

A JEWEL FOR OBSERVING THE HEAVENS THE ASTROLABE



Planispheric astrolabe, Morocco, 16th century

IN GREEK, ASTROLABE MEANS "TAKING THE STARS", BECAUSE WITH THIS MEASURING INSTRUMENT, WE CAN INDEED DETERMINE THE POSITION OF THE STARS AND BETTER "READ" THE SKY. THESE MAGNIFICENT OBJECTS PLAYED A CONSIDERABLE ROLE IN ARAB SCIENCE

ORIGINS

Hipparchus would have invented it, but it was the Arabs who were responsible for the spread of the astrolabe from the 8th century CE on. The first astrolabe was constructed in Persia at this time by Muhammad Al-Fazari. Arab scholars inserted plates of planets into the astrolabe which enabled the movement of known planets to be calculated with great precision. Its introduction in Europe is due to Gerbert of Aurillac in particular.

HOW IS IT MADE UP ?

Front of the astrolabe

- 1. Matrix** or mother: a disc of brass or bronze 10 to 50 cm in diameter which accommodates the various parts of the instrument.
- 2. Tympanum**: an engraved plate that is placed on the mother. Designed for a given latitude, certain astrolabes possess several of these.
- 3. Spider** (or Rete): a perforated disc which is placed on the matrix and the tympana and represents the ecliptic circle and the main stars. It can rotate about the axis. In fact, this is the projection of the celestial sphere.
- 4. Limbus** : a disk graduated in 24 hr and 360°.
- 5. Throne** (or Kursi): a ring that can allow the astrolabe to be held vertically



German astrolabe of Regiomontanus 15th century

WHAT'S IT FOR ?

Of limited use for astronomical observations, it served mainly for astrology, teaching astronomy and calculating the hour of the day by observing the sun or by observing the stars during the night. It was also used for topographical surveys.

Back of the astrolabe

- 6. Alidade** : a moving rule composed of two vanes (sights) for aiming at the stars

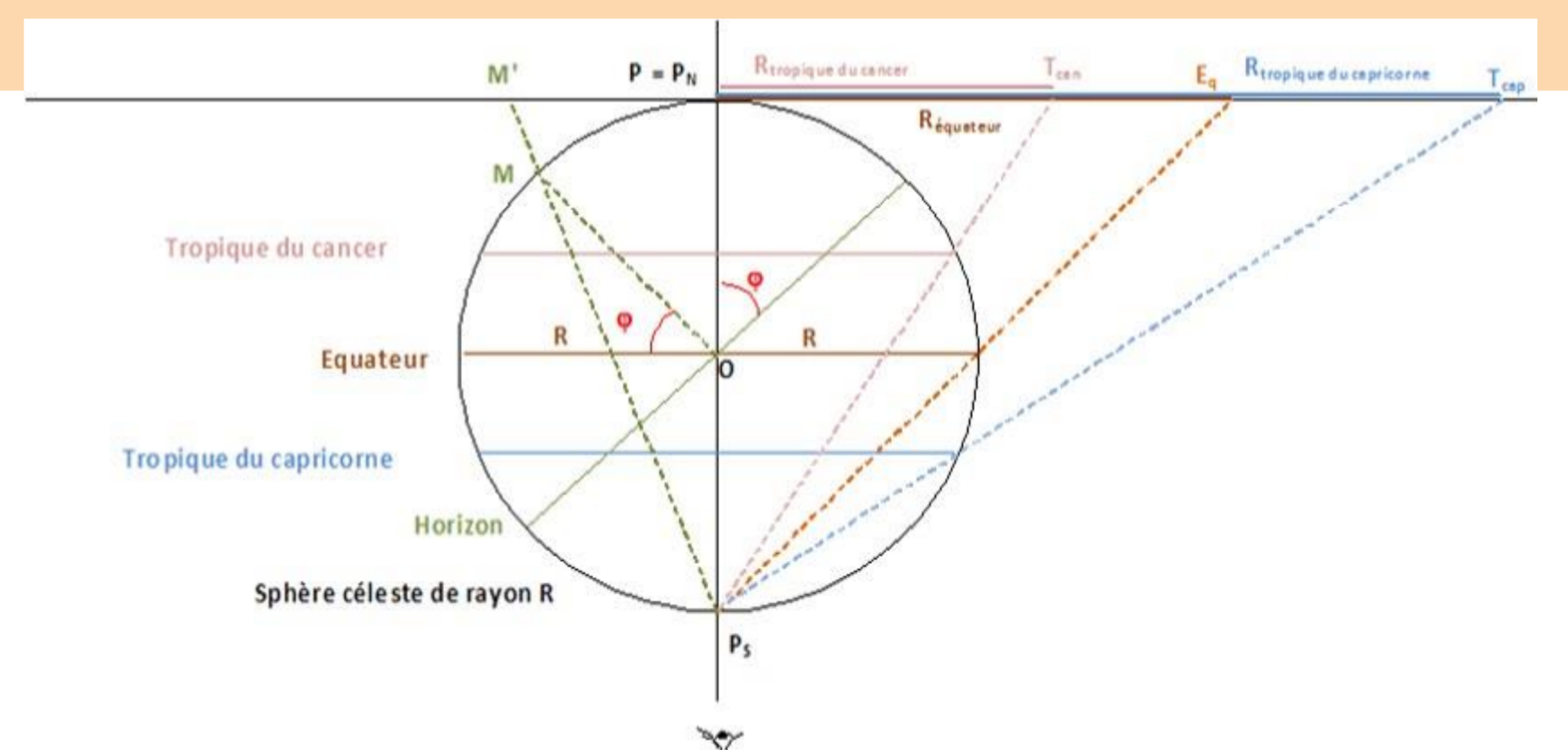


Astrolabe North Africa, 18th century

HOW DOES IT WORK?

Measuring the height of the stars :

The astrolabe is a stereographic projection of the celestial sphere at the place of observation (it is projected onto a plane tangent to the North Pole). It is held vertically in the hand by a ring. The heavenly bodies are targeted by turning the viewfinder (alidade) until the sun or a star is seen through both ends. The angle obtained by means of the viewfinder on the limbus, which is the height of the targeted object, is used to calculate the latitude of the point of observation.



AN EXAMPLE: AT WHAT LATITUDE ARE WE ?

- At night, the latitude is directly given by the height of the North star.
- During the day, measure the maximum height of the Sun. On this day (August 16) for our place of observation : 58,5°

We weigh the Sun at noon with the alidade

- We read the declination of the Sun for this day:

August 16



$\delta = 13,5^\circ$

- The maximum height is equal to $90^\circ - \text{lat} + \delta$

we deduce from it that:

$$\text{lat} = 90^\circ + \delta - h_{\text{max}} = 45^\circ$$

The real value was 44.3°

"The astrolabe of the mysteries of God is love."

Maitre Eckaert (1260-1328)



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