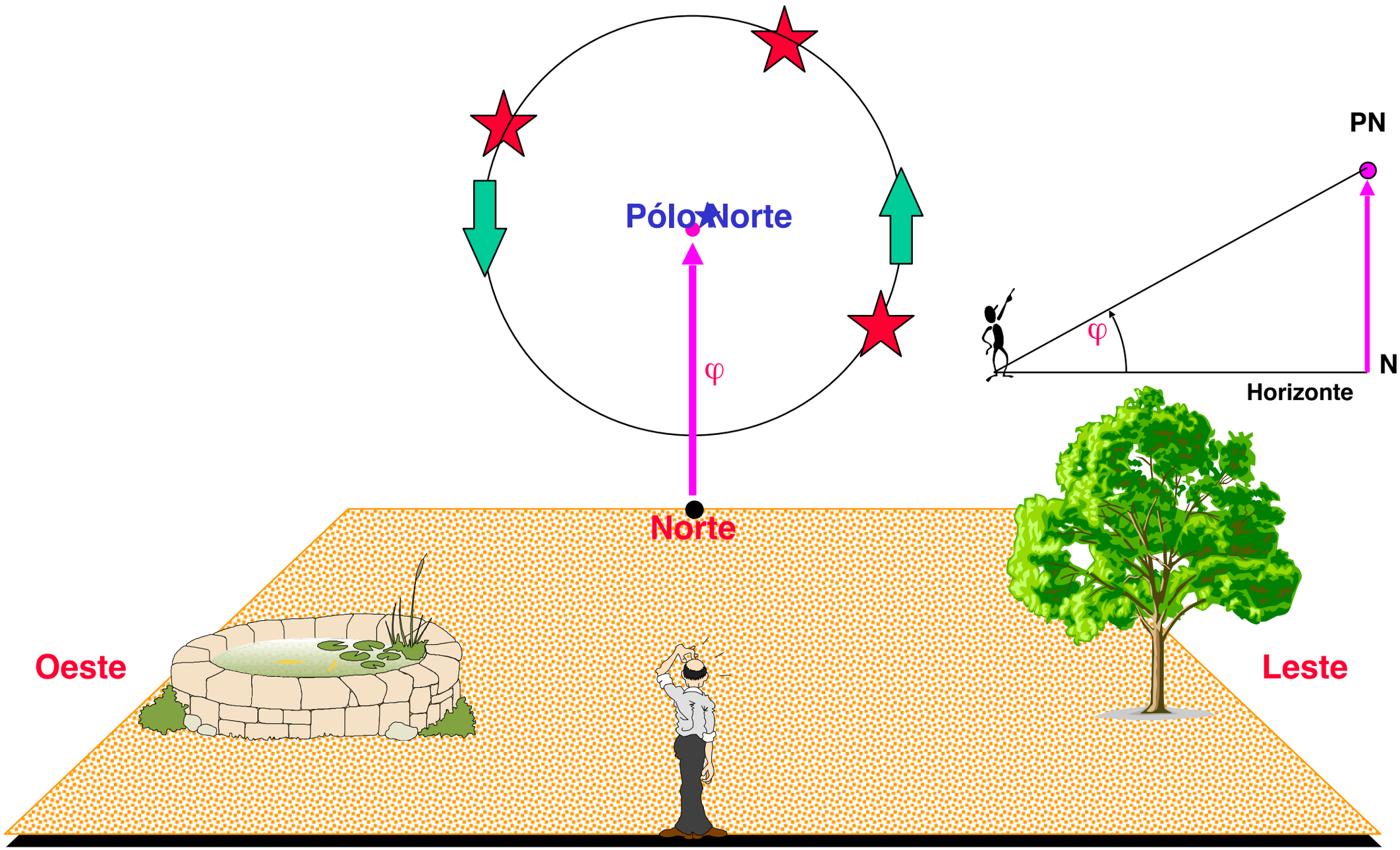
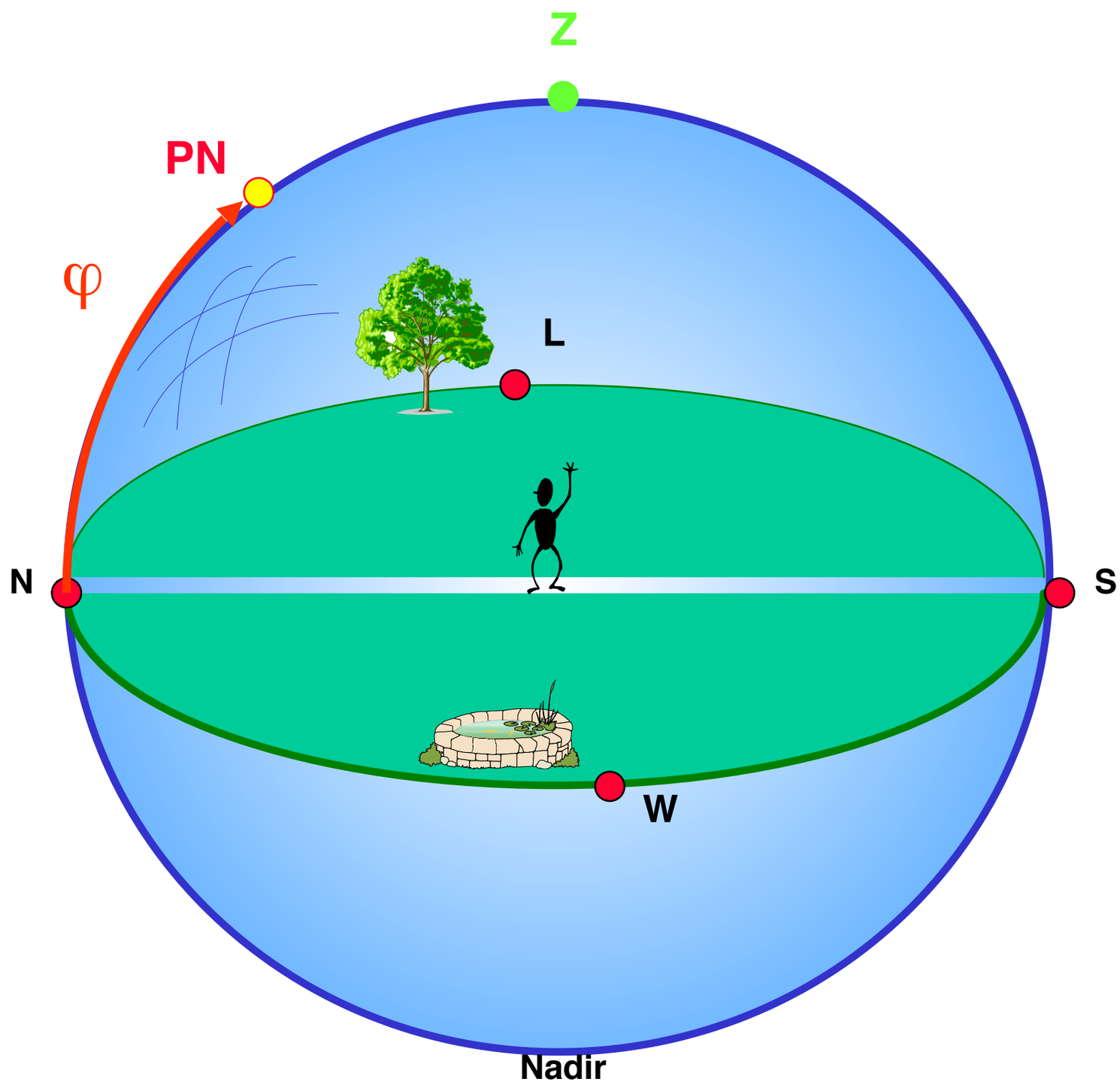


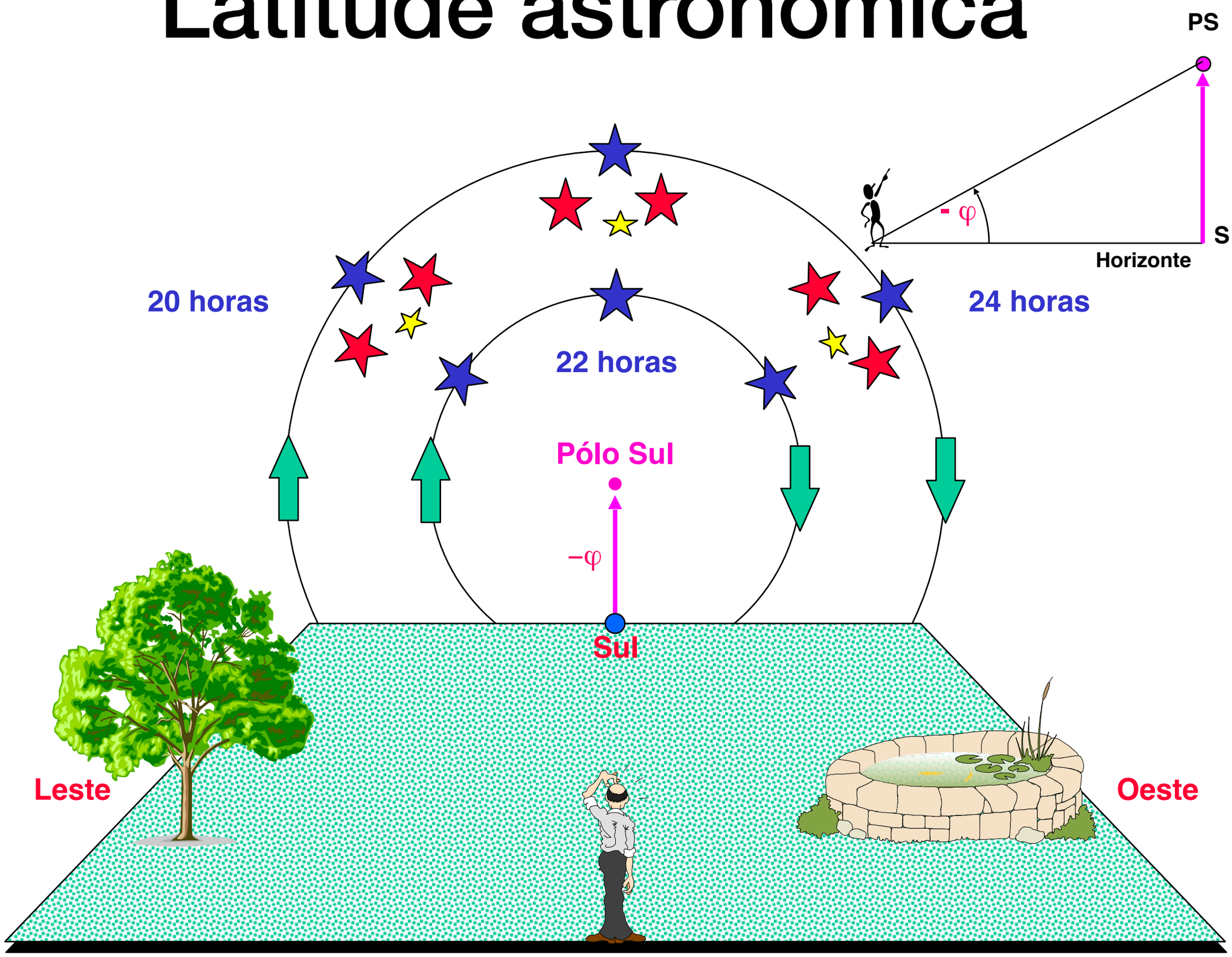

A latitude astronômica corresponde a altura do polo celeste

# Latitude astronômica boreal

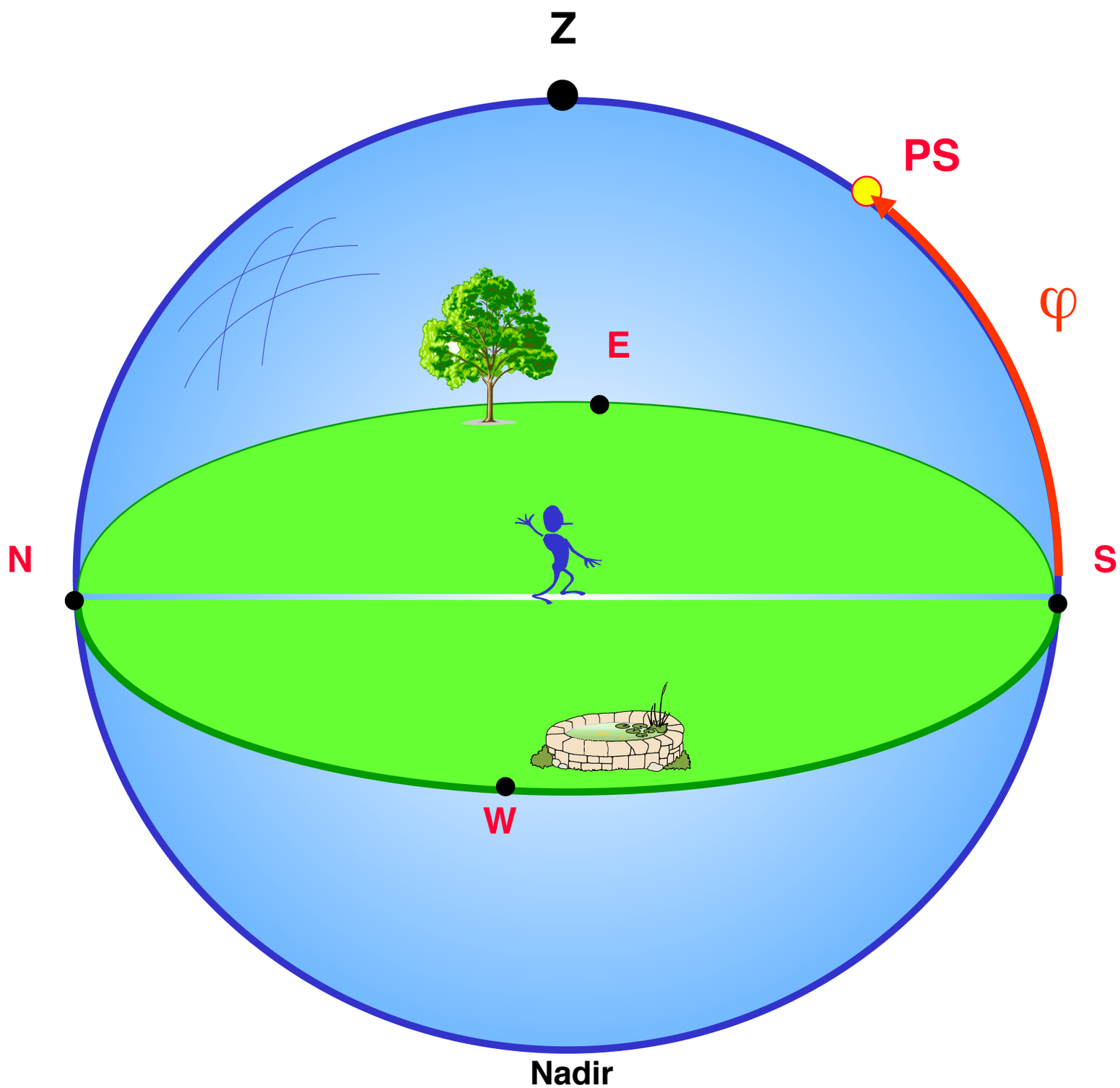



$\varphi = h_{PN}$

# Latitude astronômica



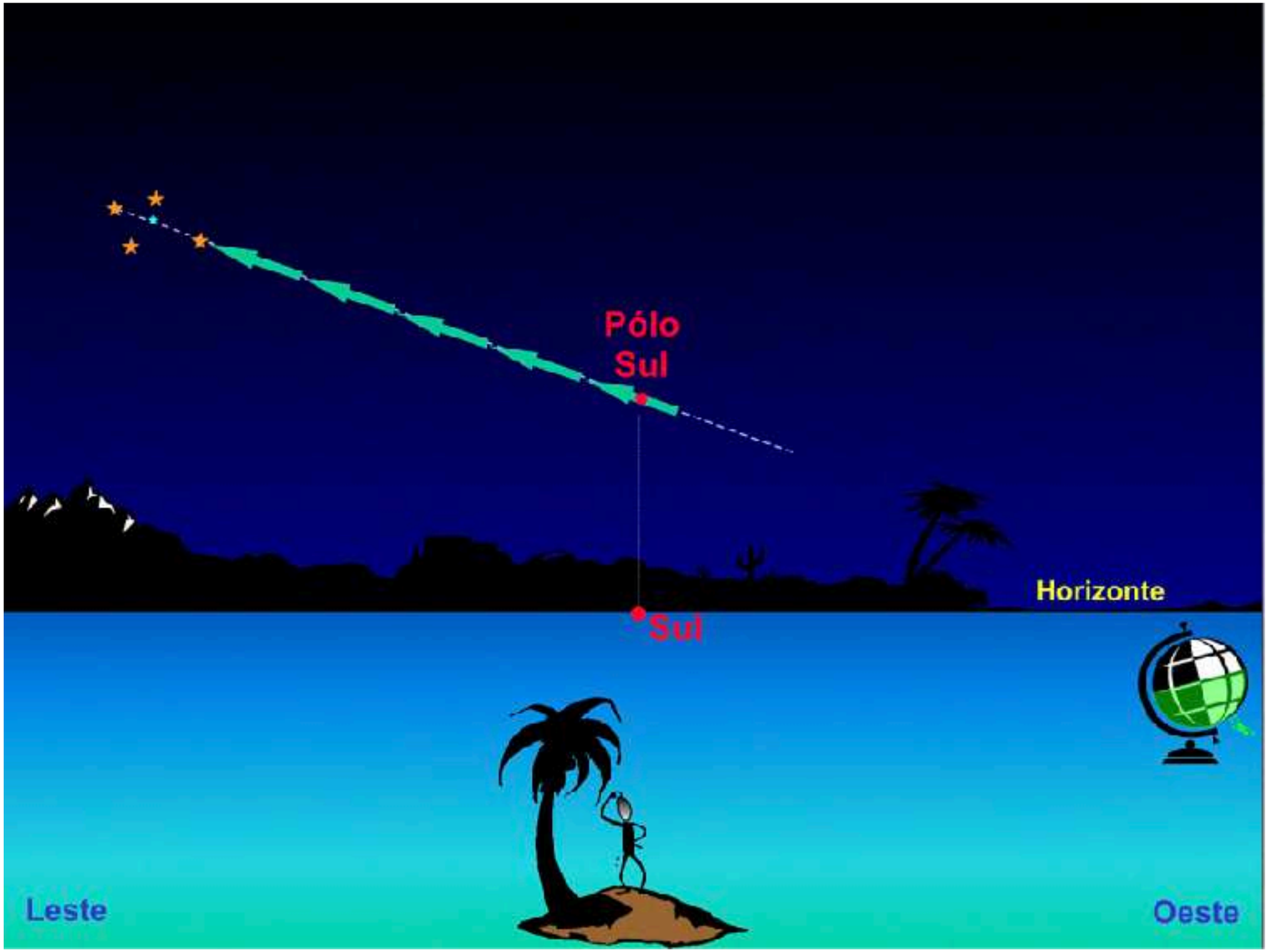
# Latitude astronômica austral



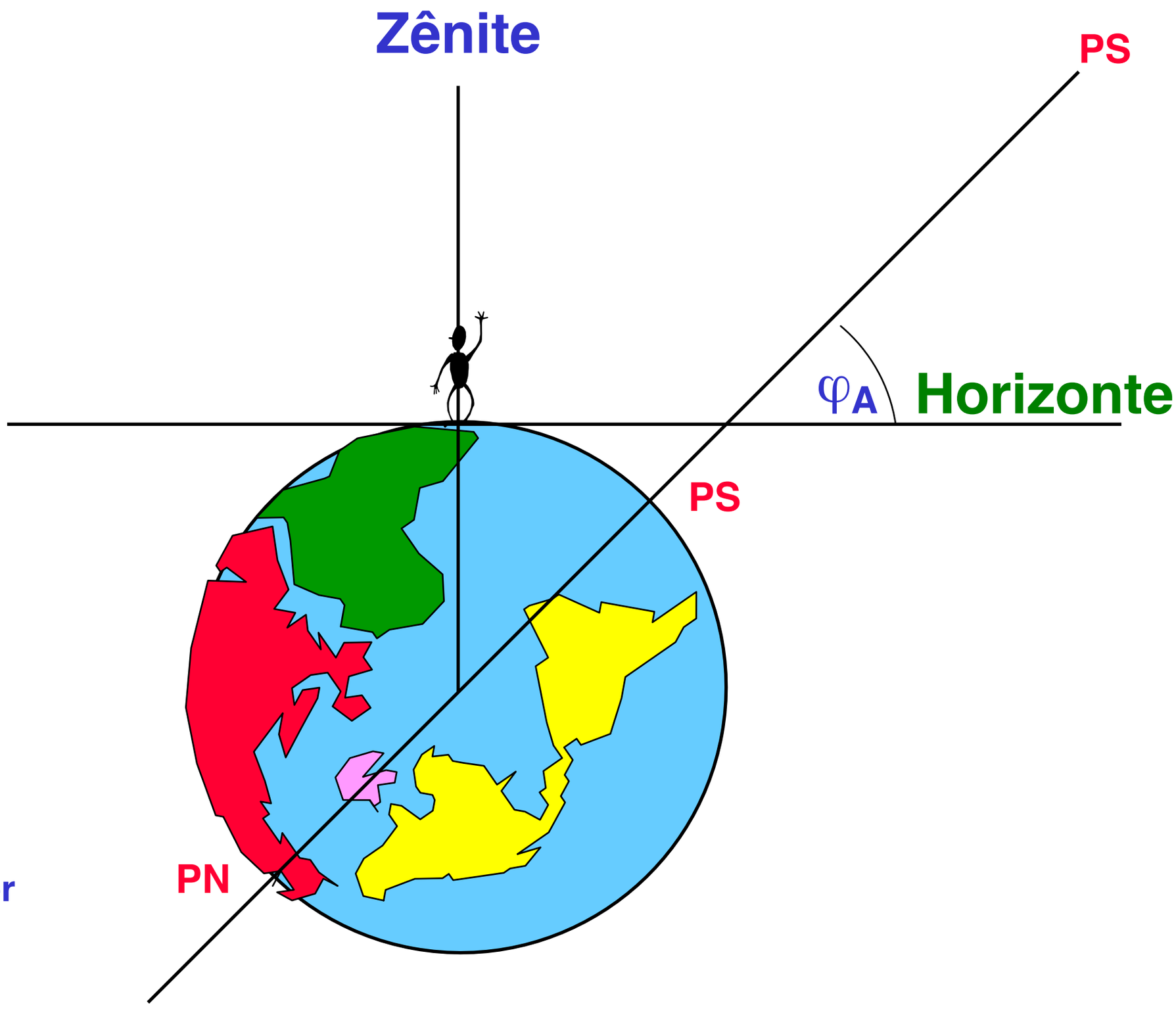

$\varphi = h_{PN}$

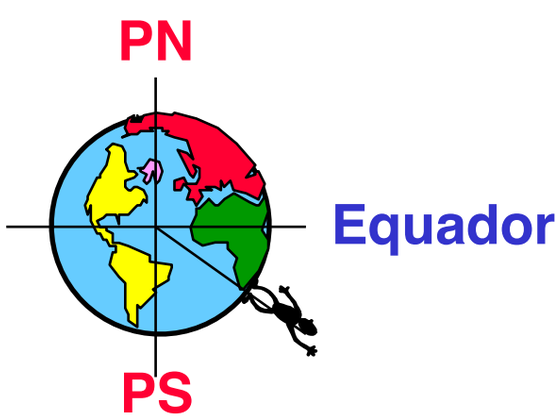
$\varphi = - h_{PS}$

# Pontos cardeais a partir do Cruzeiro do Sul



# Latitude astronômica e a latitude geográfica



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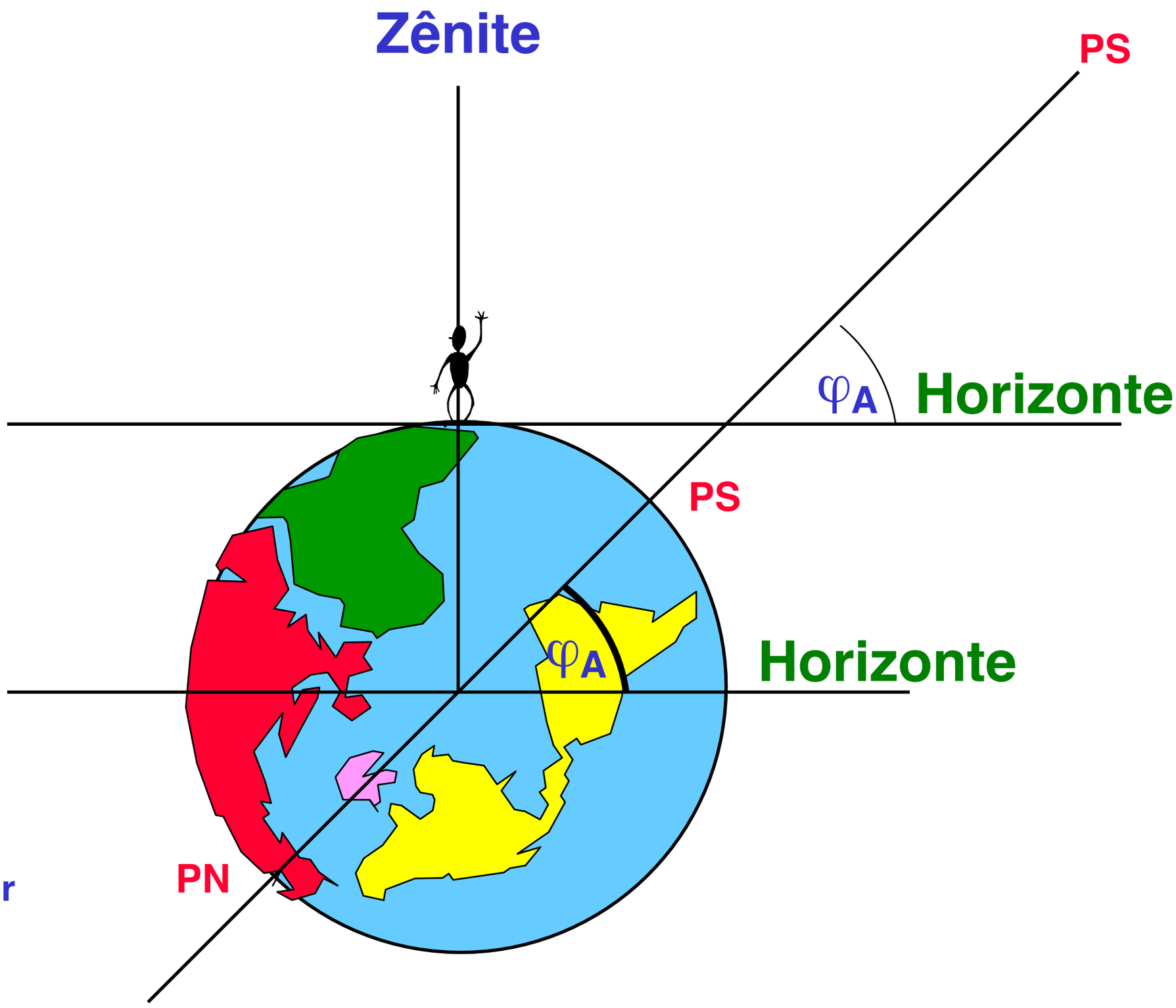


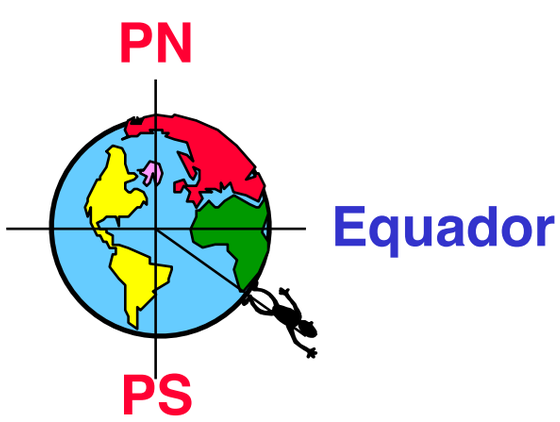

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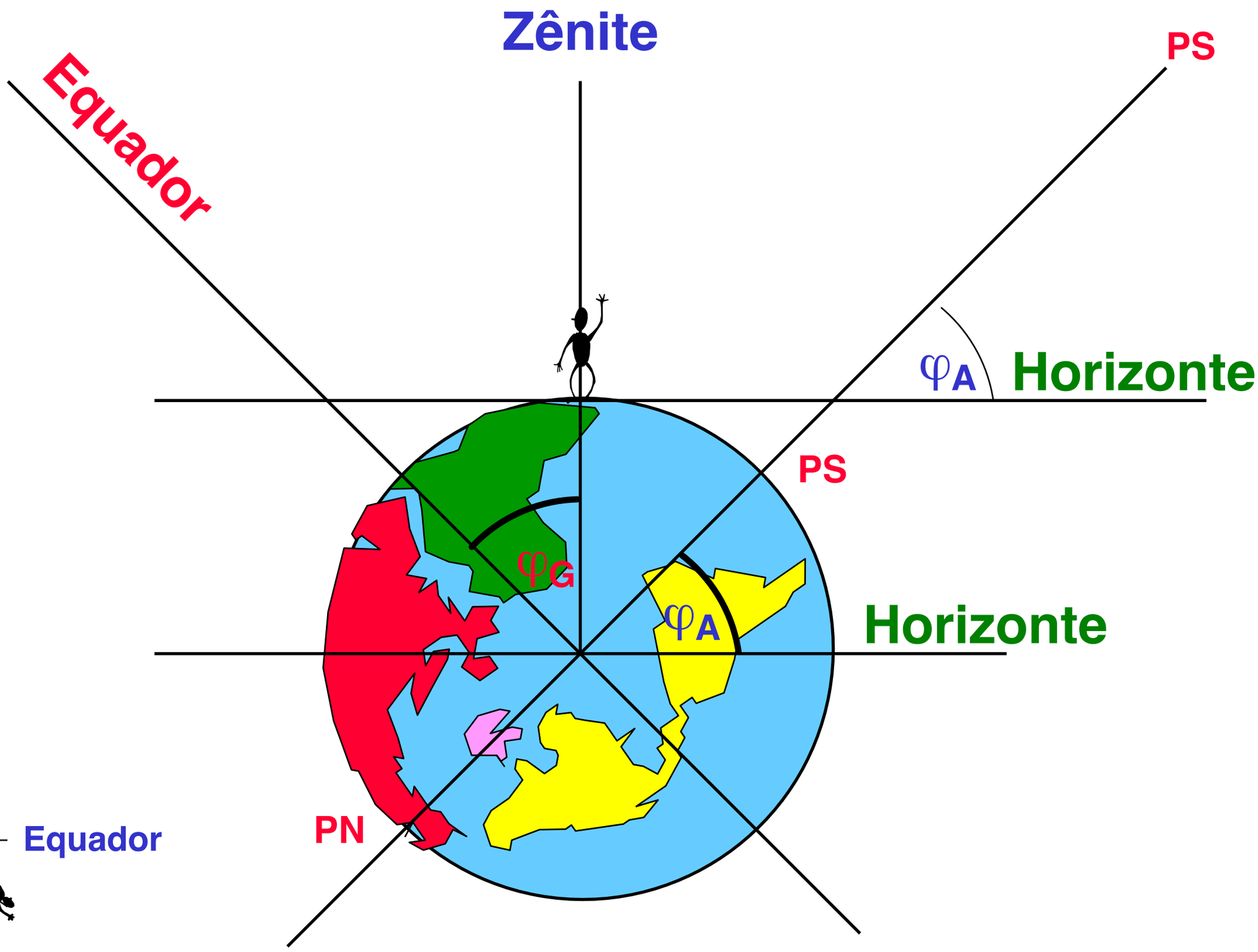


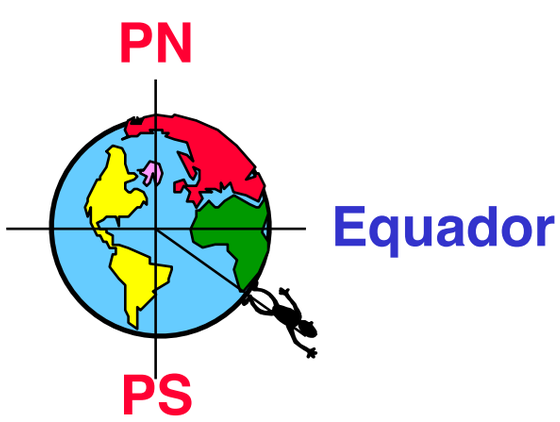

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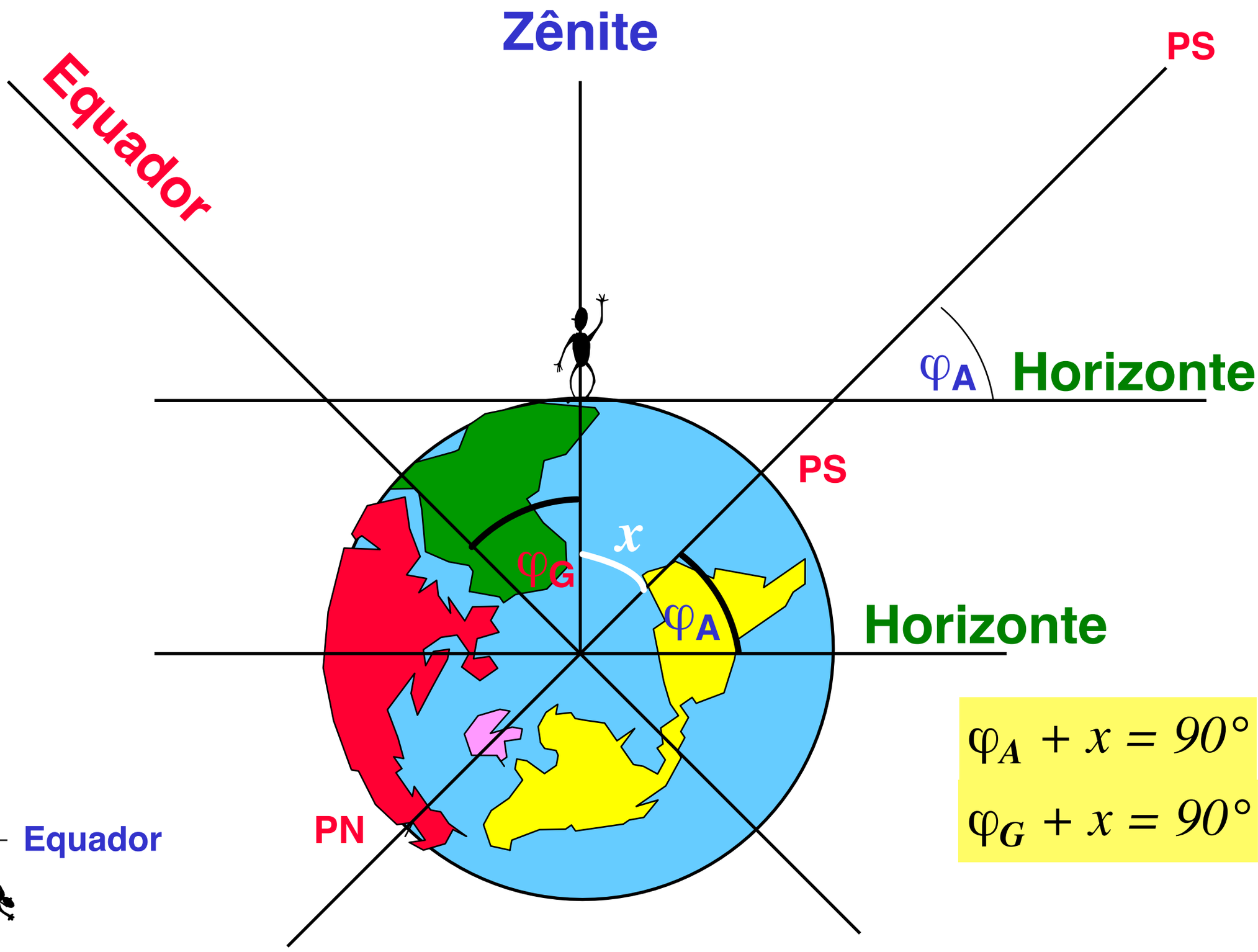
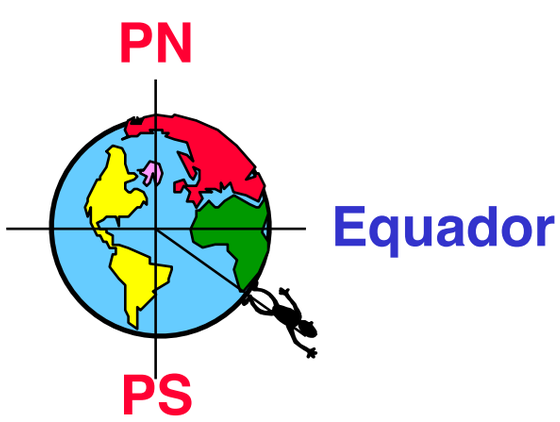
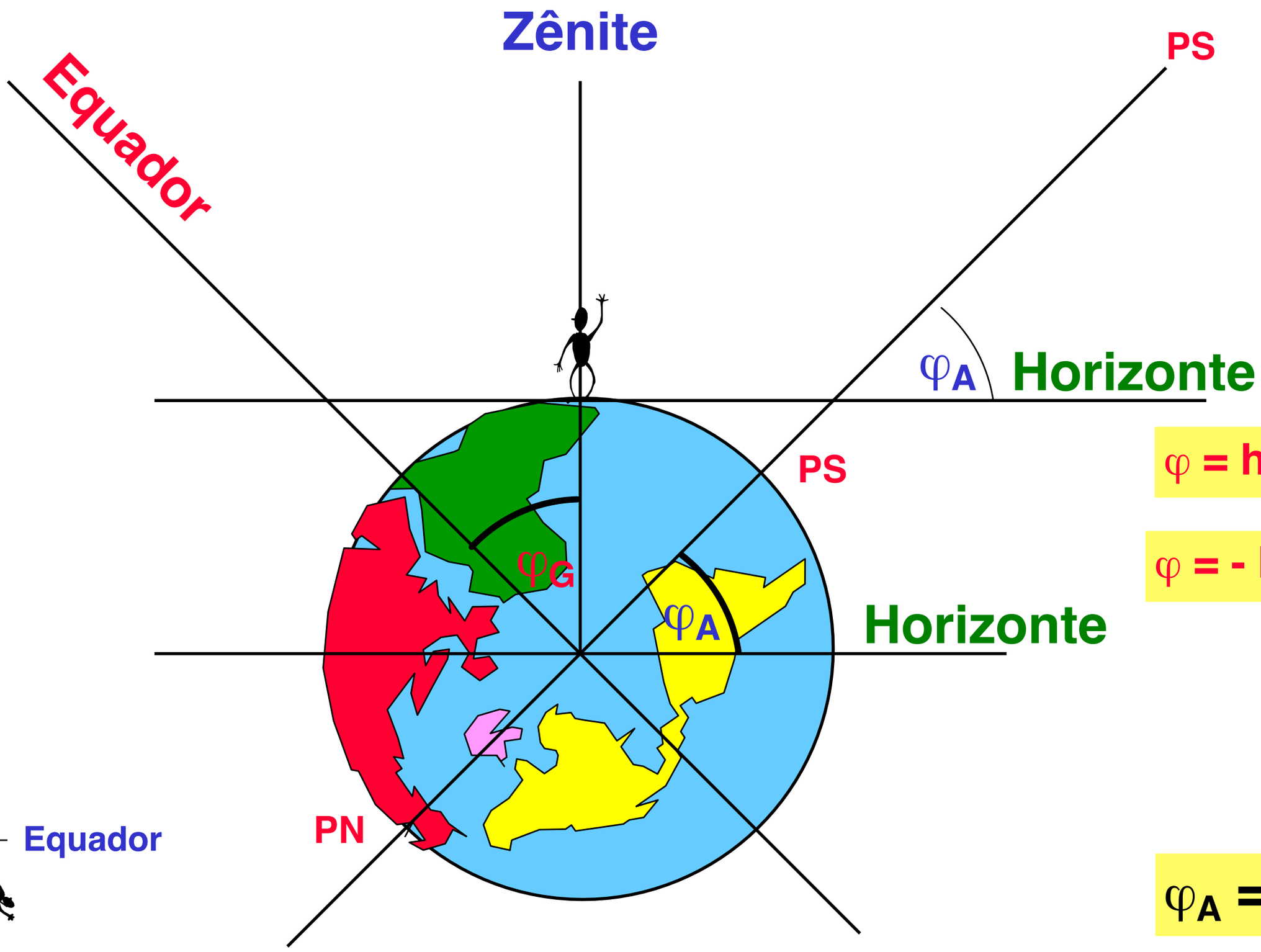



$$\varphi_A + x = 90°$$

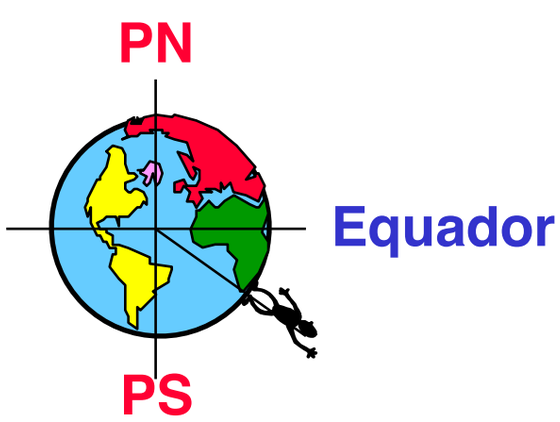
$$\varphi_G + x = 90°$$

# Latitude astronômica e a latitude geográfica



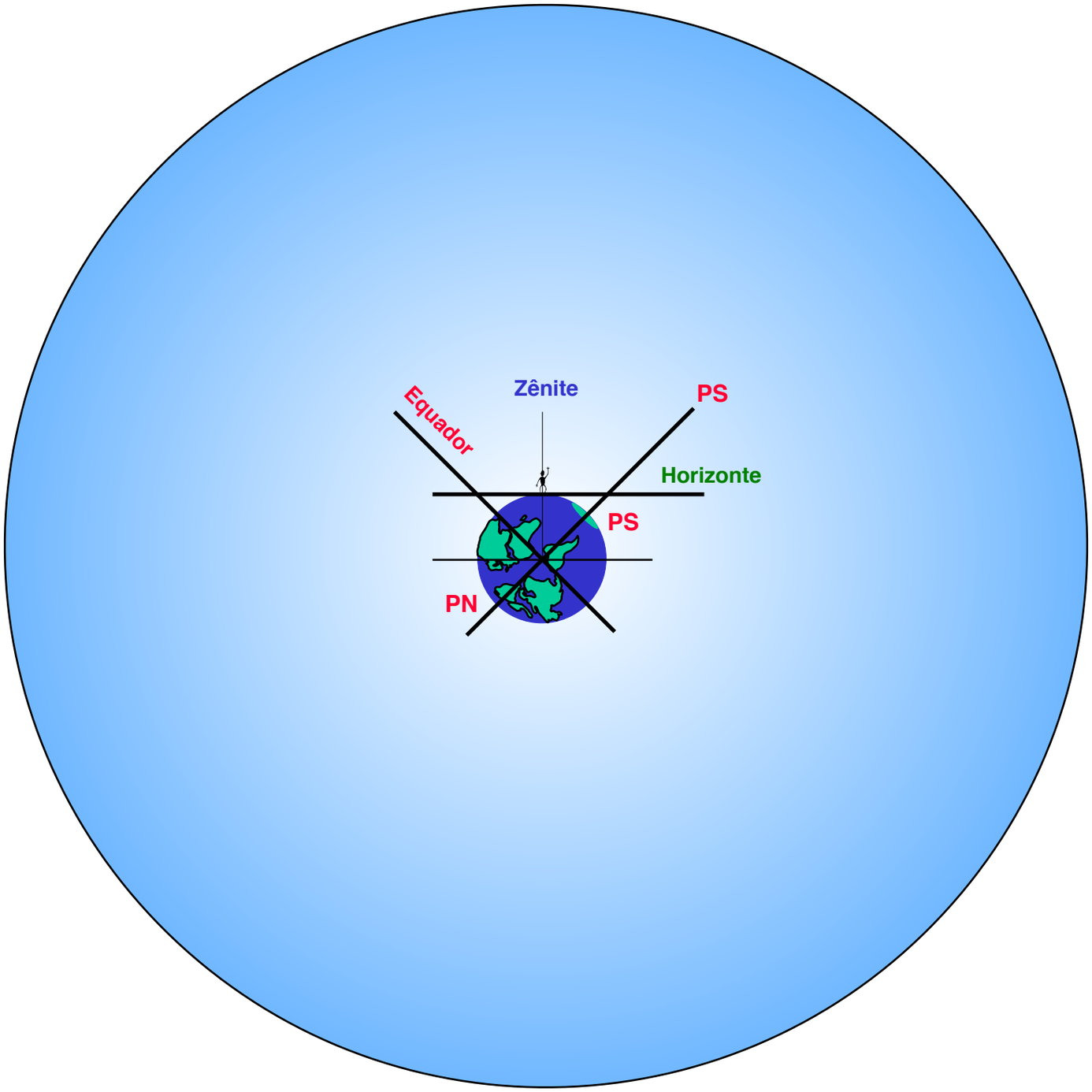

$\varphi = h_{PN}$

$\varphi = - h_{PS}$




$\varphi_A = \varphi_G$

# Representação da Terra e da esfera celeste



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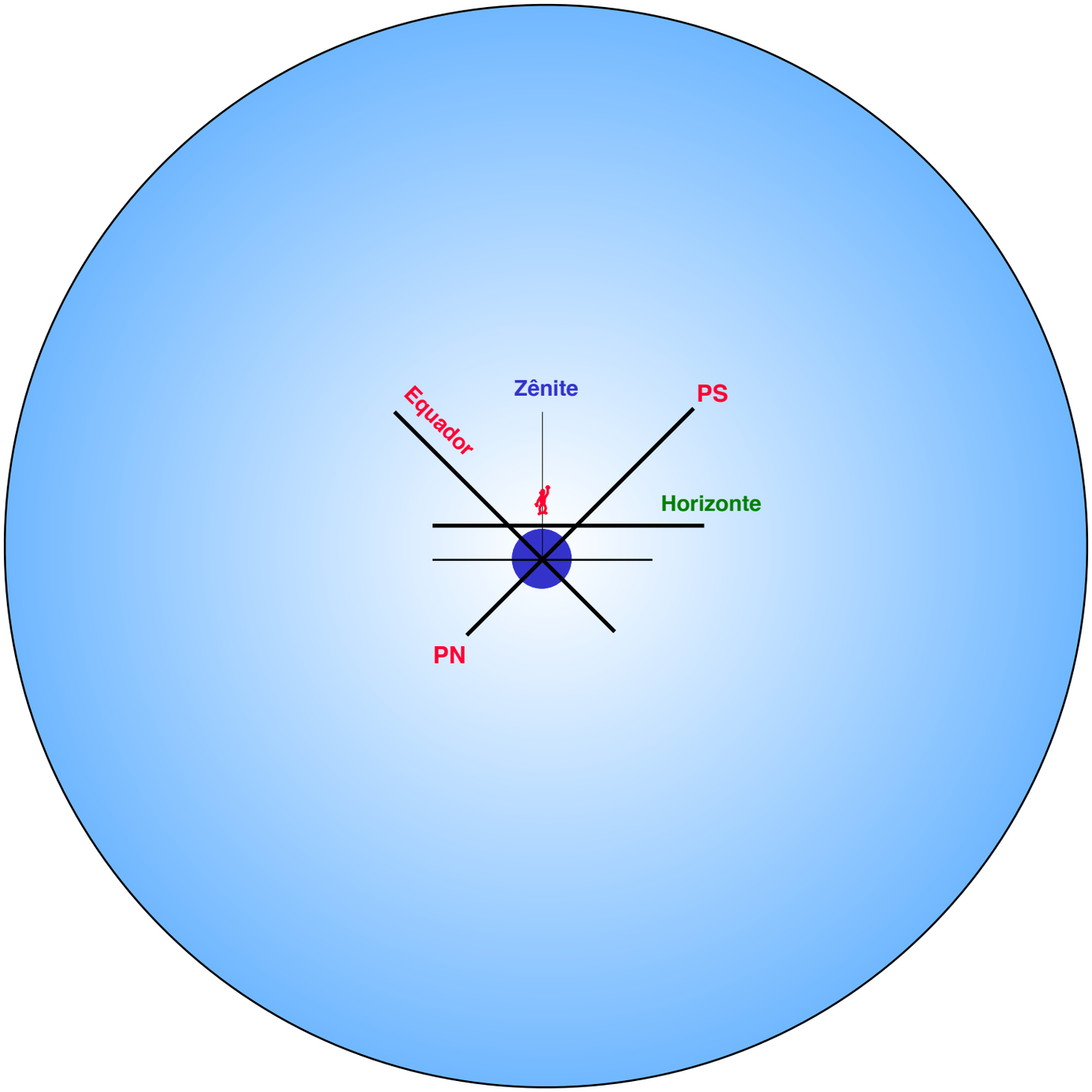

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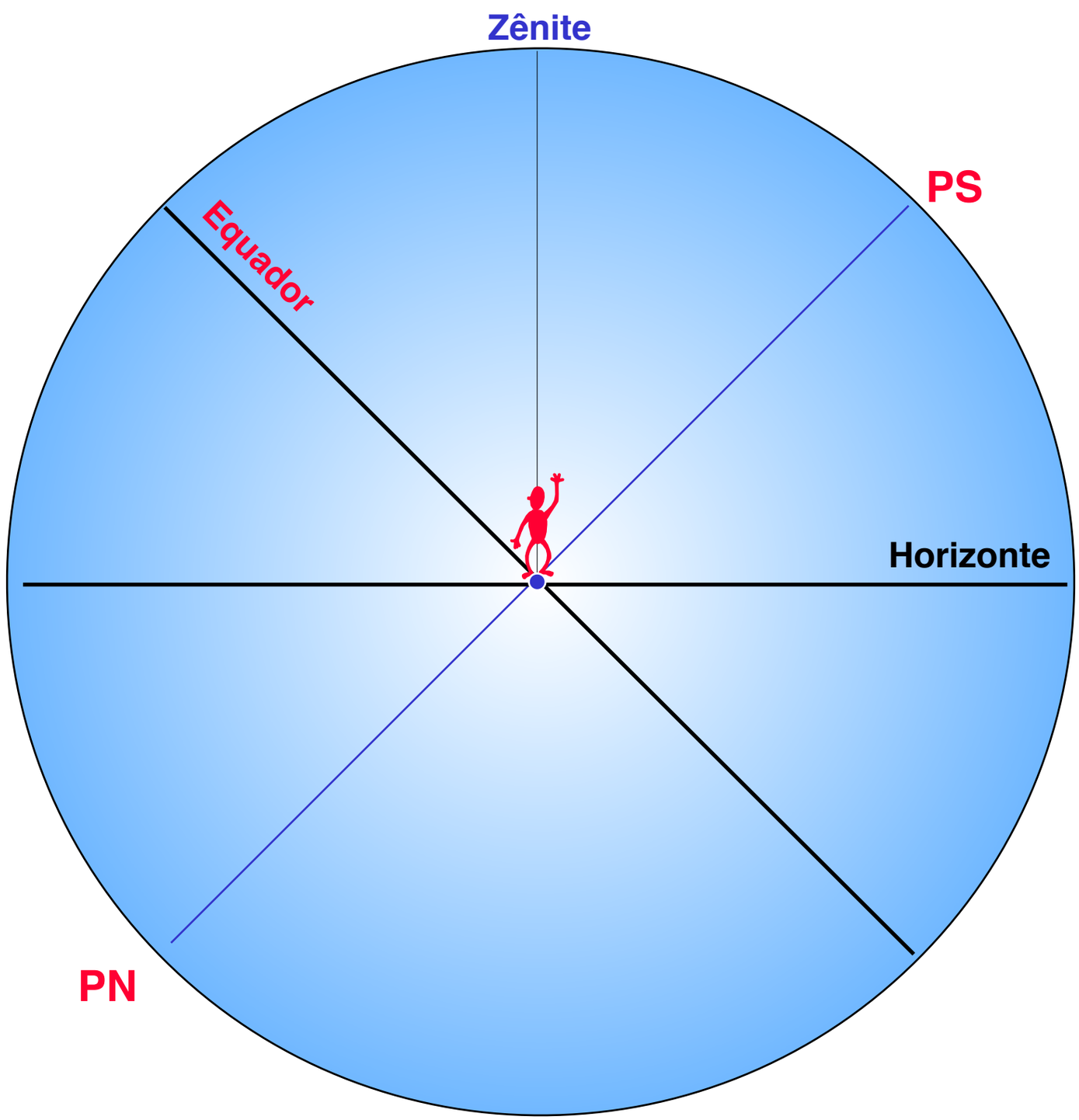
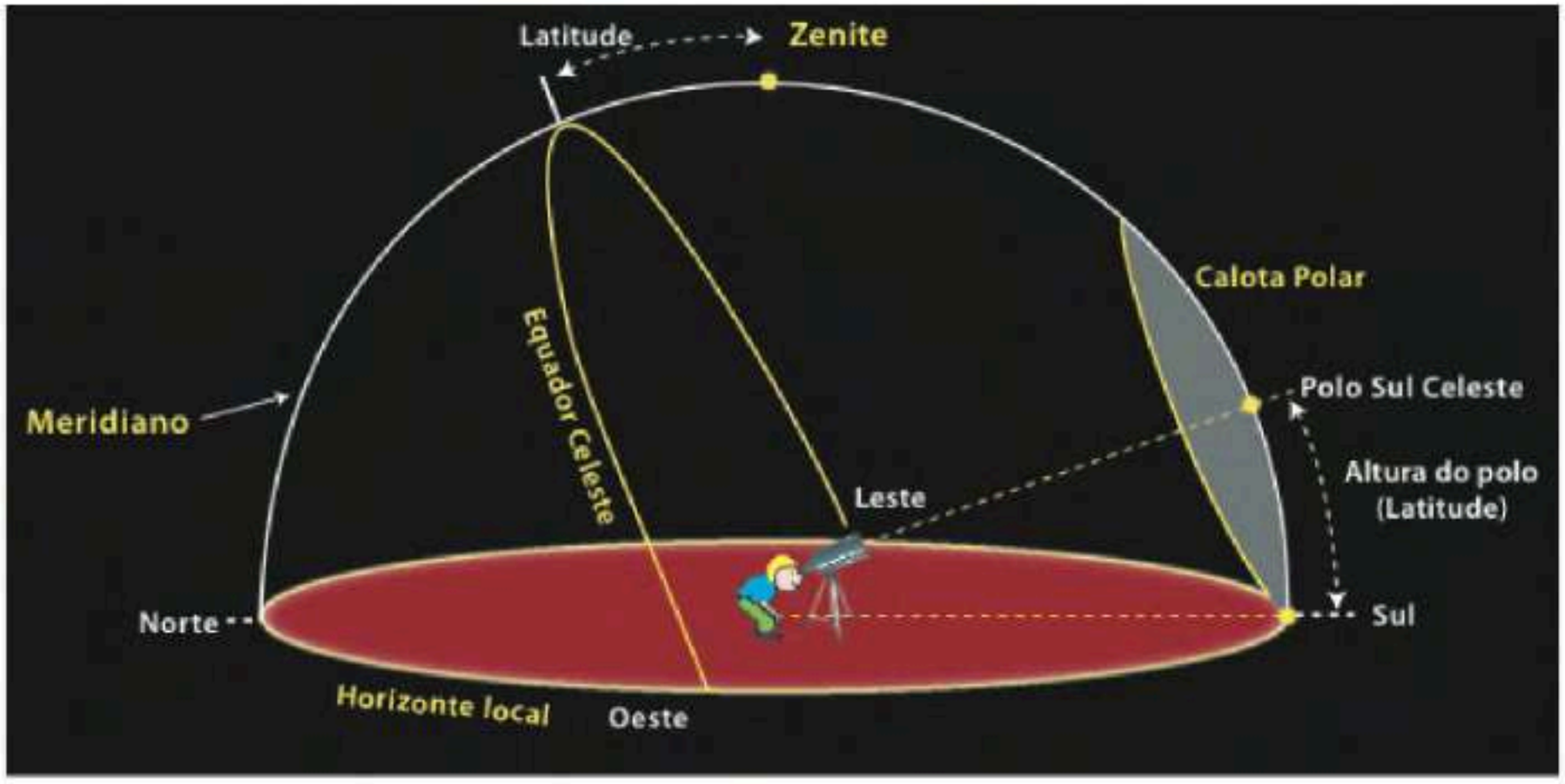
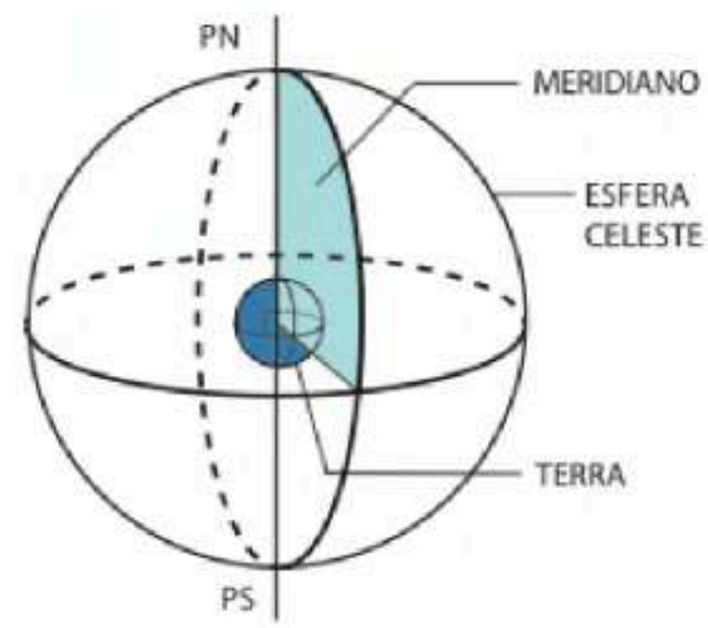
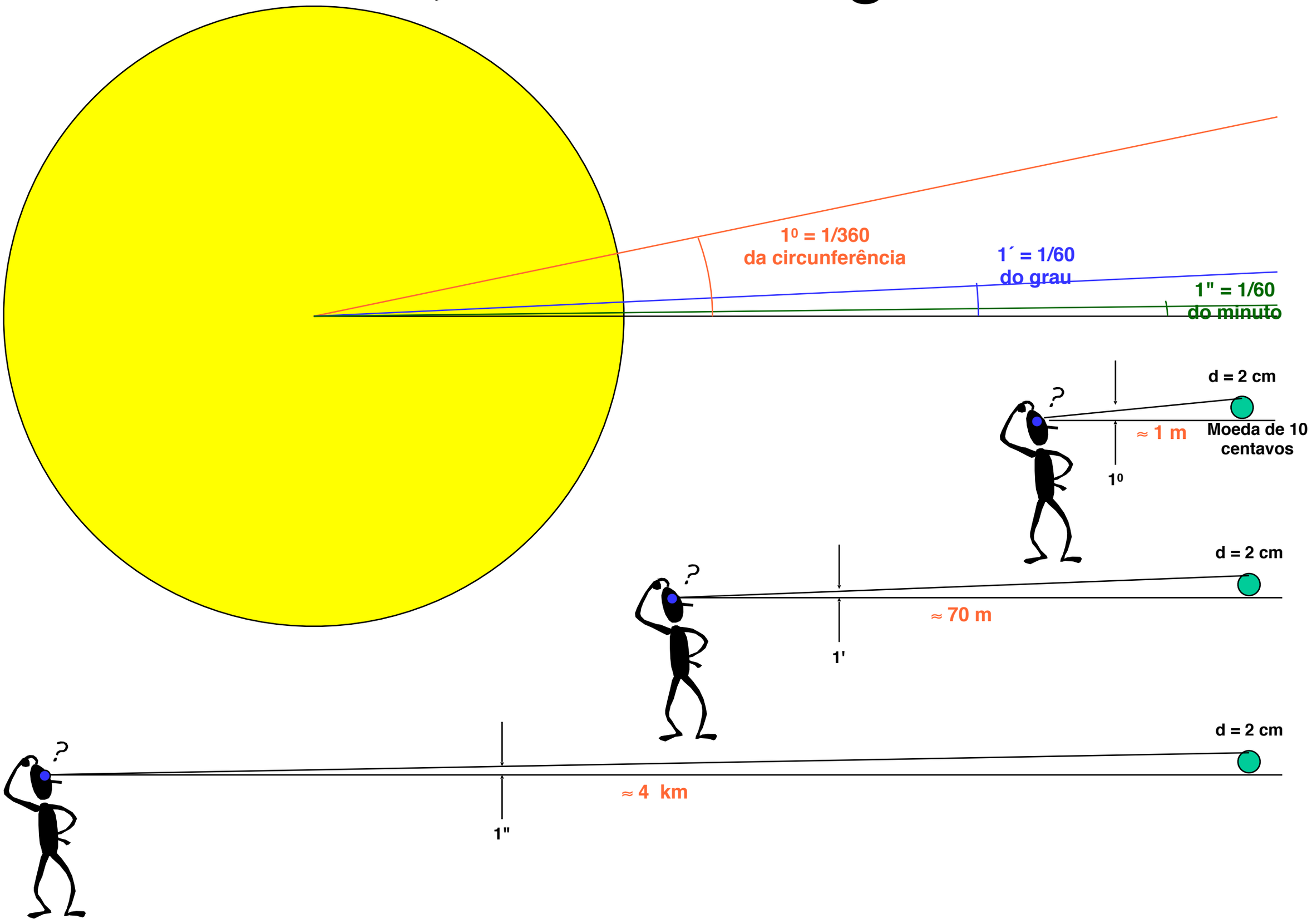


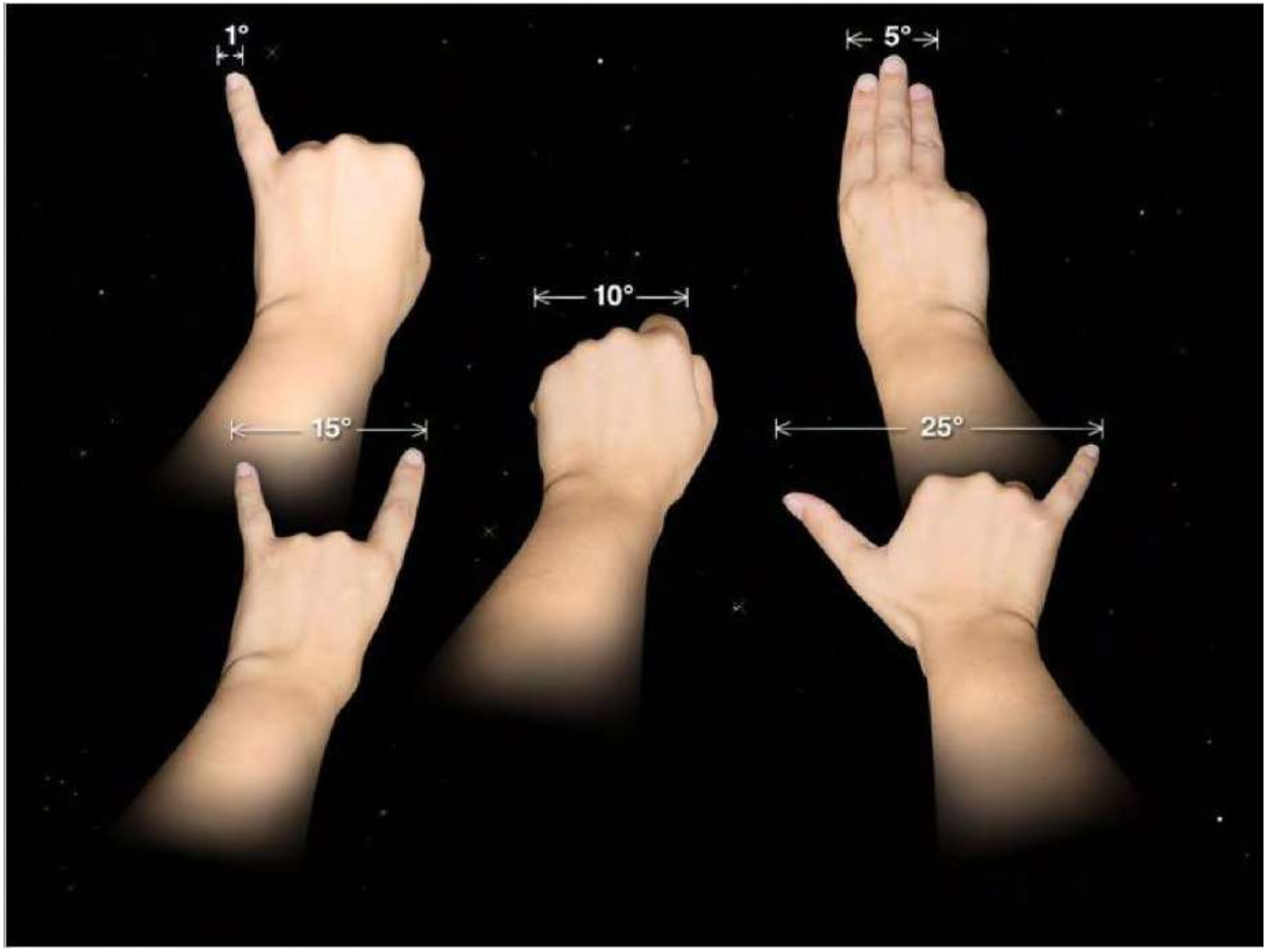

Latitude
Zenite
Calota Polar
Equador Celeste
Polo Sul Celeste
Meridiano
Altura do polo
(Latitude)
Leste
Norte
Sul
Horizonte local
Oeste


PN
MERIDIANO
ESFERA
CELESTE
TERRA
PS

# Manipulações com ângulos

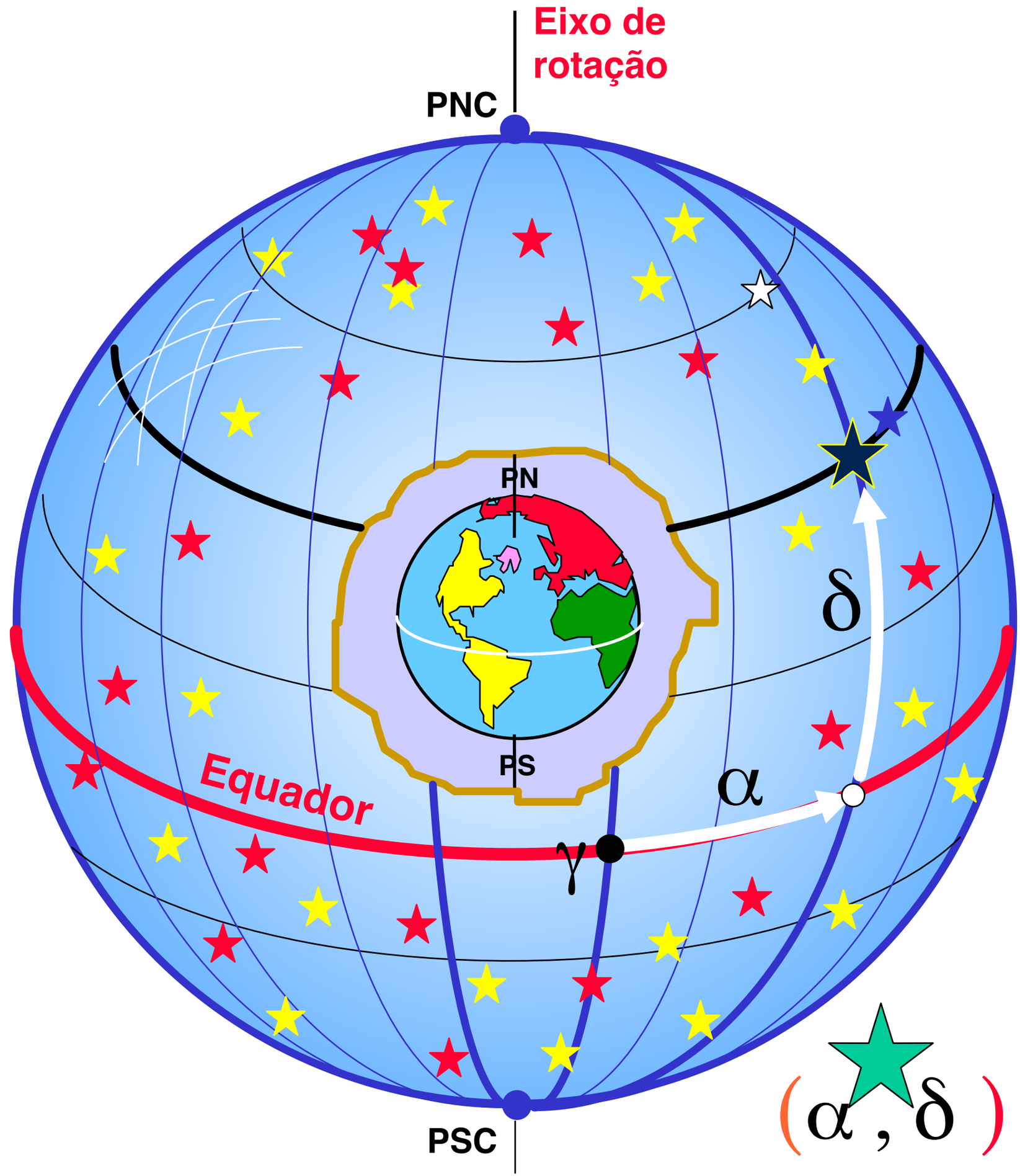
# Grau, minuto e segundo




1°
5°
10°
15°
25°

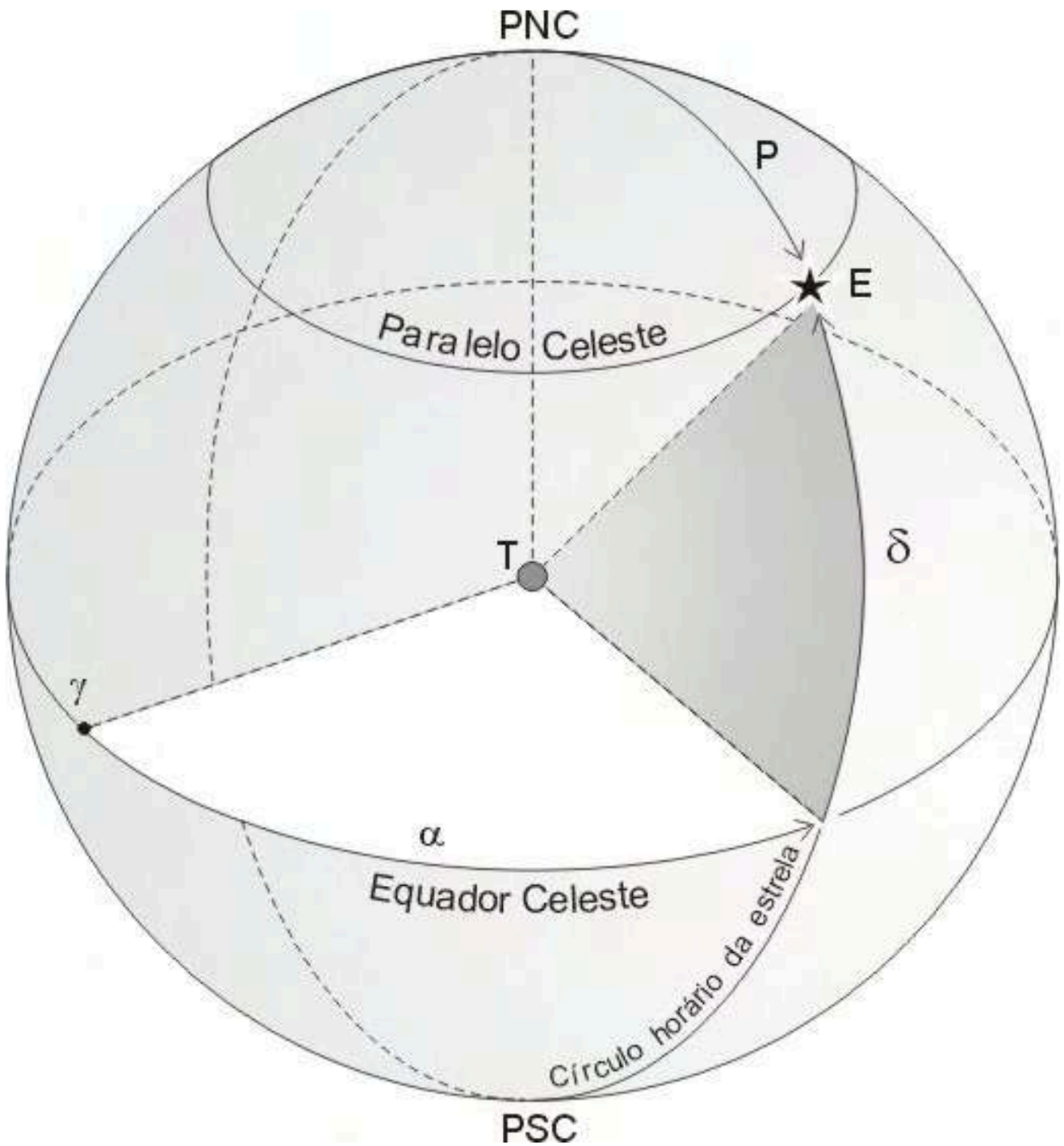
# Sistema equatorial de coordenadas

# Sistema Equatorial de coordenadas

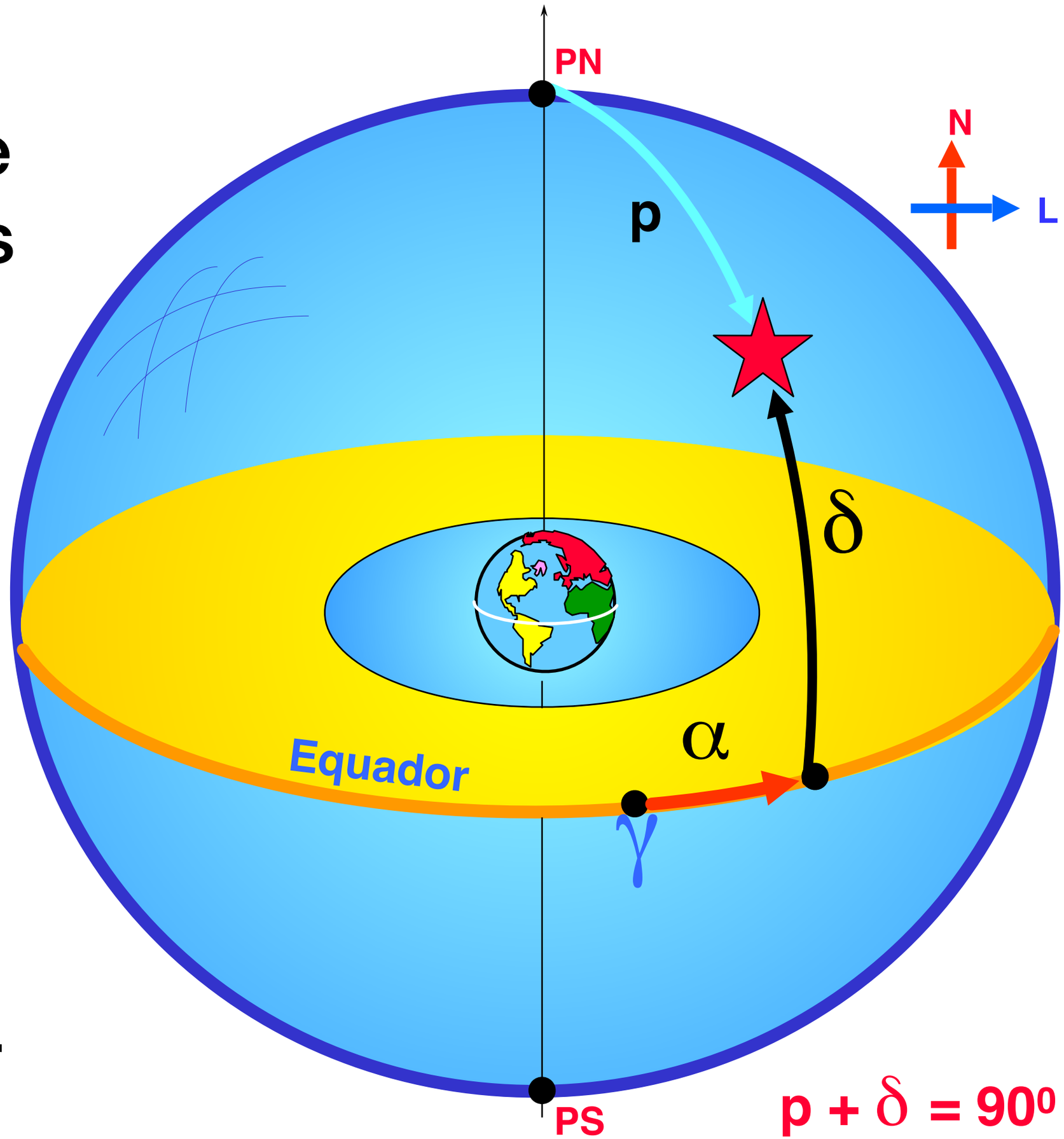



α = ascensão reta
δ = declinação

# Sistema equatorial de coordenadas



# Sistema Equatorial de Coordenadas




★ $(\alpha , \delta)$

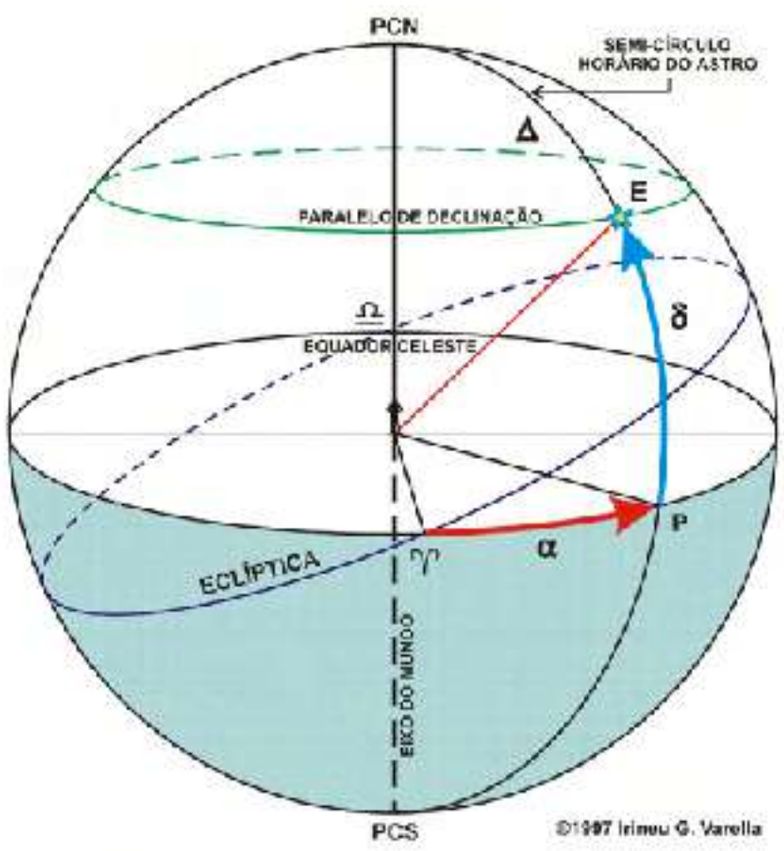
$\alpha$ = **ascensão reta**

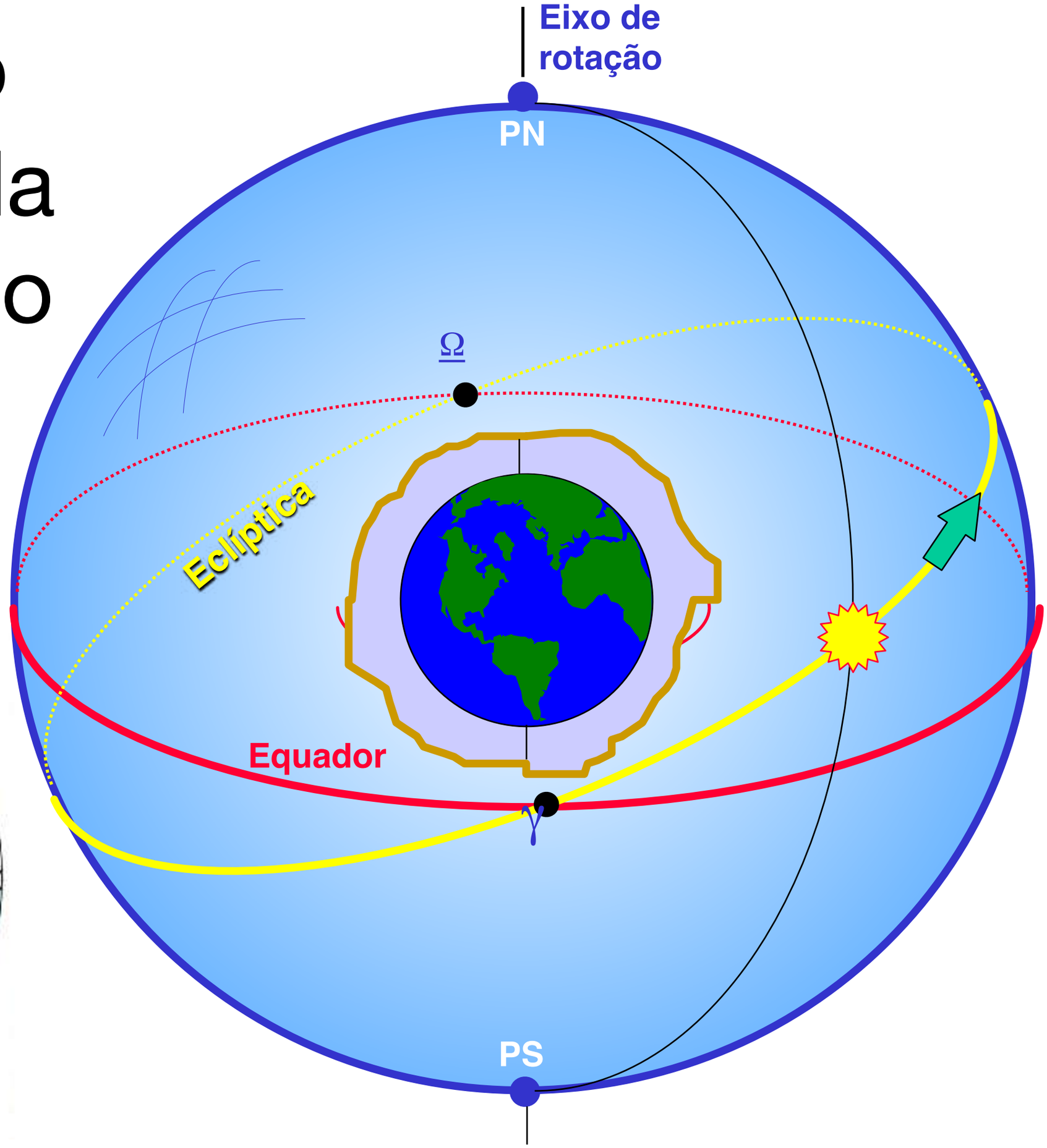
$\delta$ = **declinação**

**p = distância polar**

$p + \delta = 90^0$

# $\alpha$ é medido no sentido da translação do Sol



# Unidades

## Ascensão reta

$0^0 \leq \alpha < 360^0$

## Declinação

(S) $-90^0 \leq \delta \leq +90^0$ (N)

## Definição

1 hora $\equiv 15^0$

$0^h \leq \alpha < 24^h$

## Distância polar

(N) $0^0 \leq p \leq +180^0$ (S)

# Animação: Sky Explorer

Coordenadas equatoriais

https://astro.unl.edu/naap/motion1/cec_units.html

https://astro.unl.edu/naap/motion1/cec_both.html

# Animação: Sky Explorer

Comparação entre os sistemas horizontal e equatorial

https://astro.unl.edu/naap/motion2/two_systems.html

# Animação: Sky Explorer

Movimento aparente das estrelas nos sistemas horizontal e equatorial

https://astro.unl.edu/naap/motion2/animations/ce_hc.html