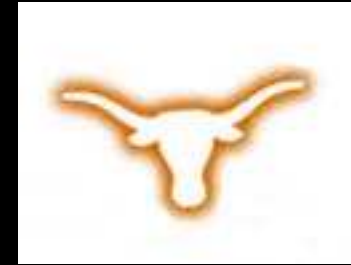




**Astro 301/ Spring 2005
(46690)**



Introduction to Astronomy

Instructor: Professor Shardha Jogee

TAs: Nick Sterling & Nairn Baliber

MWF 12-1 W-3.502

Lecture 5 ; Mon Jan 31/2005

Motion of galaxies within local group

Local Group = set of ~40 galaxies, bound by gravity. Includes M31 (And), Milky Way, M33, LMC, M32, SMC. Extends at least 5 million ly from MW

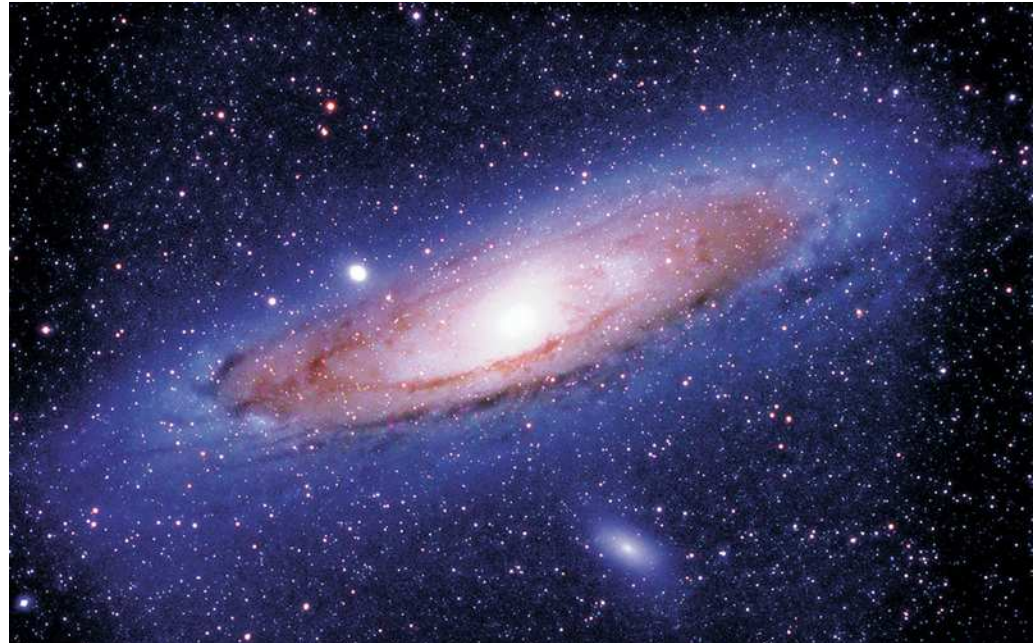
Some galaxy neighbors of MW

Sagittarius (dE) = 0.08×10^6 ly

LMC (Irr) = 0.16×10^6 ly

SMC (Irr) = 0.19×10^6 ly

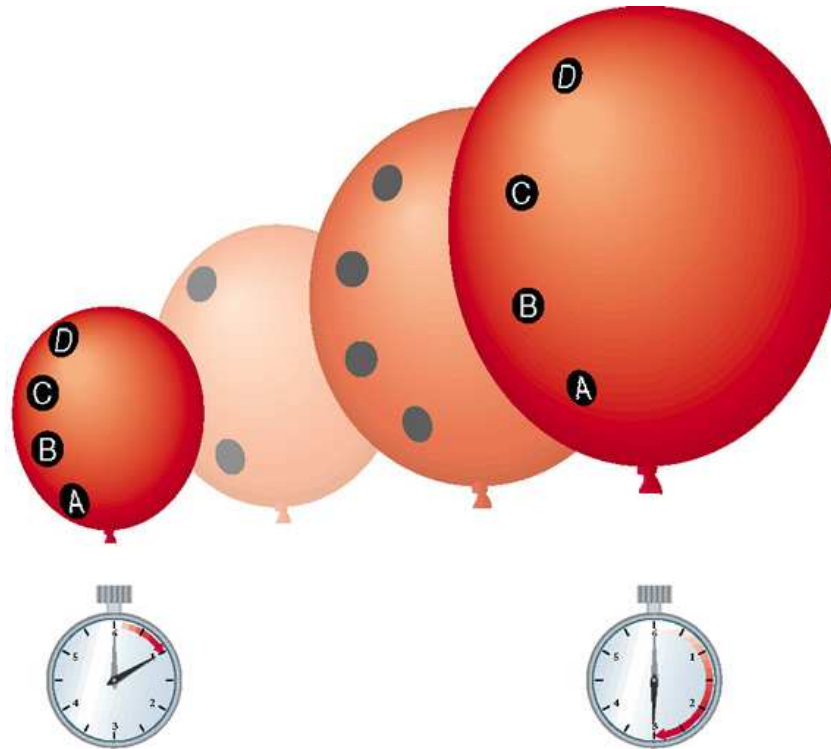
M31 (SAb) = 2.5×10^6 ly



Motions of galaxies with local group dominated by 'gravity' of local members

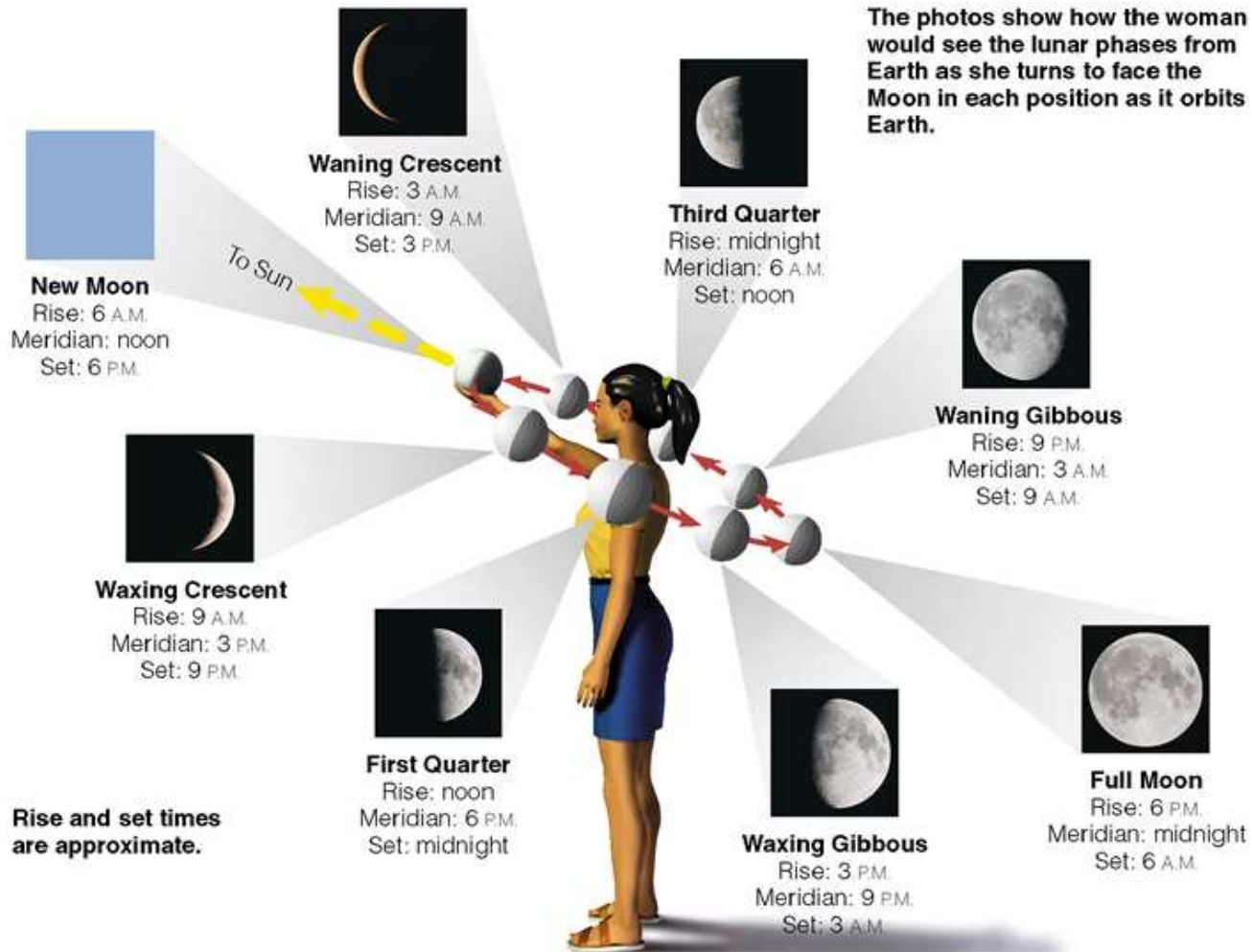
- SMC and LMC orbit Milky Way & are tidally interacting with it to form Magellanic stream
- Milky Way is moving towards M31 at 83 km/s.... may merge in ...?? Gyr
- Sagittarius dE being 'sucked into' and ripped apart by MW

Motion of distant galaxies well outside local group



Lunar Cycle

- Moon's orbital motion about Earth: Period =?; Distance from E= ?; Sense =?
- Reason for lunar cycle from New Moon to Full Moon?



History and Science of Astronomy

Astronomy and Temporal Calendars

<u>Unit of time</u>	<u>Astronomical connection</u>
1 year	?
Winter-Summer interval of 6 months	?
1 month	?
1 week	?
1 Day	?
Hours, Min, Sec	?

<i>Object</i>	<i>Teutonic Name</i>	<i>English</i>	<i>French</i>	<i>Spanish</i>
Sun	Sun	Sunday	dimanche	domingo
Moon	Moon	Monday	lundi	lunes
Mars	Tiw	Tuesday	mardi	martes
Mercury	Woden	Wednesday	mercredi	miércoles
Jupiter	Thor	Thursday	jeudi	jueves
Venus	Fria	Friday	vendredi	viernes
Saturn	Saturn	Saturday	samedi	sábado

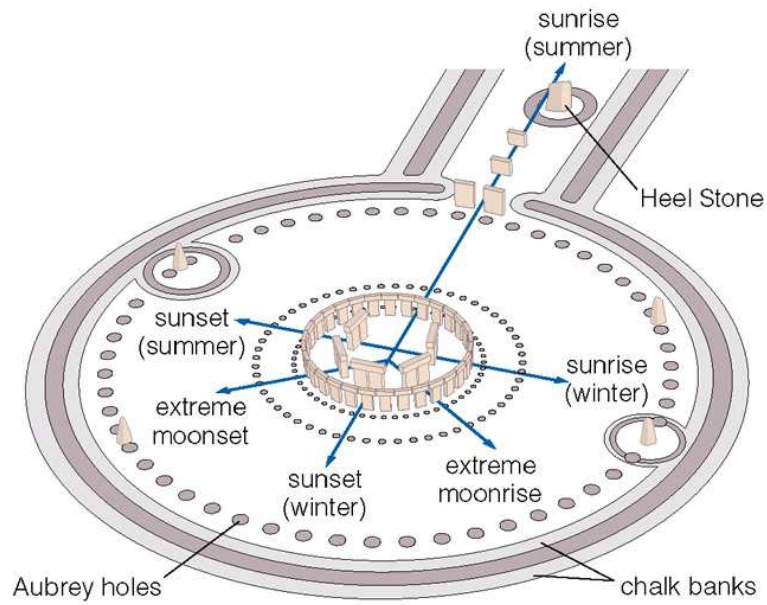
Determining time of day and night



- Night time : use position of stars in sky if know the date e.g., rise and set time of Orion in Dec; Egyptian sundials
- Daytime: use position of Sun on sky. e.g., Shadow of sticks and obelisks.
Sundials

Ancient Egyptian Obelisk (83 ft)

Determining time of year and seasons



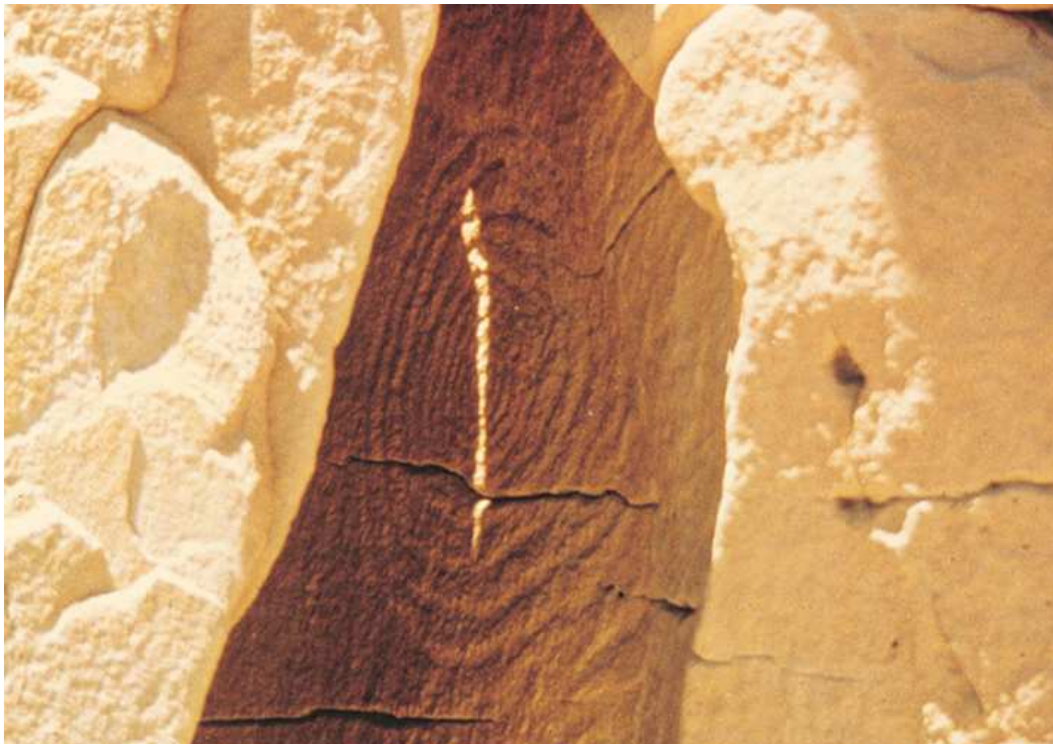
Stonehenge (2750-1550 BC).
Summer solstice



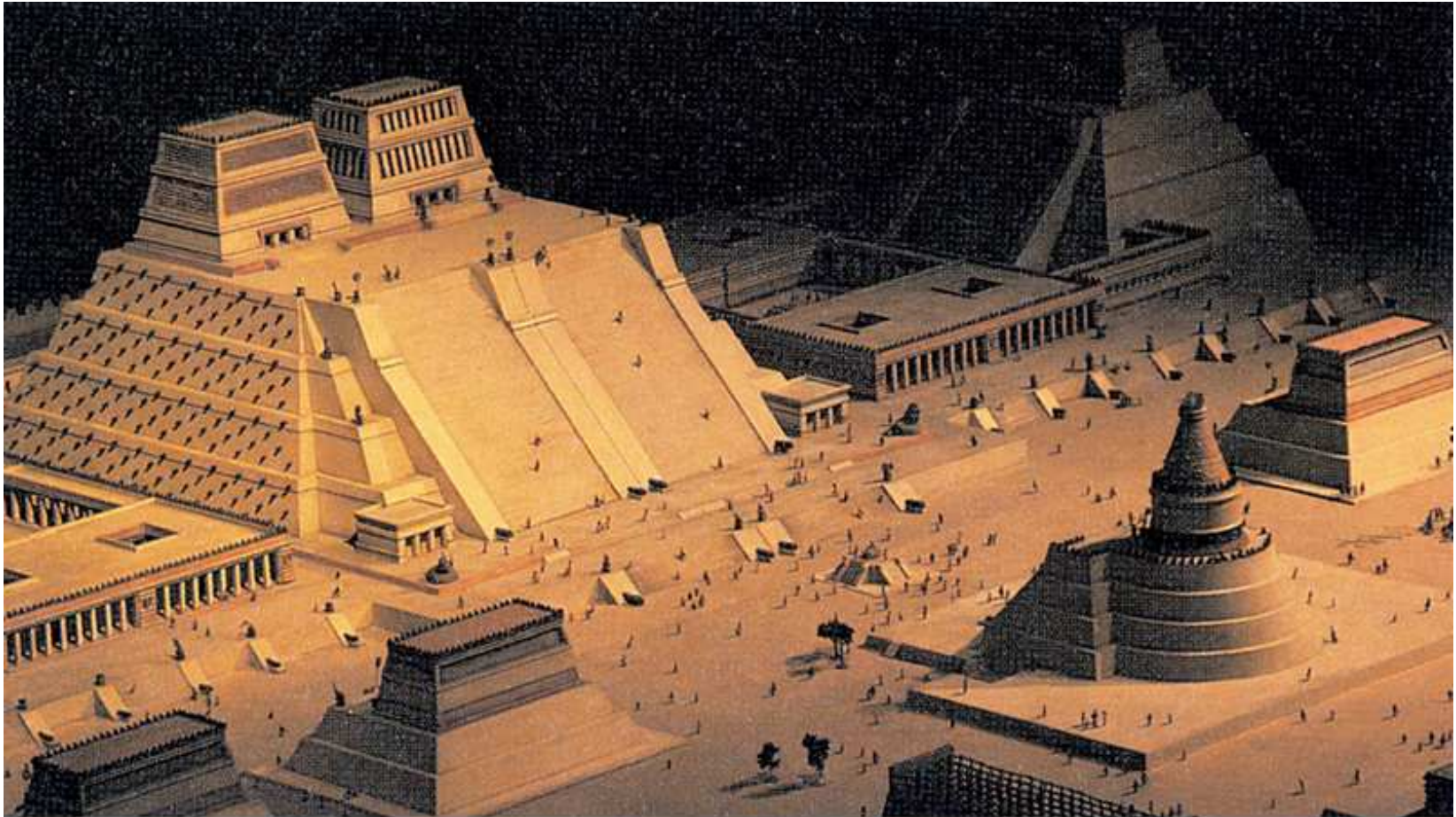
Determining time of year and seasons



Sun Dagger in New Mexico
Noon on Summer Solstice



Determining time of year and seasons



Templo Mayor in Aztec city à Fall and Spring equinoxes

Lunar Cycle and Metonic Cycle

- Lunar cycle
- 12 month lunar calendar year vs 12 month solar calendar year
- Muslim calendar
- Metonic cycle = 19 year cycle such that

History and Science of Astronomy: Overview

- See class notes

- 3000 BC; Chinese astronomy
- 2700-2100 BC; Egyptians & Babylonians
- 625 BC-150 AD; Greek scientists and geocentric models (Thales, Pythagoras, Democritus, Plato, Eudoxus, Aristotle, [Aristarchus], Apollonius, Hipparchus, Ptolemy)
- 300 BC; Expansion of Greek empire into Middle East (Egypt, Mesopotamia)
- 300 BC-400 AD; Library of Alexandria
- 600-800 AD ; House of Baghdad; compilation of knowledge by Arabs from Egyptians, Greeks, Hindu, Chinese. Development of arithmetic.
- 800-1400 ; Knowledge compiled spreads in Byzantine Empire
- 1453 ; Capital of Byzantine Empire falls to the Turks . Eastern scholars move to Europe transferring knowledgeEuropean Renaissance
- 1473—1642 ; Heliocentric models and birth of modern astronomy (Copernicus, Brahe, Kepler, Galilei)

- 1642-1747 Newton: Laws of gravity
- 1905-1915 Einstein's Special and General Theory of Relativity