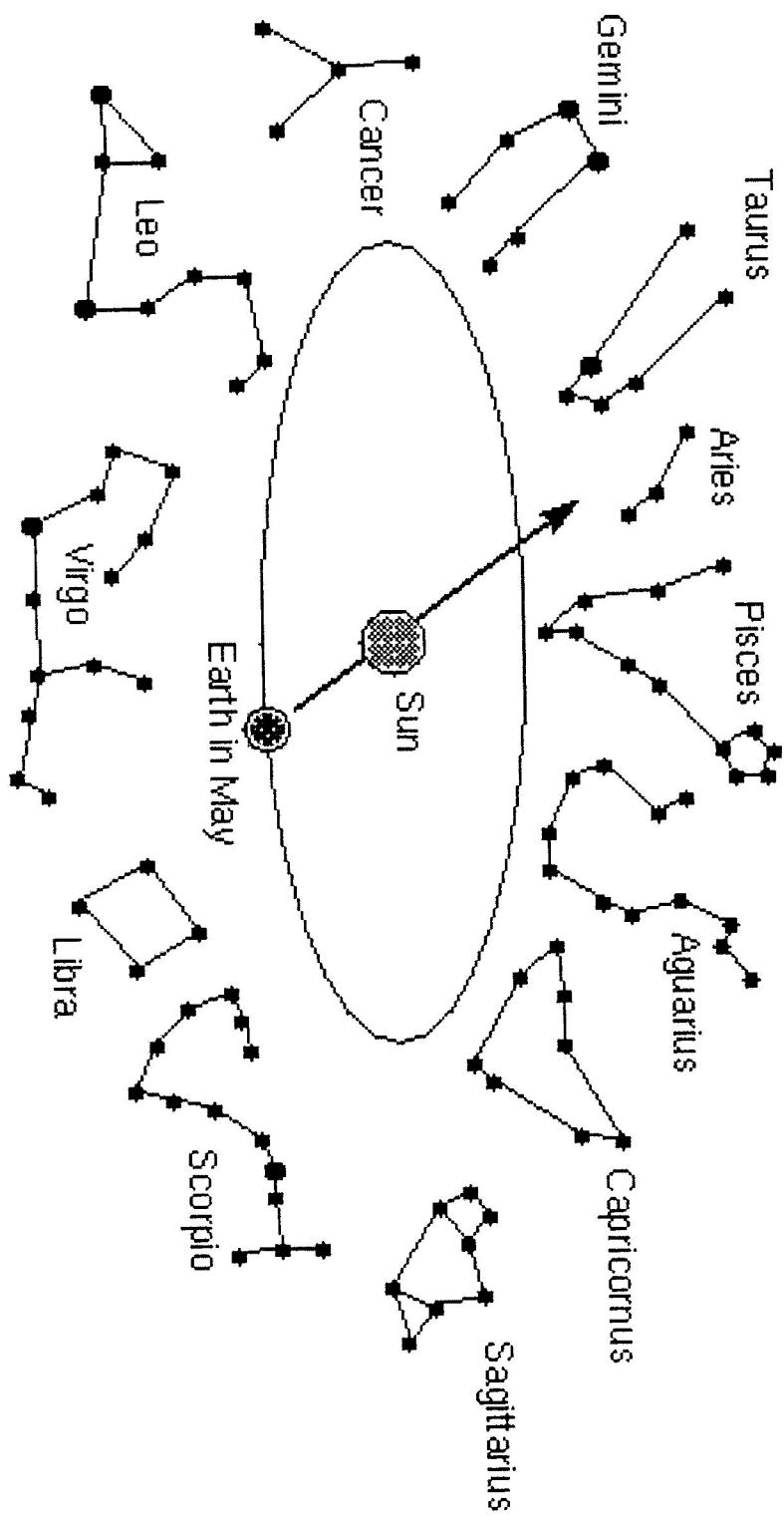


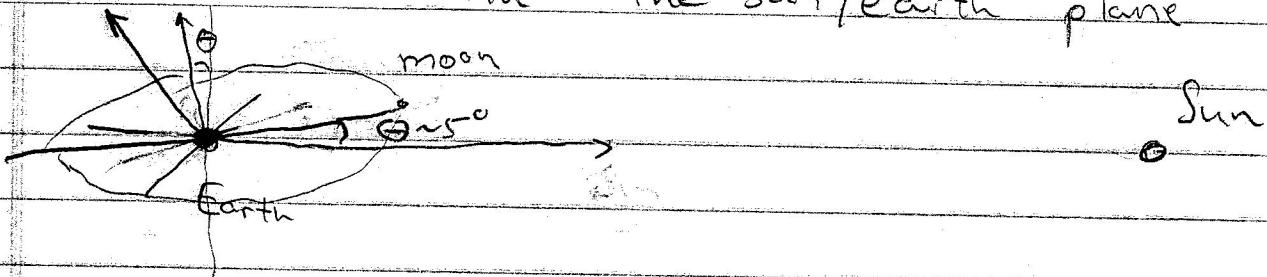
Problem: Use this picture to explain why the zodiac signs move relative to the setting sun



③ The Moon

- Moon revolves around the earth once a month
- At night the moon - follows essentially the ecliptic up to a few degrees

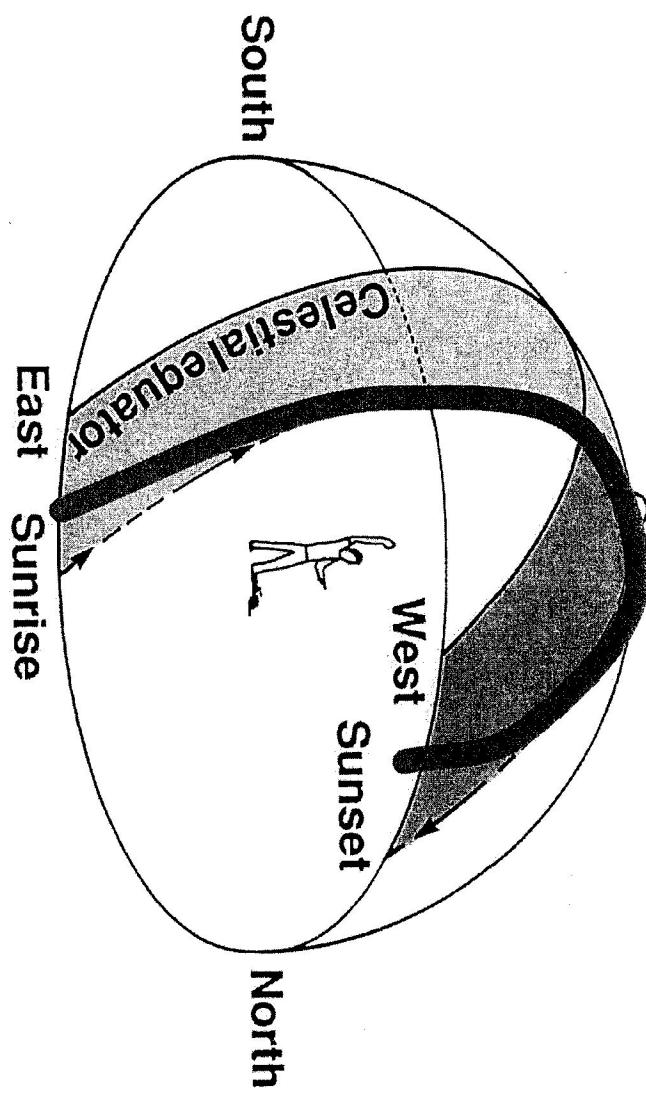
Why? Because the earth/moon plane is almost aligned with the sun/earth plane



- If the sun/earth and moon/earth planes were exactly aligned how often would eclipses occur?
- What has to happen for a lunar eclipse to occur?

Nightly Trajectory of Moon

Noon sun



a Summer Solstice

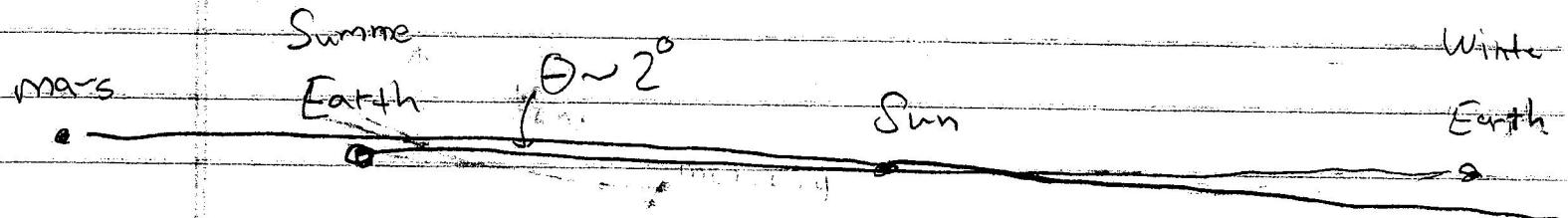
The Moon's Trajectory -- Close to the Ecliptic
but not quite.

The Planets - or "wanderers"

- There are five planets visible with the naked eye

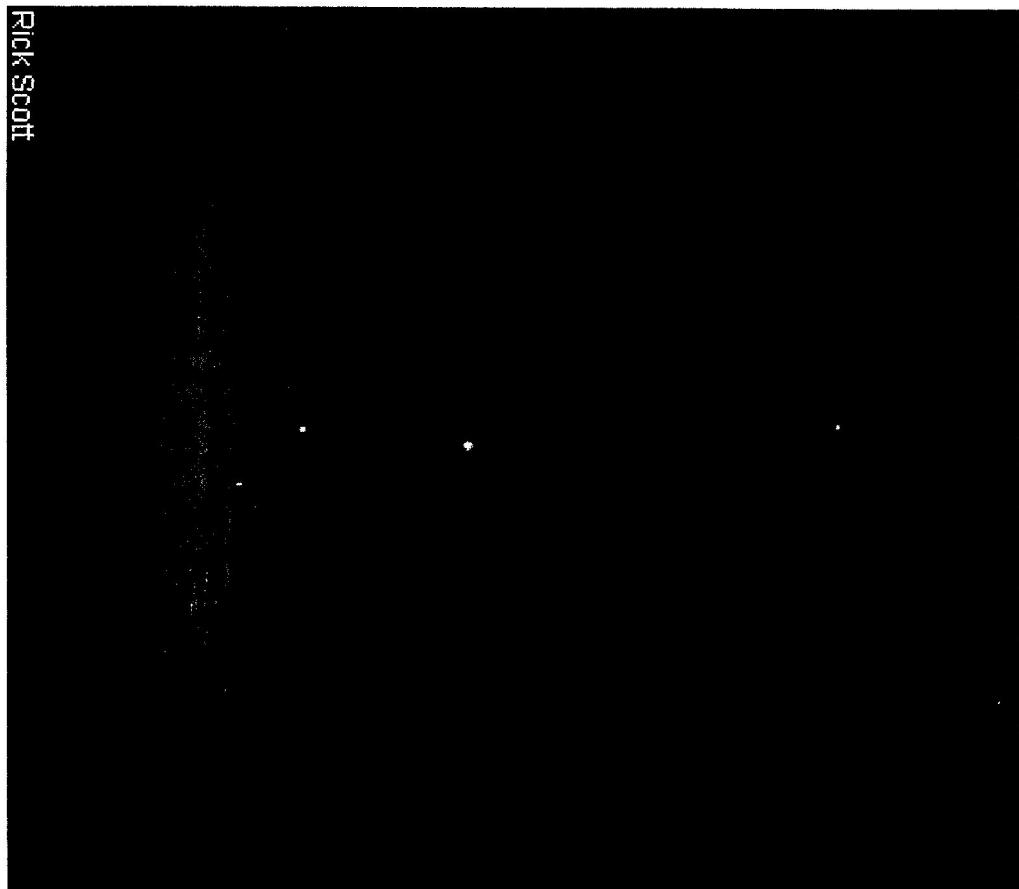
Mercury, Venus, Earth, Mars, Jupiter, Saturn

- The Planets also move ^{roughly} along the Ecliptic, but in a strange way.
- Question: Why are the planets on the ecliptic



Answer because the angles of inclinations of the orbital planes are small

The Planets or "wanderer"



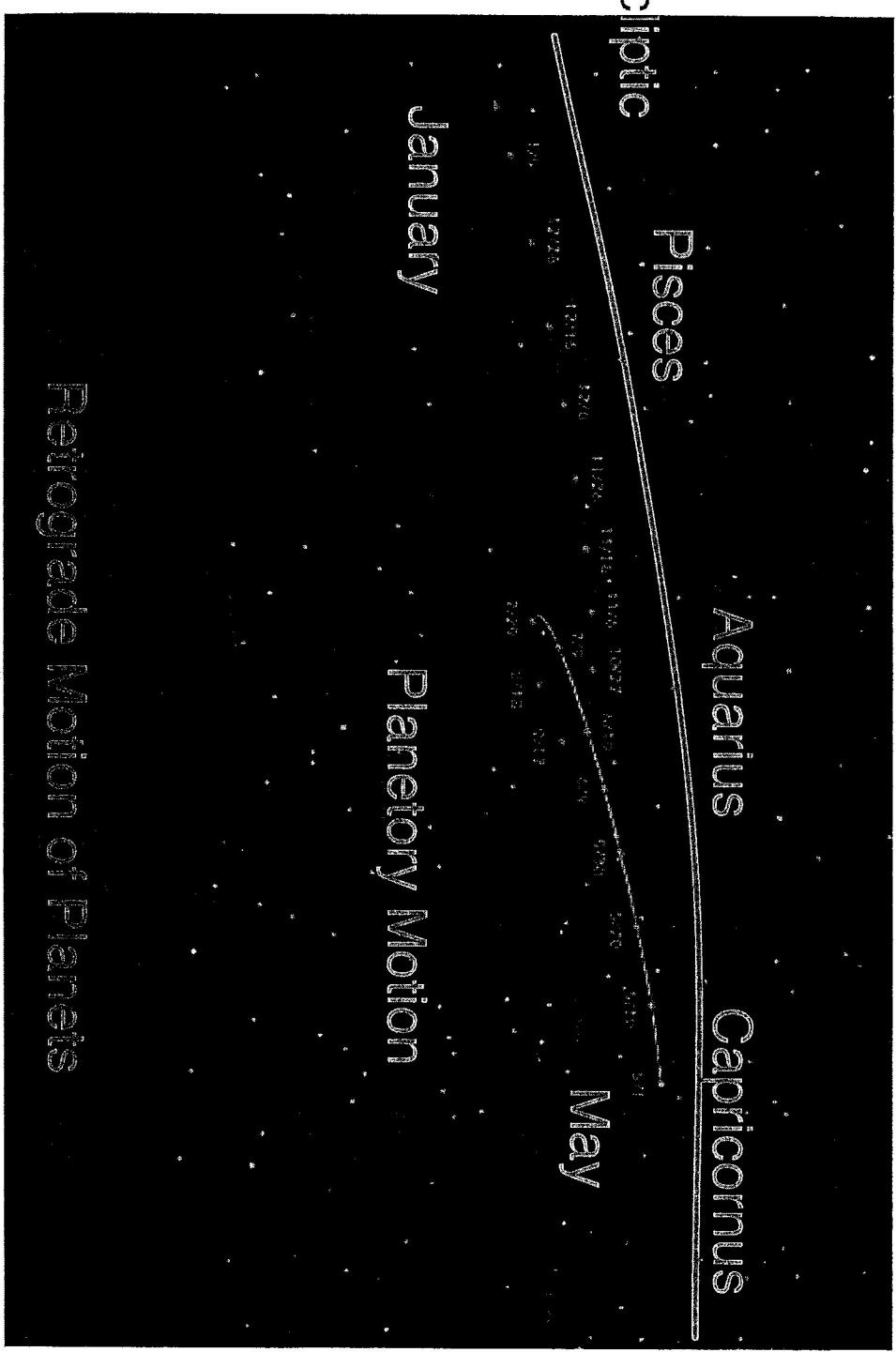
Rick Scott

From top to bottom Saturn, Venus, Jupiter, Mercury in alignment in ecliptic

Why are the planets on the ecliptic?

What is a wandering planet? (Source hyperphysics)

- During the a time period of several months the planets seem to change there positions irrationally relative to the constellations

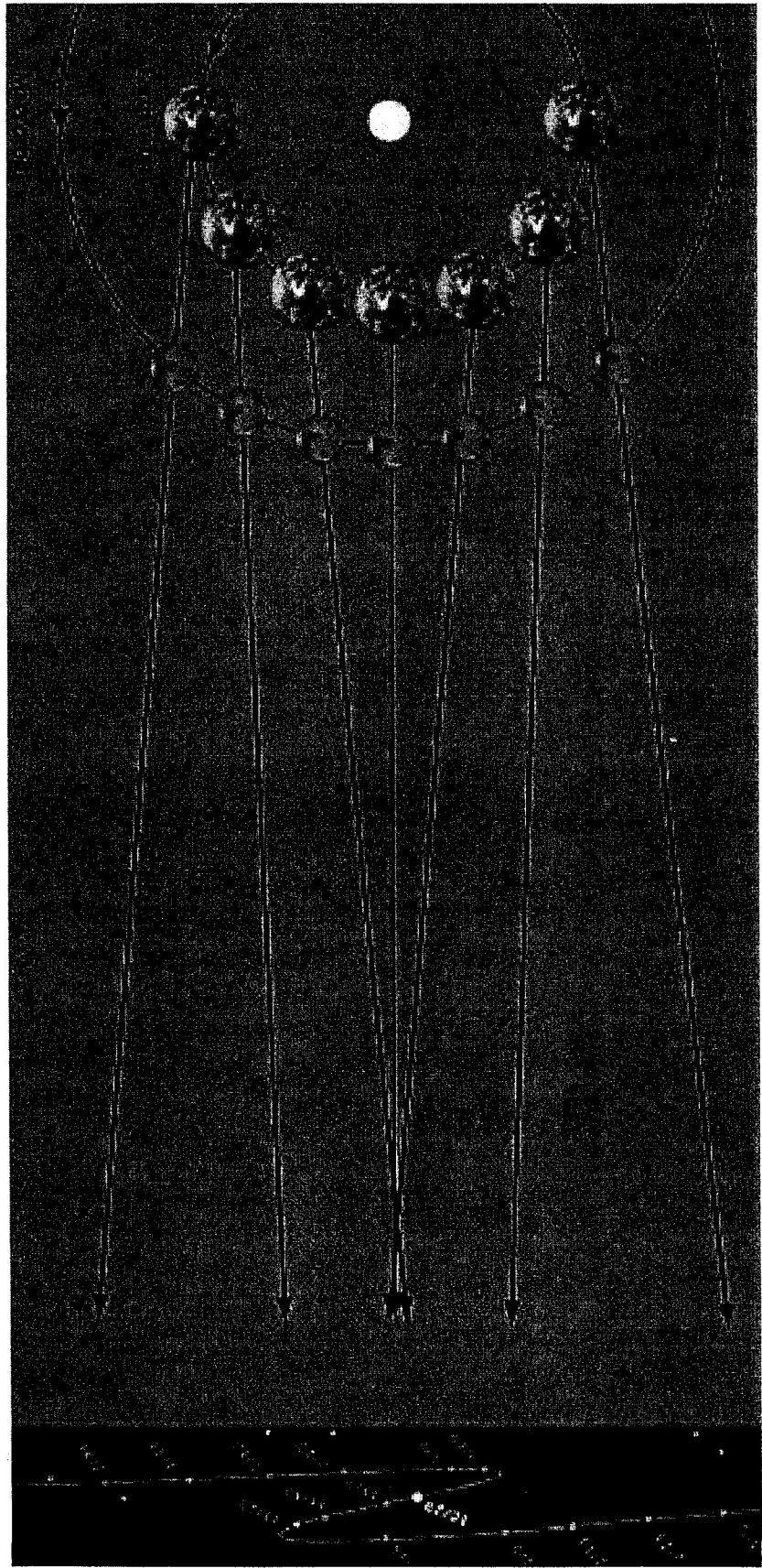


Retrograde Motion of Planets

Movie:

- Video due to Dr. Ted Snow – U. Boulder

Copernican Explanation for the Motion of Mars (Source hyperphysics)



- Video due to Dr. Steven J. Daunt

Ptolemeic Version of the retrograde motion

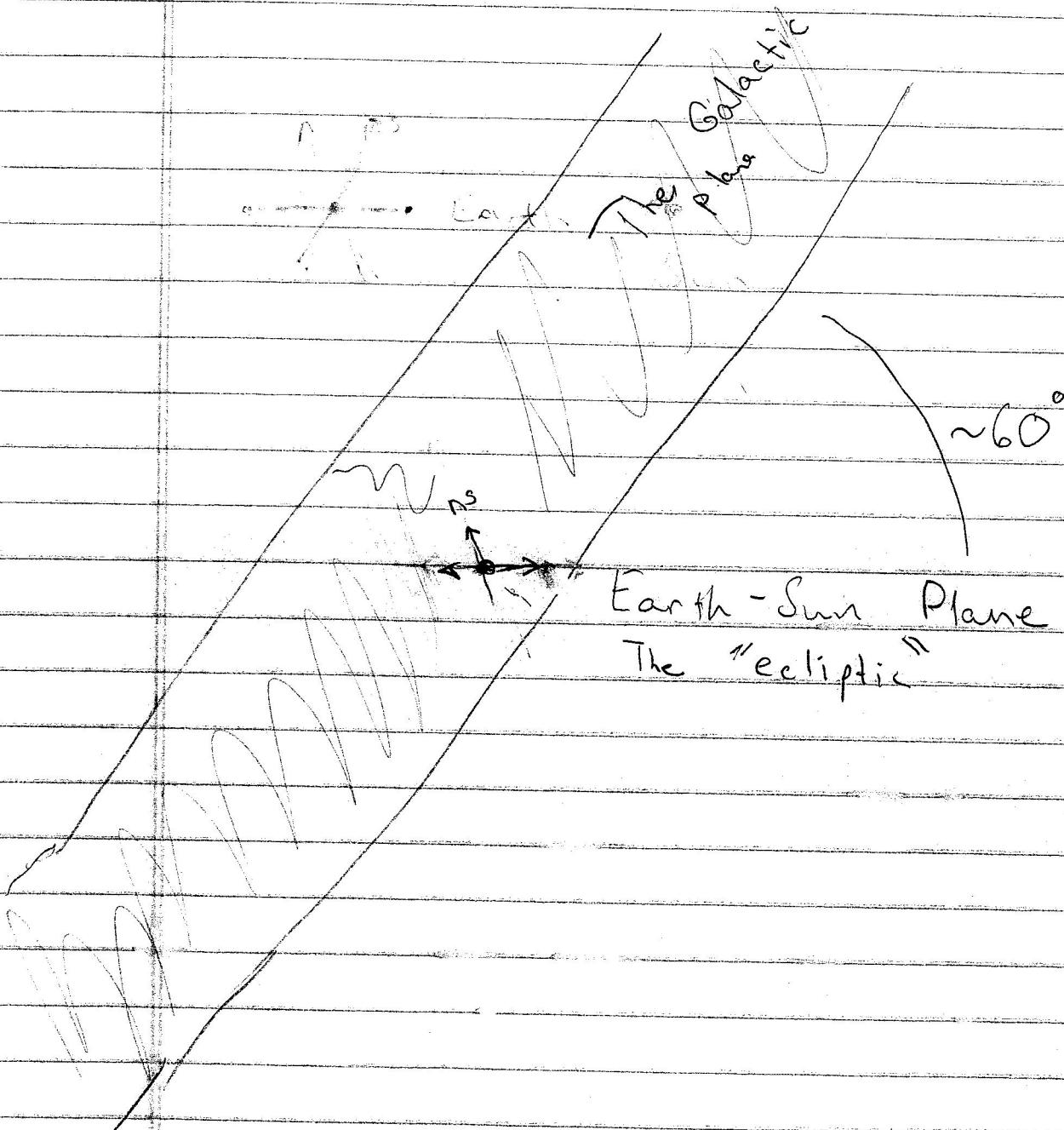
- Video due to Dr. Steven J. Daunt

What else do you see ? View from Chile

- Awesome video!
- Another

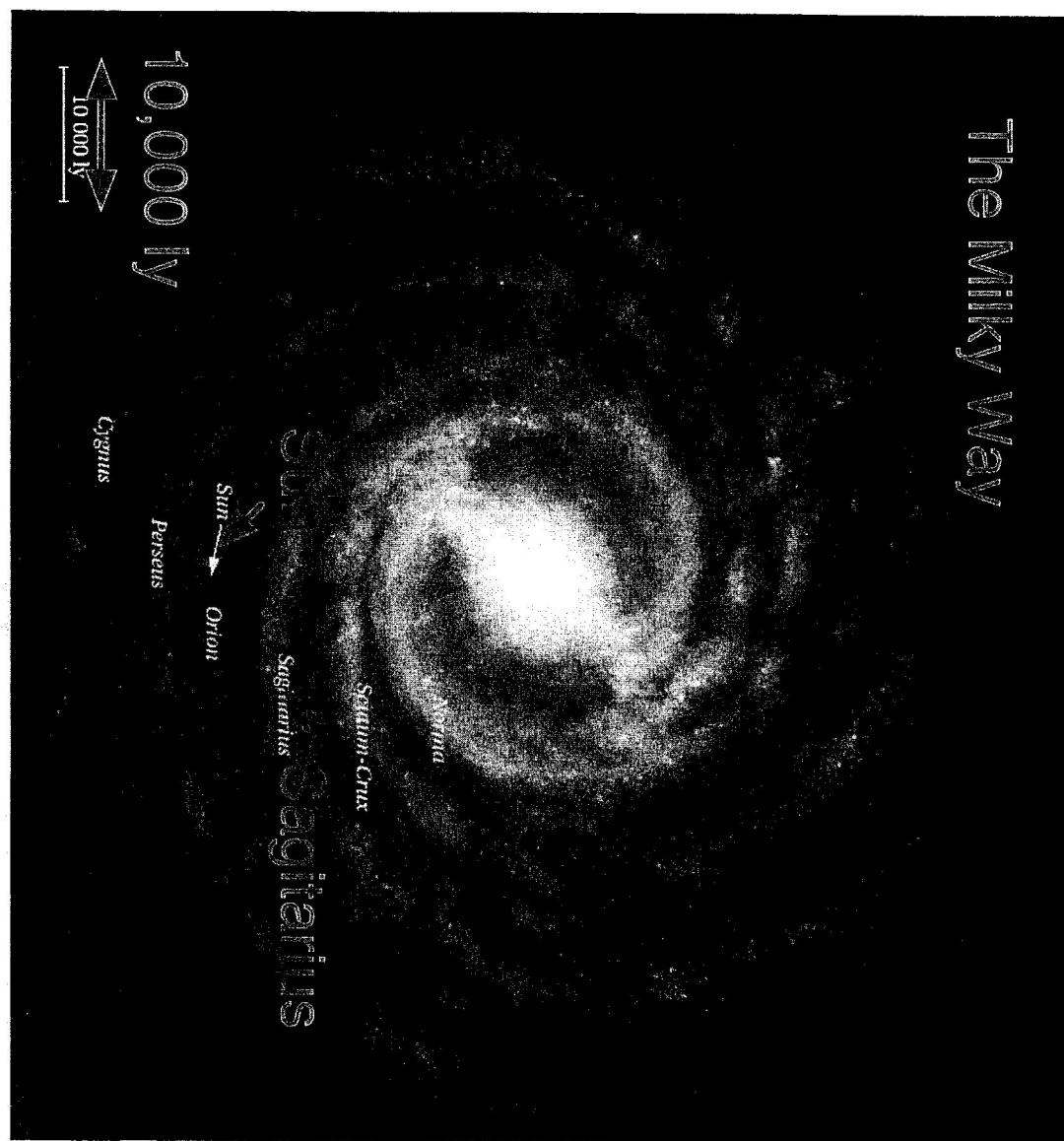
What you are seeing is the stars in our galaxy – the Milky Way

What is going on with the milky way



- The nearest star is α -centauri
 - distance from earth + sun
- 4.3 Light Years $\approx 2.7 \times 10^5$ AU

The Milky Way



- Distance to nearest star – α -centauri is $\sim 4.5 \text{ ly} = 10^5 \text{ au}$. (1 au = distance to sun = $1.5 \times 10^8 \text{ km}$)
- Distance to galactic center is $\sim 10^4 \text{ ly} \sim 10^9 \text{ au}$

• Then distance to α -centauri was determined in the 19th century