sidereal time

We have seen that the rotation of the Earth causes a regular change in the apparent positions of stars. The hour angle of a star can therefore be used as a measure of time. In particular, astronomers use the hour angle of the first point of Aries, $HA^{\aries}$, as a measure of the rotation of the Earth with respect to the stars. This is known as *local sidereal time*:

$LST = HA^{\aries}$

and is zero when the first point of Aries crosses the observer's meridian. As its name implies, local sidereal time depends upon the observer's longitude on the Earth's surface.

From Figure 15 it can be seen that the $HA^{\aries}$ is equal to the sum of the right ascension of the star X (RAX) and the hour angle of the star X (HAX). Hence,

$LST = RAX + HAX$.

This is a very important relationship because X can be any celestial object - star, Sun, Moon, planet or spacecraft. Since the hour angle of a star is zero when it transits on the observer's meridian, the star's right ascension at that time is the local sidereal time (or, equivalently, the local sidereal time gives the right ascension of the star).

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