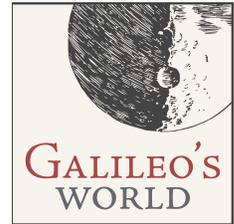
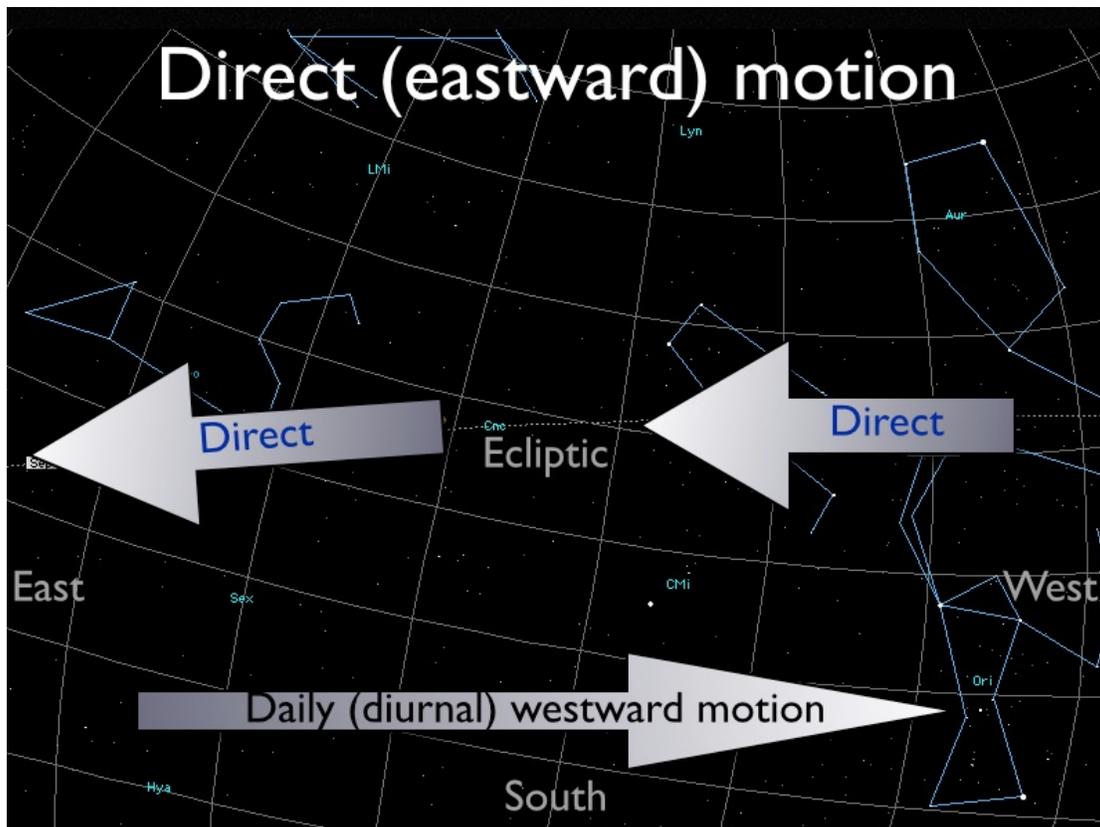


Introduction to Zodiacal motion

EXHIBIT: *Galileo's World*
GALLERY: Music of the Spheres, The Sky at Night



Against the background of the daily diurnal motion, the outer planets have an additional slow motion called their Zodiacal (or “direct”) motion. Stars are fixed in relative position, but planets move slowly from west to east.



As the planets move in their direct, **eastward** motion from night to night, they travel near the path of the Sun (the **ecliptic**). Any constellation containing the path of the Sun is a **Zodiac** constellation. A planet's eastward motion along the Zodiac is its Zodiacal or direct motion.

On a celestial globe, find the path of the Sun, or ecliptic. (See the Introduction to the Celestial Globe.)

Imagine that a planet lies at any point on the ecliptic. Each night, when the planet rises in the east, it will **move a little farther eastward** along the ecliptic. In other words, it falls a little behind the daily motion of the background stars. For that reason, it will **rise slightly later** each evening, **taking more than 24 hours** to appear above the horizon from one rising time to the next. For example: if a planet rose with the bright star Regulus this morning, then

tomorrow morning Regulus will rise first, and the planet will fall behind it, rising a minute or so later.

Model the Zodiacal motion of a planet with a celestial globe:

1. Hold the celestial globe so that the equator is in both your left hand (east) and your right hand (west). You are facing south. Stars and planets will appear to rise in the east and set in the west as you rotate the globe from left to right, as in the exercise on diurnal motion.
2. This time, imagine that the planet falls behind the fixed star it rose with the day before. Find Regulus in the Leo the Lion. Regulus lies almost exactly on the ecliptic. Turn the celestial globe so that Regulus is rising on the eastern horizon (left). Imagine that the planet is rising very near the ecliptic, at the very same time as Regulus.
3. Turn the globe from left to right one full turn, so that Regulus is rising very near the ecliptic, on the eastern horizon (left) once more. Now, the planet has fallen behind Regulus so that it is still invisible beneath the horizon.
4. Turn the globe from left to right just a slight amount, so that Regulus is just a little above the eastern horizon. Now the planet is rising on the eastern horizon.



Alternatively, imagine that the planet is a tiny ant walking on the ecliptic from your right hand toward your left. The ant marches less than half an inch with each turn of the globe. You see the ant rise above the eastern horizon a little later with each turn of the celestial globe. This is the direct, eastward motion of the outer planets (Mars, Jupiter and Saturn) as they travel around the Zodiac.

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