

Observing Total Lunar Eclipses

Calendar in the Sky

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Imagine a night...
... when a new partner
joins the stately dance
of moon around Earth
and Earth around Sun.

Image Credit: Rob Gonsalves, *Imagine a Night*

<http://artodyssey1.blogspot.com/2009/10/rob-gonsalves-rob-gonsalves-is-canadian.html>

Types of Eclipses

LUNAR ECLIPSES

- When the Earth blocks the Sun's light from reaching the Moon
- [When the Moon moves through the Earth's shadow]
- Different classifications of lunar eclipses: total, partial, penumbral



SOLAR ECLIPSES

- When the Moon blocks the Sun's light from reaching the Earth
- [When the Moon's shadow falls onto the Earth]
- Different classifications of solar eclipses: total, partial, annular



What Causes Eclipses

Eclipses occur because of a geometrical coincidence:

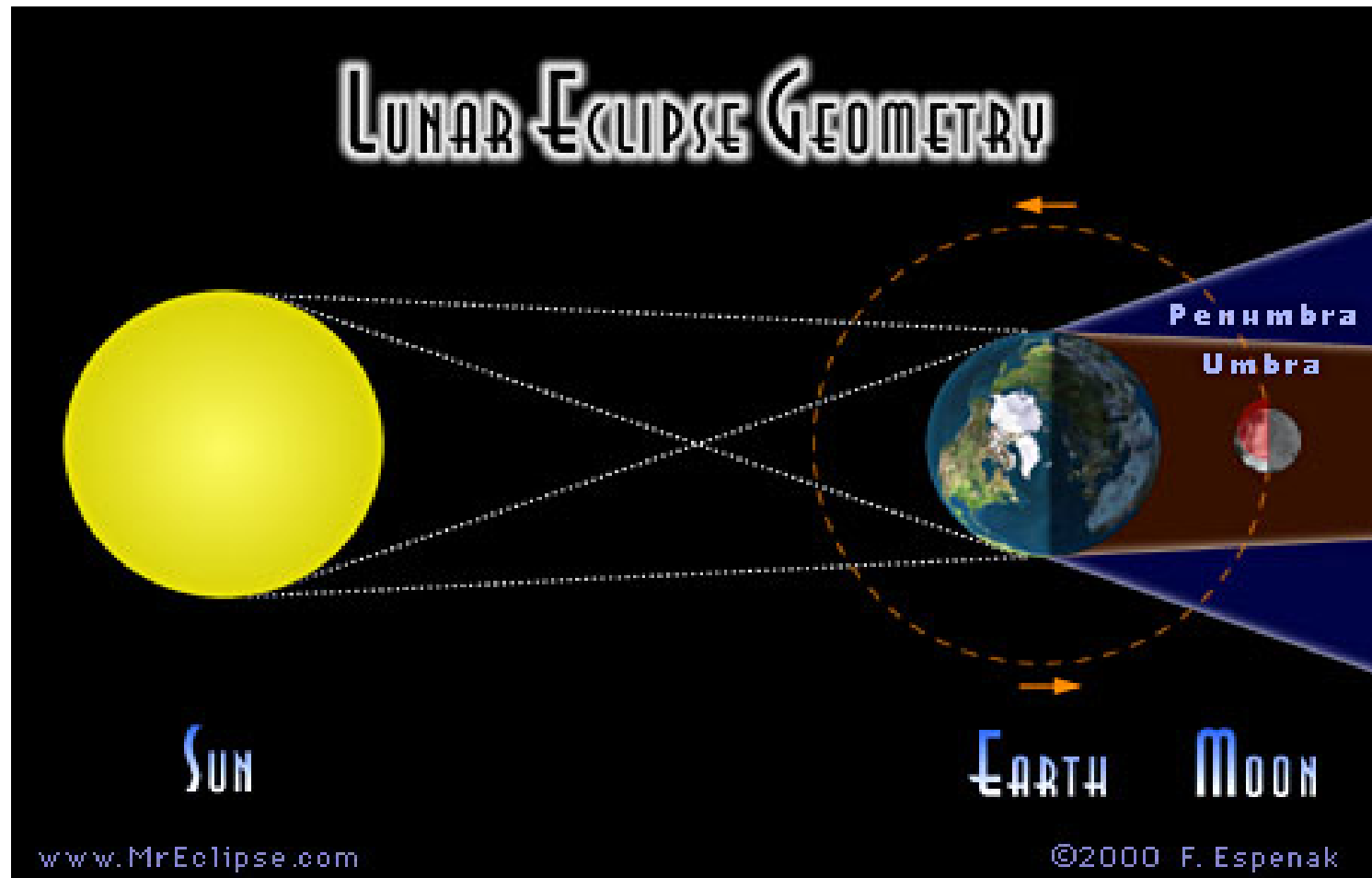
- The Moon is 400x closer to the Earth than the Sun
- But the Sun is 400x bigger than the Moon

Lunar eclipses can ONLY occur when:

1. The Moon is in full moon position AND
2. The Moon is located at or near the lunar nodes



Lunar Eclipses



NOTE: Diagram is not to scale!

Lunar Nodes

Lunar Nodes Animation: <http://astro.unl.edu/classaction/>
(click on “Lunar Cycles”, then “Animations”, then “Moon Inclination”)

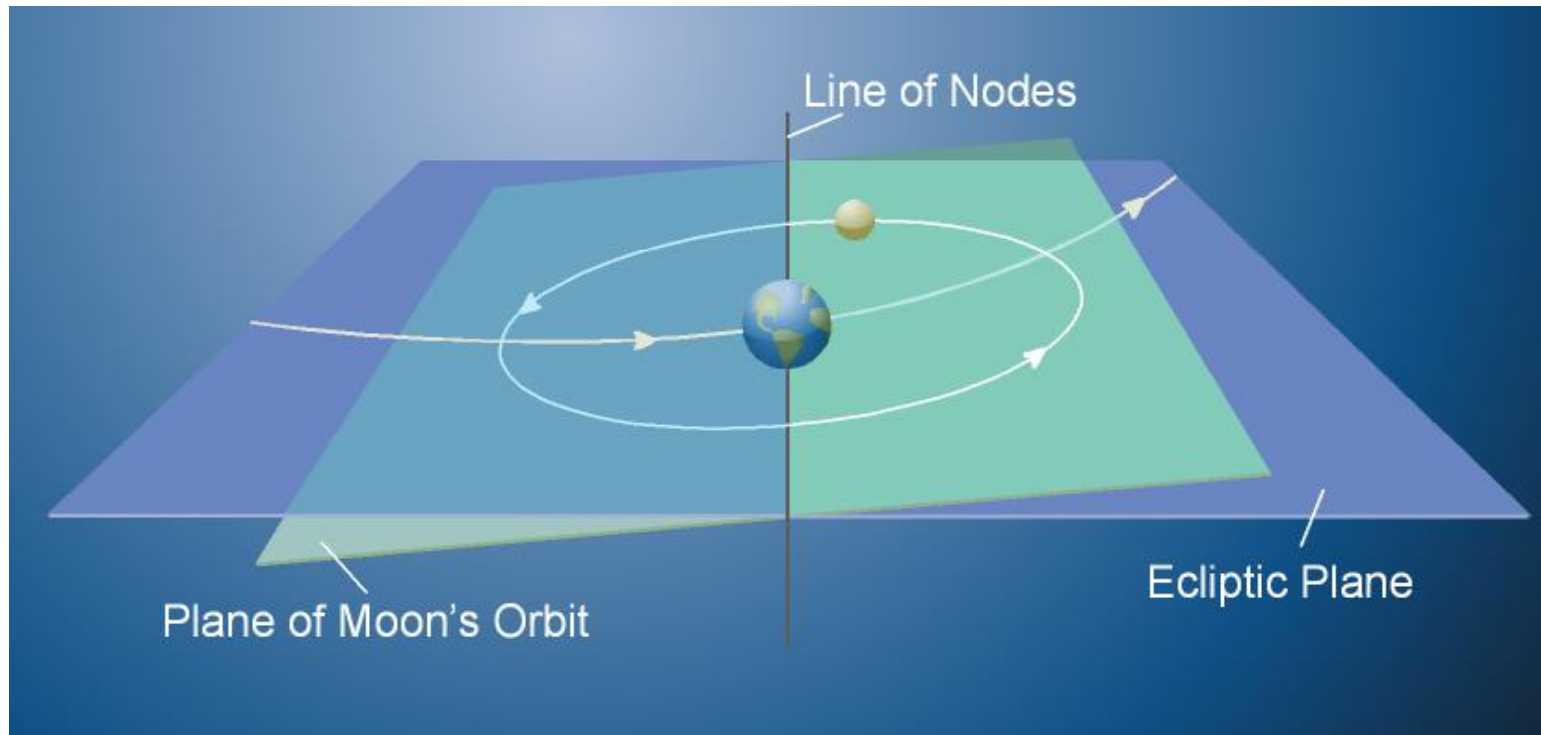


Image Credit: University of Nebraska Lincoln

Facts About Lunar Eclipses

- There can be between 0-3 lunar eclipses per year
- When a lunar eclipse takes place, everyone on the nighttime side of the Earth can see it
- Lunar eclipses can only happen at full moon
- But lunar eclipses do not happen EVERY full moon

Total Lunar Eclipse

<http://www.youtube.com/watch?v=2dk--IPAi04>



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www.MrEclipse.com



Total Lunar Eclipse

July 16, 2000, Lahaina



Penumbral Lunar Eclipse

(when the moon passes through the Earth's penumbral shadow)

Before Eclipse



Mid-Eclipse



Partial Lunar Eclipse

(when part of the moon passes through the Earth's umbral shadow)



Upcoming Total Lunar Eclipse: April 14-15, 2014

<http://eclipse.gsfc.nasa.gov/OH/OH2014.html#LE2014Apr15T>

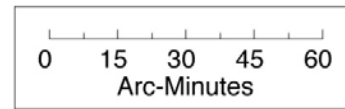
Eclipse Durations

Penumbral = 05h44m00s
Umbral = 03h34m44s
Total = 01h17m48s

$\Delta T = 67$ s

Rule = CdT (Danjon)

Eph. = VSOP87/ELP2000-85

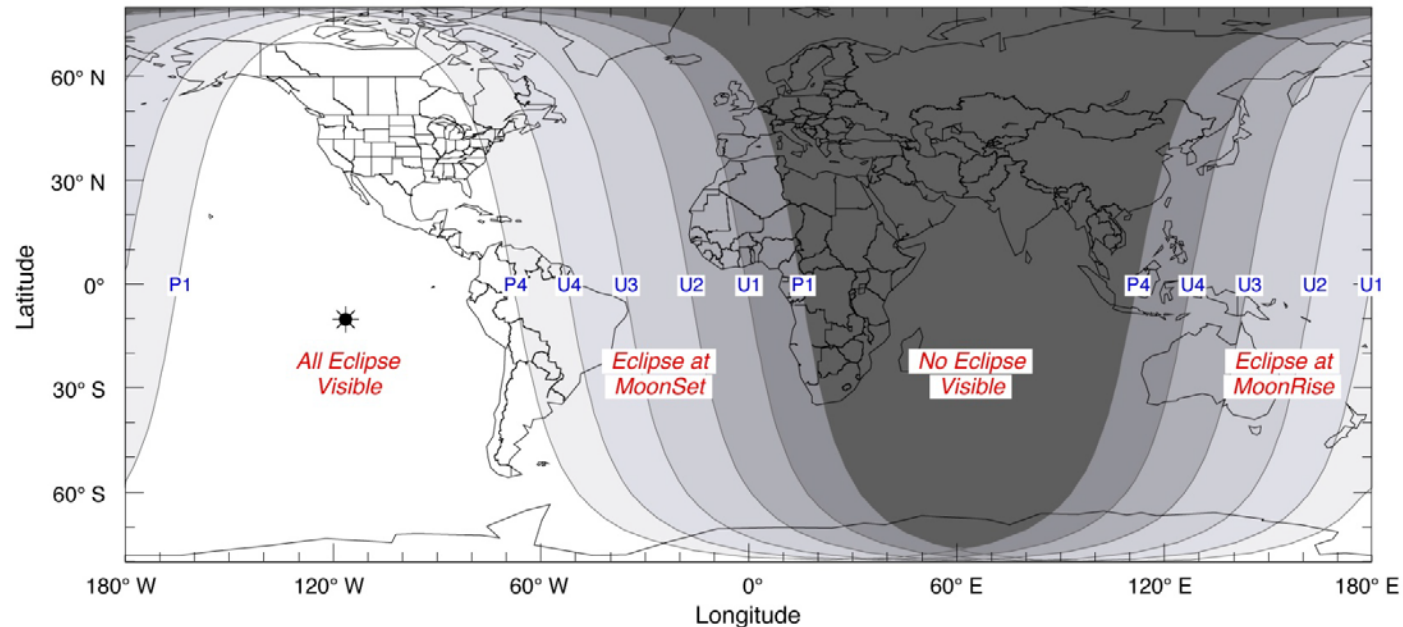


F. Espenak, NASA's GSFC

eclipse.gsfc.nasa.gov/eclipse.html

Eclipse Contacts

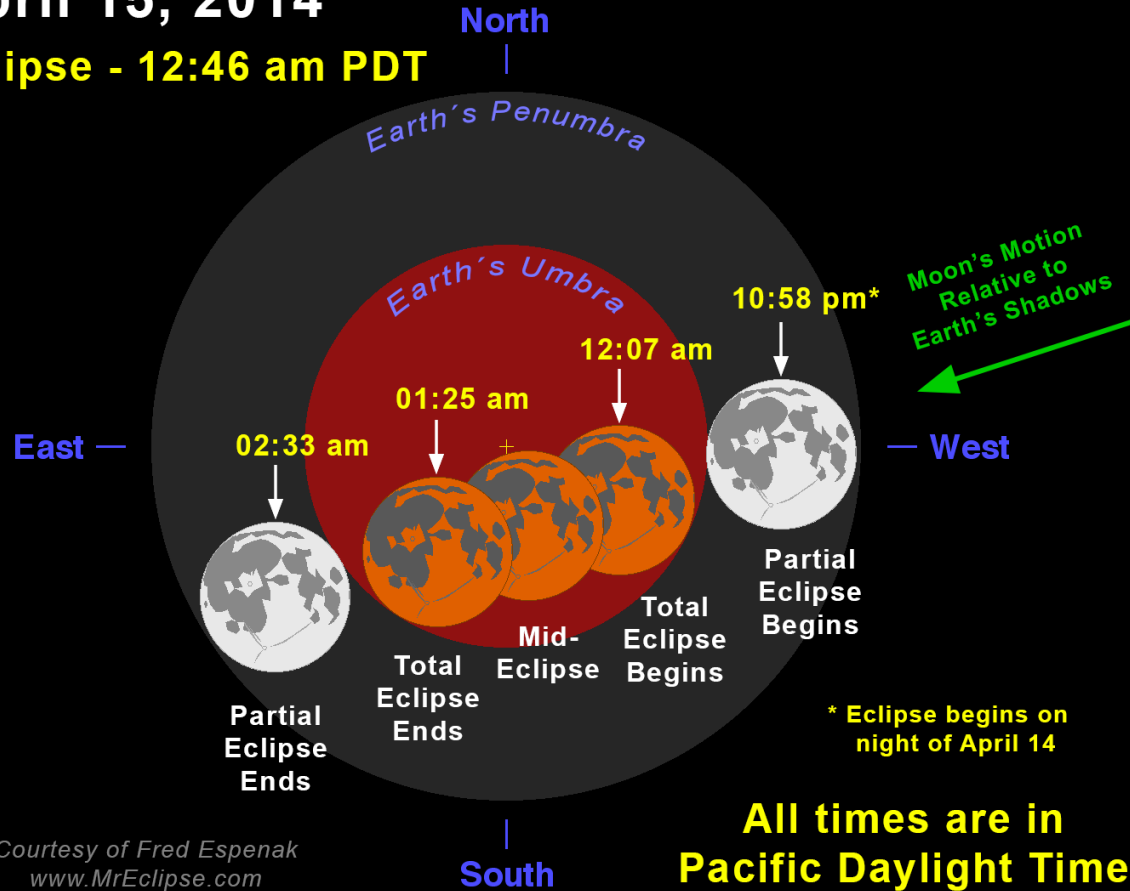
P1 = 04:53:37 UT
U1 = 05:58:19 UT
U2 = 07:06:47 UT
U3 = 08:24:35 UT
U4 = 09:33:04 UT
P4 = 10:37:37 UT



Total Eclipse of the Moon

April 15, 2014

Mid-Eclipse - 12:46 am PDT



* Eclipse begins on night of April 14

All times are in Pacific Daylight Time

Courtesy of Fred Espenak
www.MrEclipse.com

Total Lunar Eclipse – April 15, 2014

NOTE:

All times listed are UT. Depending on the observer's time zone, the eclipse may begin on April 14. Use online tool such as <http://www.timeanddate.com/worldclock/> to convert to your local time.

04:52 – penumbral eclipse begins (first contact of Moon with Earth's shadow)

07:06 – partial eclipse begins (first contact of Moon with Earth's umbra)

07:42 – Full Moon

07:46 – middle of eclipse (Moon nearest to center of Earth's shadow)

08:25 – total eclipse ends (Moon touches farther edge of Earth's umbra)

09:33 – partial eclipse ends (last contact of Moon with Earth's umbra)

10:39 – penumbral eclipse ends (last contact of Moon with Earth's shadow)