PERSIAN AND ARABIC ASTRONOMY

LOCATING

A RELIGIOUS AND MATHEMATICAL ASTRONOMY

Astronomers at work in the Istanbul Observatory (16 th miniature)

After Ptolemy, astronomical knowledge in Europe stagnated for over a thousand years.
In the Islamic world, however, significant progress occurred between the ninth and eleventh centuries, as much in the mathematical tools of astronomy as in observations of the sky.

Tenth century astronomers created spherical trigonometry to determine the direction of prayer with respect to Mecca.

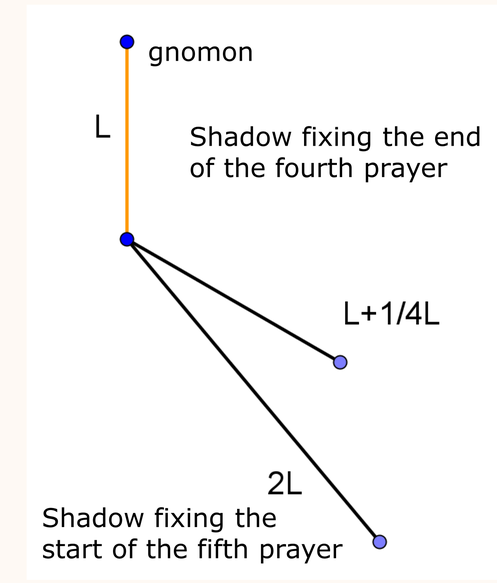
Astronomy for organising worship

The Islamic calendar was lunar at first: the year had 12 months of 29 or 30 days (a synodic revolution) comprising 354 or 355 days.

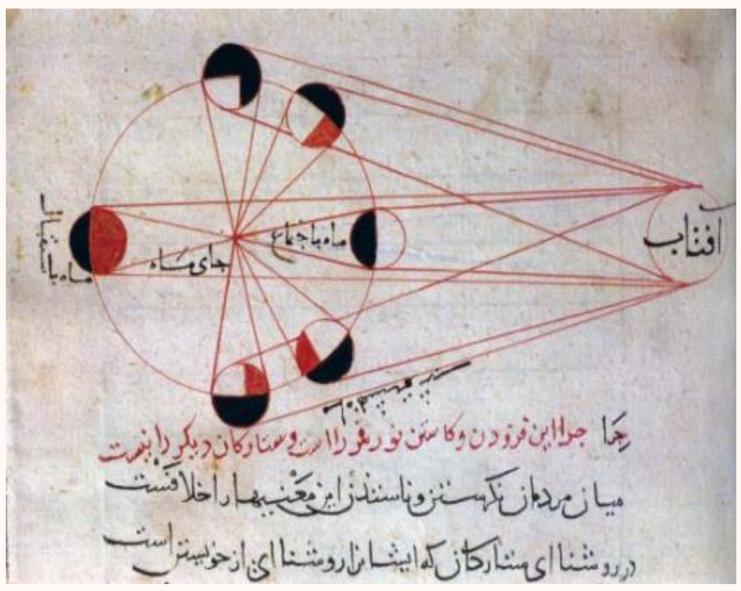
Omar Khayyam (1048-1131), director of the observatory in Isfahan in 1074, reformed this imprecise calendar which was out of step with the seasons and hence the economy.

He introduced **a leap year**, as in the Julian calendar, and measured the length of the year as 365.24219858156 days.

This calendar proved more accurate than the Gregorian calendar created five centuries later!



The observation of the position of the sun to determine the moments of prayer.



An astronomy which offers precise mathematical models consistent with observation

The calculations are remarkably accurate, for example the inclination of the Earth to a half a minute of arc.

Al Biruni (973-1048) *observed an eclipse from the observatory of Kath. Another astronomer viewed it from Baghdad. The time difference between the two observations allowed them to calculate the longitude of the two cities.*

Arab astronomers created many observatories.
They will study, critique and improve the Ptolemaic system.
Despite the intuition held by several astronomers like Ibn al-Haytham, called Alhazen (965-1039), who wrote "Doubts about Ptolemy," the geocentric system was never really challenged.

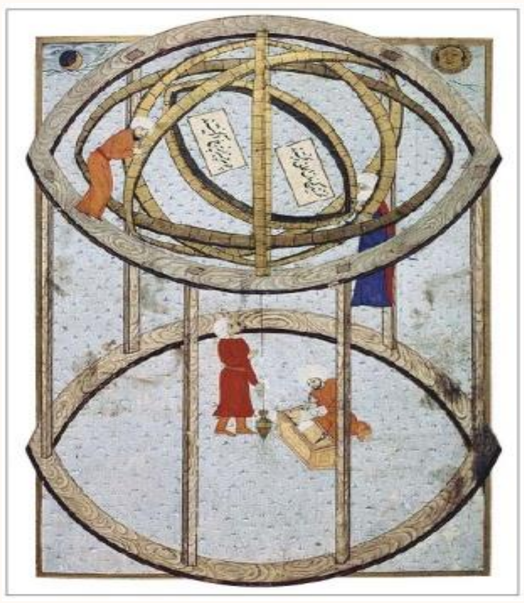
An astronomy which generated technological progress

Astronomers, such as Ibn al-Shatir who made sundials, astrolabes ..., manufactured instruments of extreme precision.

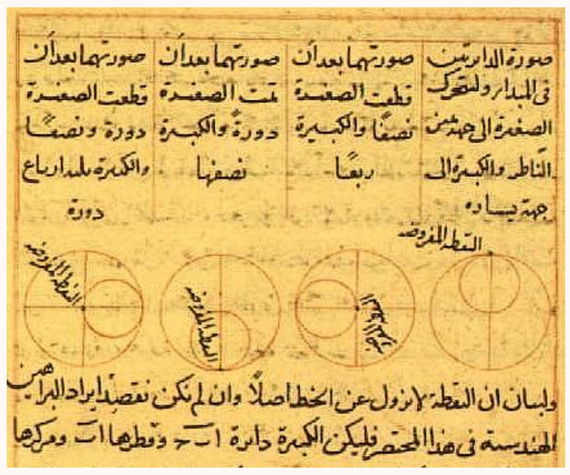
Al-Tusi (1201- 1274) devised a system combining two uniform circular motions. The planet turns on the small inner circle twice as fast as around the large circle His model was improved and made more complex by **Al-Shirasi** and **Al-Urdi.**

His manuscript reached Italy and COPERNICUS knew of it.

10 th Astrolabe



Giant armillary sphere (Persian miniature 1581) "So great that a horse could pass between the rings"



The couplling of Al-Tusi

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