Eclipses and Saros

by Alison Price

Workshop Outline

Part 1

Eclipses and Saros

Part 2

Prenatal Eclipses and the August 2017 eclipses

Part 1

Eclipses

Eclipse Seasons

Solar Eclipses

Lunar Eclipses

Saros Cycles

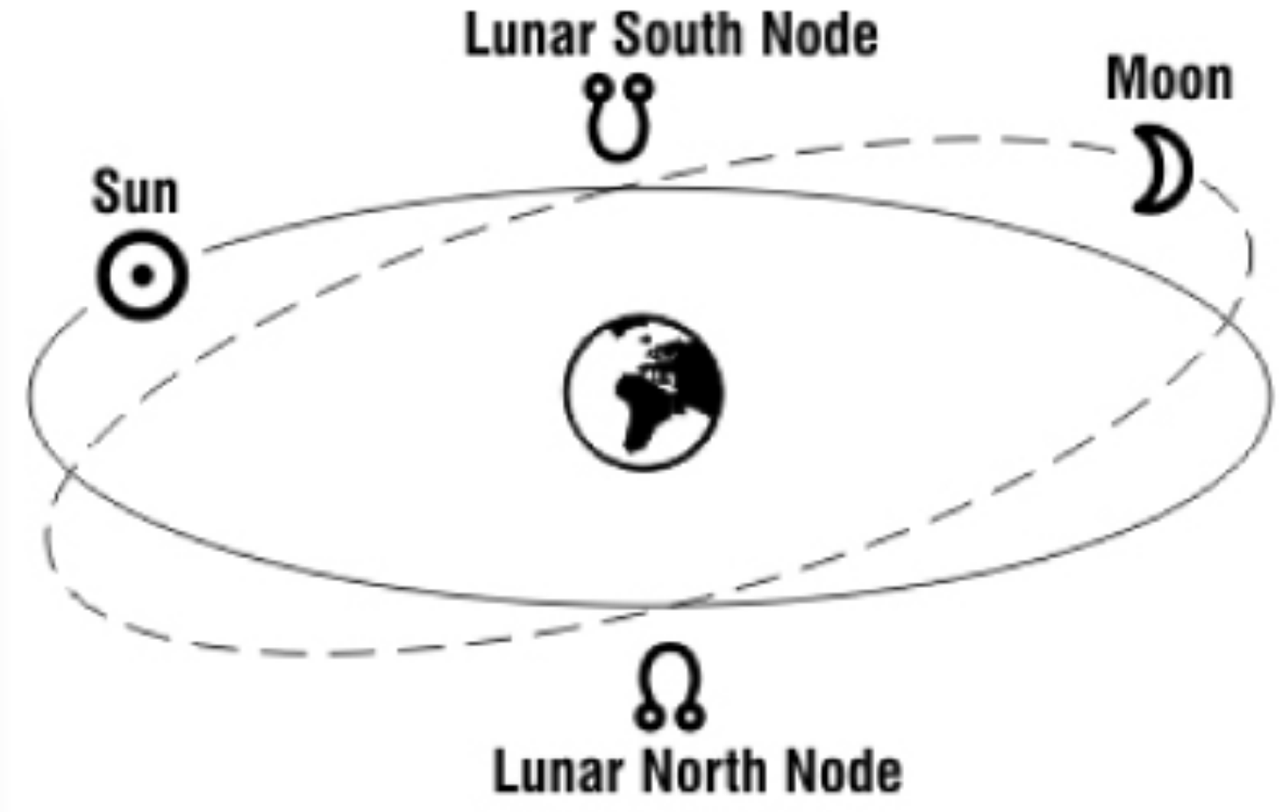
Where Eclipses Come From

The plane of the ecliptic

The path the Sun takes is called *the plane of the ecliptic*. Do you see a clue in the word *ecliptic*?

The Moon's path

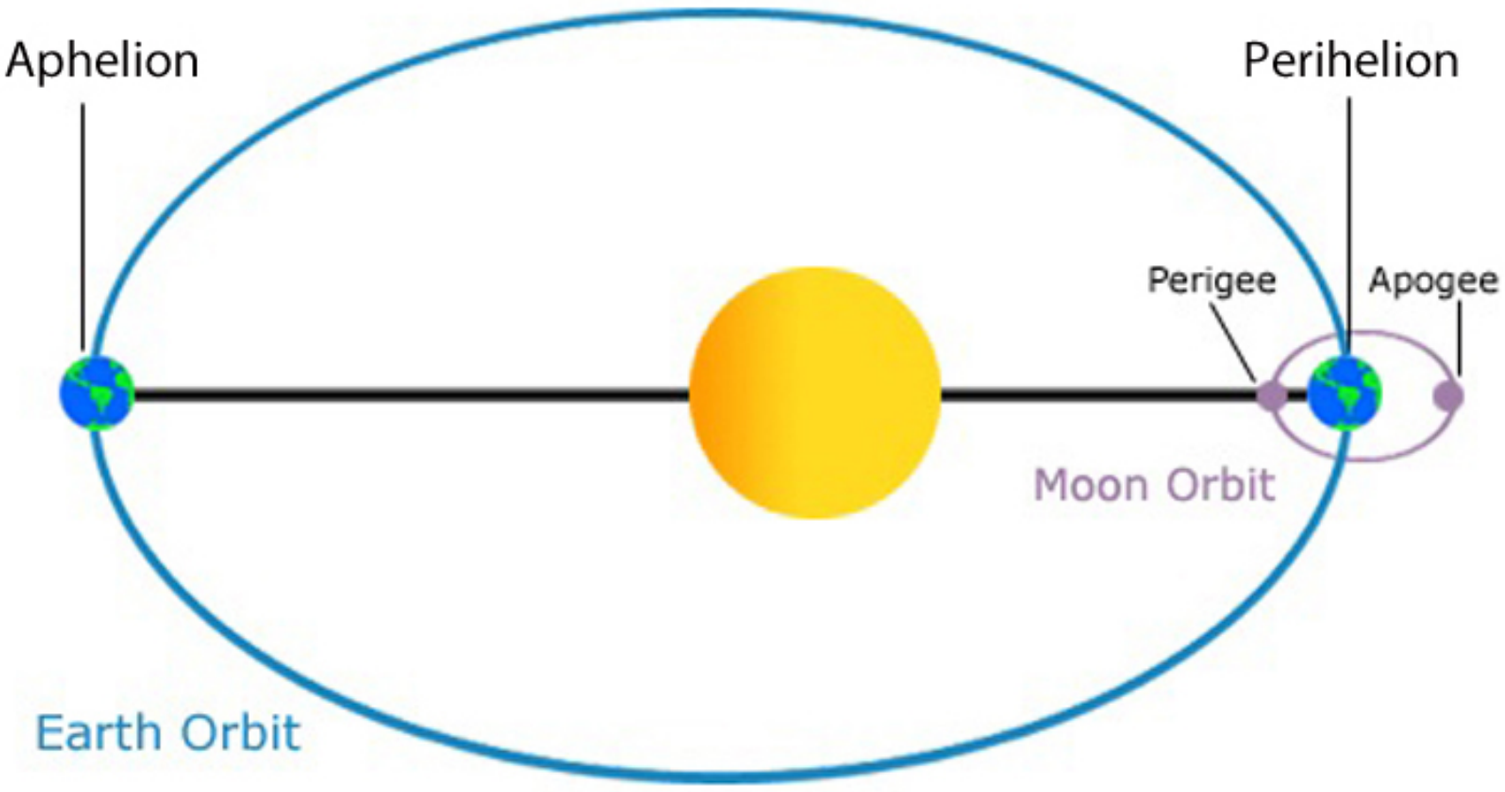
The Moon's path is tilted at 5.1 degrees from the plane of the ecliptic.



Perihelion and Aphelion

Perihelion and Aphelion

The Sun is closer to the Earth in January (perihelion) and farther away in July (aphelion).



Potential for Eclipses

Potential for Eclipses

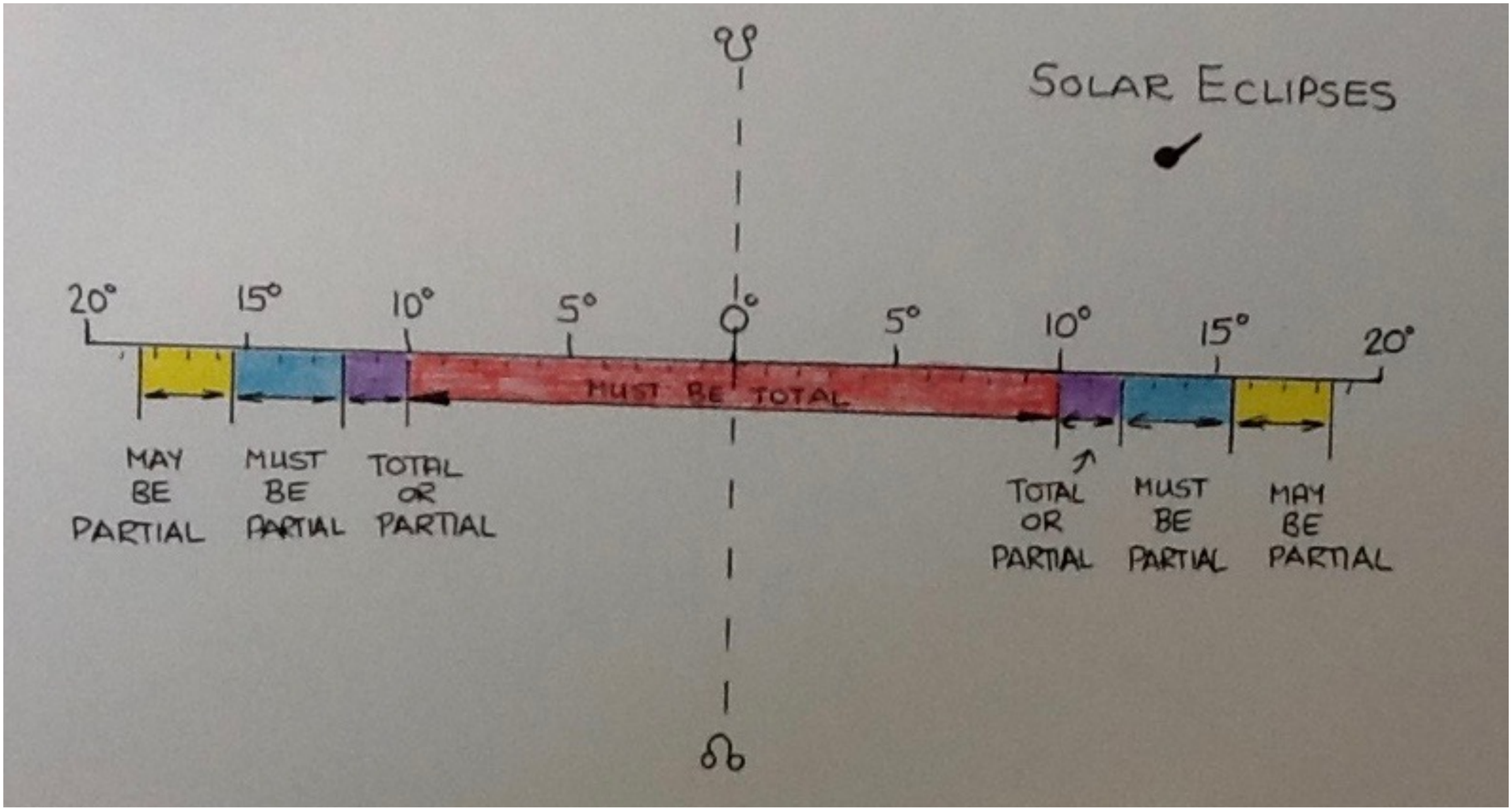
If a new Moon takes place within about 17° of a node, then a solar eclipse will be visible somewhere on Earth. The Sun makes one complete circuit of the ecliptic in 365.24 days, so its average angular velocity is 0.99° per day. At this rate, it takes 34.5 days for the Sun to cross the 34° wide eclipse zone centered on each node.

Nodal eclipse zone

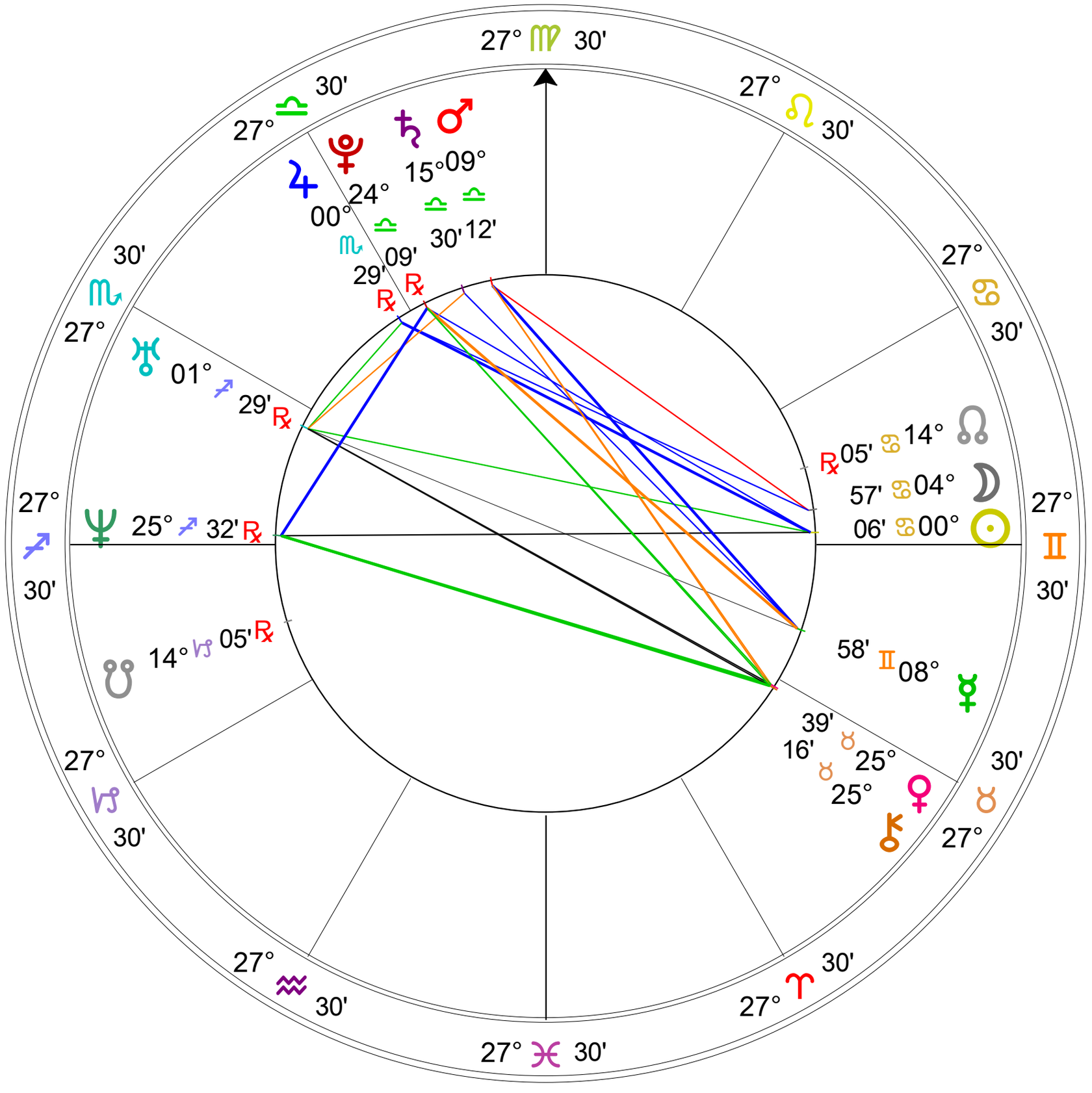
Because the Moon's orbit with respect to the Sun has a mean duration of 29.53 days, there will always be one and possibly two solar eclipses during each 34.5-day interval when the Sun passes through the nodal eclipse zones.

Eclipses seasons

These time periods are called eclipse seasons.


SOLAR ECLIPSES
20°
15°
10°
5°
0°
5°
10°
15°
20°
MUST BE TOTAL
MAY BE PARTIAL
MUST BE PARTIAL
TOTAL OR PARTIAL
TOTAL OR PARTIAL
MUST BE PARTIAL
MAY BE PARTIAL

HRH Prince William
21 June 1982
9:03pm
London, England



Eclipse Seasons

Annual Eclipse Seasons

Each year there are two eclipse seasons six months apart.

Each year the eclipses begin earlier in the year due to the retrograde motion of the nodes.

Every season has at least one solar eclipse and one lunar eclipse.

Solar eclipses

One or two solar eclipses occur each season.

Two, three or four solar eclipses occur each year.

Lunar eclipses

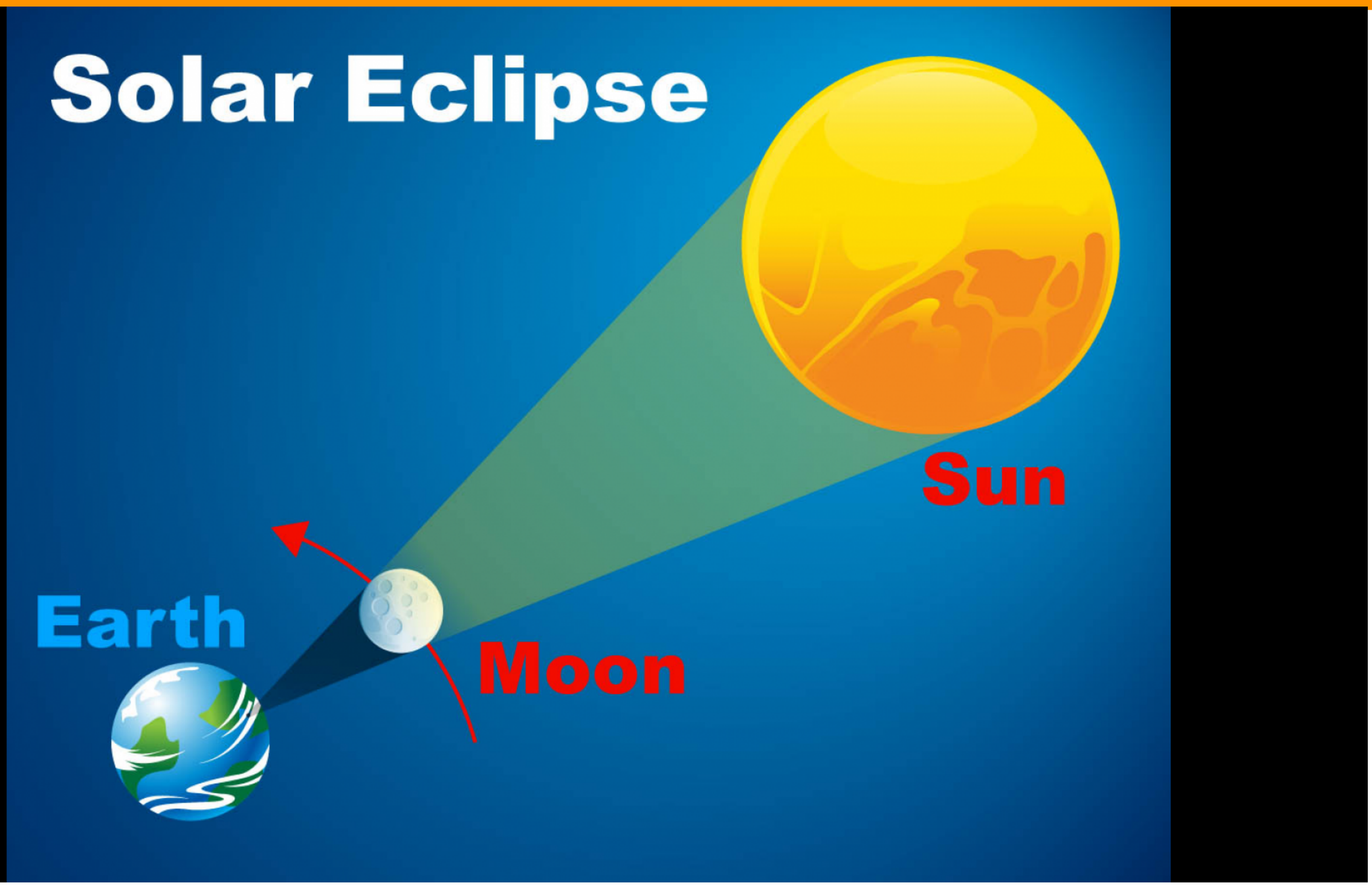
One, two or three lunar eclipses occur each season.

Lunar eclipses occur two weeks before or after a solar eclipse.

Solar Eclipses

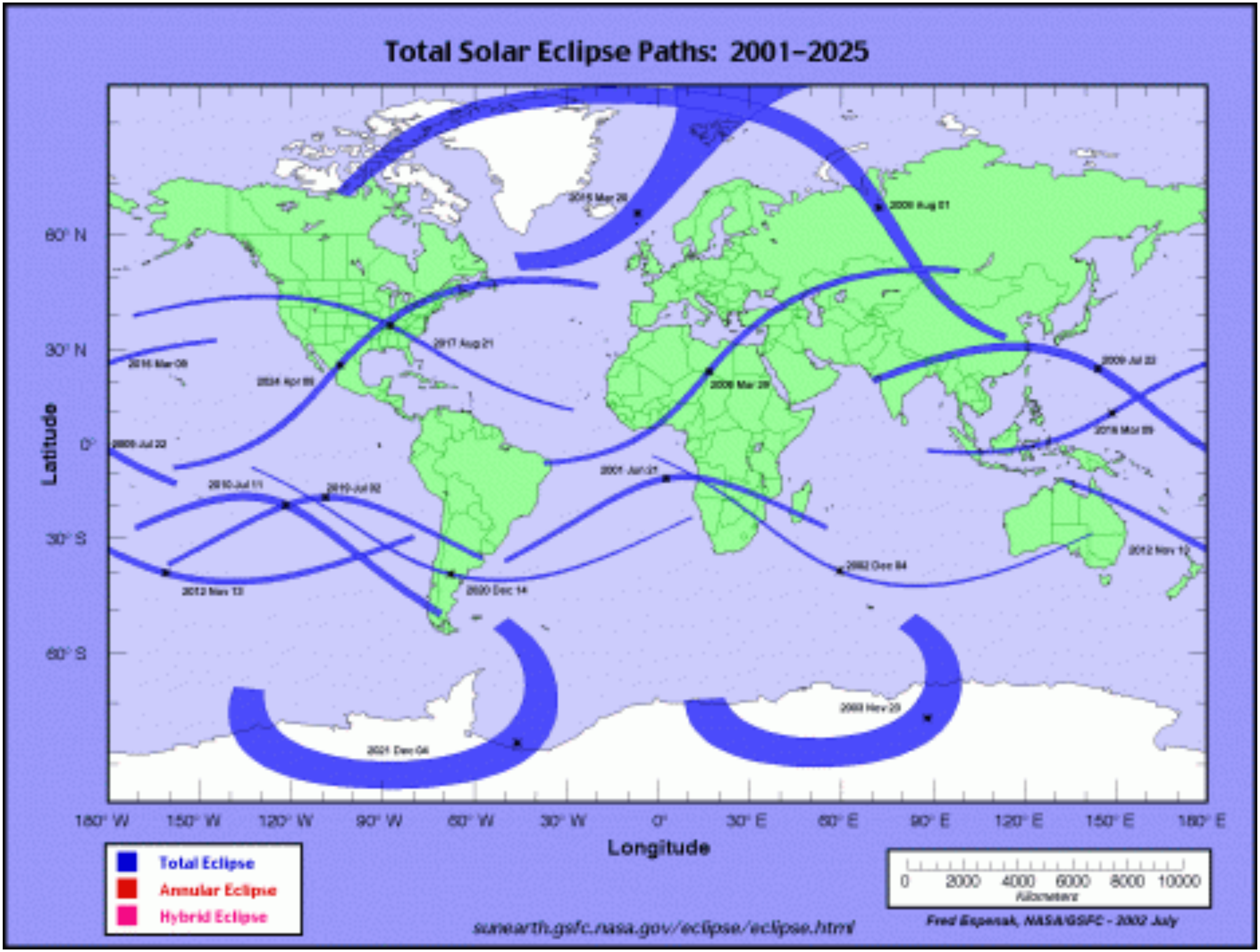
Solar Eclipses

Solar Eclipses



The Moon’s Shadow

Total Solar Eclipse Paths: 2001–2025



Solar Eclipses

Central line solar eclipses

Central solar eclipses are eclipses in which the central axis of the Moon's shadow strikes the Earth's surface.

All partial (penumbral) eclipses are non-central eclipses since the shadow axis misses Earth.

However, umbral eclipses (total, annular and hybrid) may be either central (usually) or non-central (rarely).

Hybrid solar eclipses

Hybrid eclipses are also known as annular/total eclipses. Such an eclipse is both total and annular along different sections of its umbral path

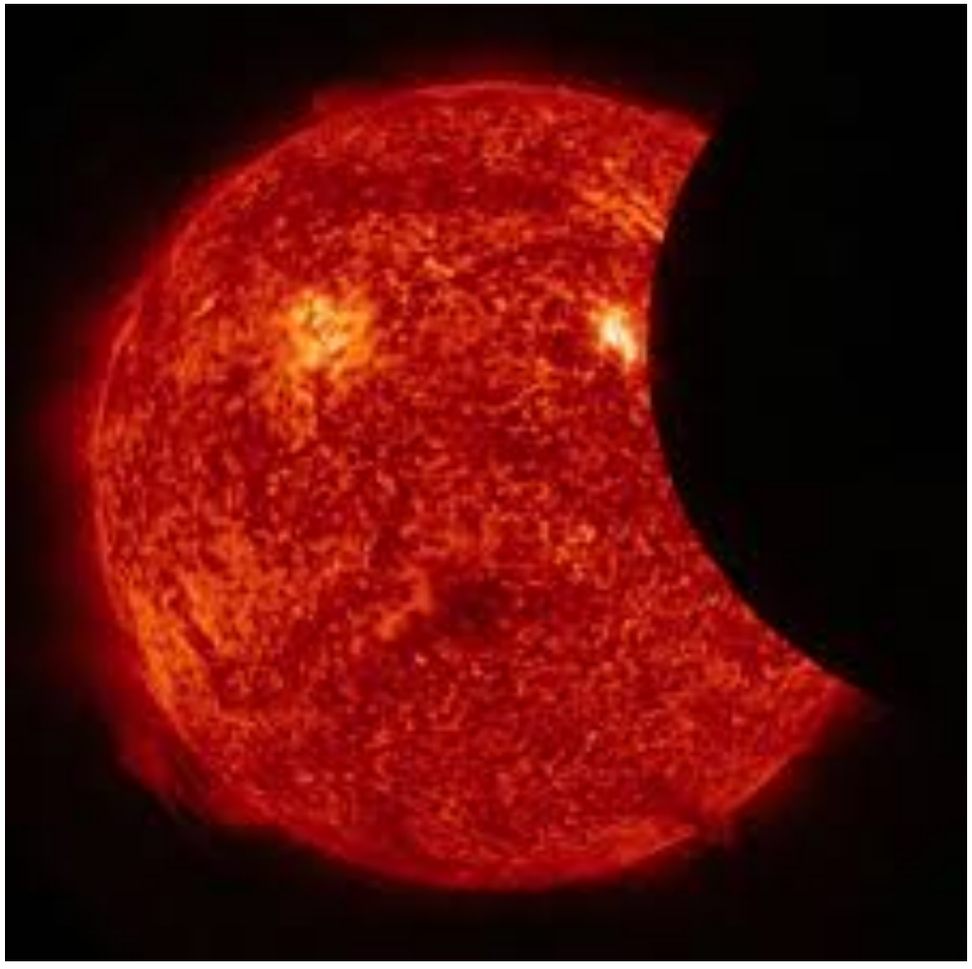
Partial Solar Eclipse

Partial Solar eclipse (P)

A partial solar eclipse occurs when the Sun is not completely covered by the Moon.

When the Sun is 18°31’ conjunct the node it can be partial.

When the Sun is 15°21’ in orb from the node it must be a partial solar eclipse.



Total Solar Eclipse

Total Solar eclipse (T)

A total solar eclipse occurs when the Moon covers the Sun totally (only visible at certain places on Earth).

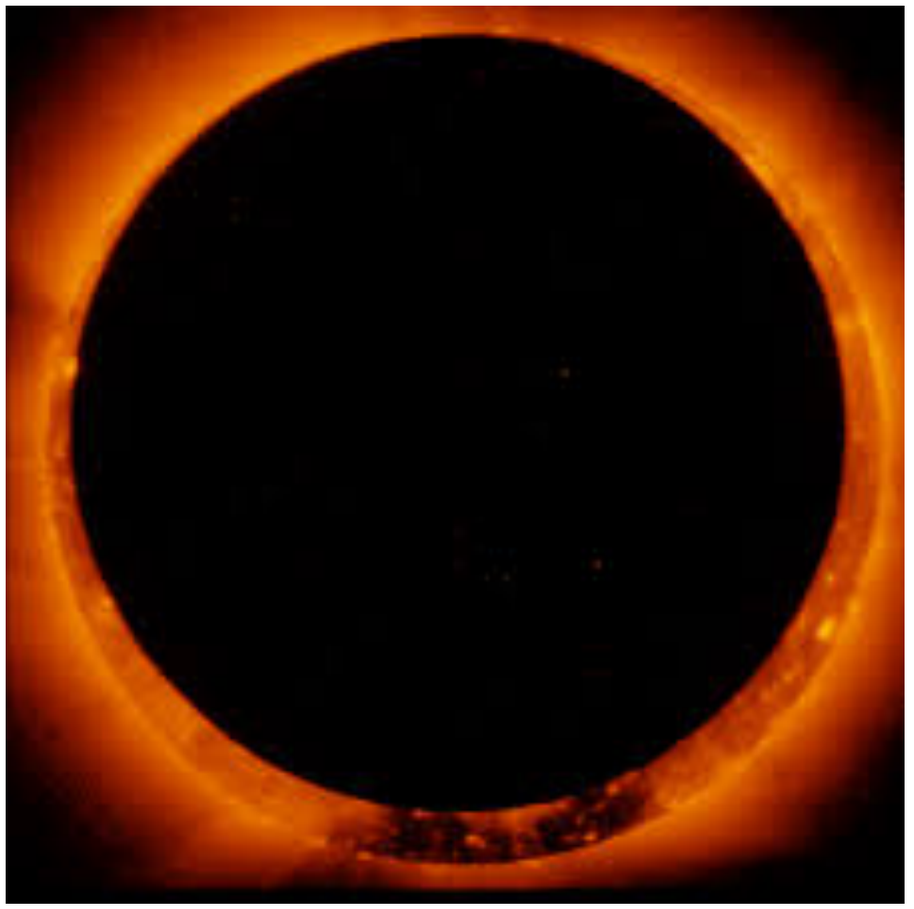
This occurs often during July when the Earth is farther from the Sun at aphelion.

When the Sun is less than 9°55' from the node it must be a total solar eclipse.

Annular Solar Eclipse

Annular Solar eclipse (A)

An annular solar eclipse is total but the Moon is so far from the Earth that its shadow does not land on the surface or the Earth.



At the annular solar eclipse you can see a ring of fire around the Moon as the Sun shows around the edge of the Moon.

This happens frequently in January when the Earth is nearer the Sun at perihelion.

Annular Total Solar Eclipse

Annular Total Solar eclipse (AT) - Hybrid eclipse

This eclipse is total for part and annular for part.

Two Rare Solar Eclipses

Two Rare Solar Eclipses

Annular non Central Solar eclipse (A non-C)

A rare annular eclipse but the central line does not touch the surface of the Earth. The last one was on April 29, 2014 and the next one is on October 3, 2043.

Total non Central Solar eclipse (T non-C)

A rare total eclipse where the central line does not touch the Earth's surface. The next one is April 9, 2043.

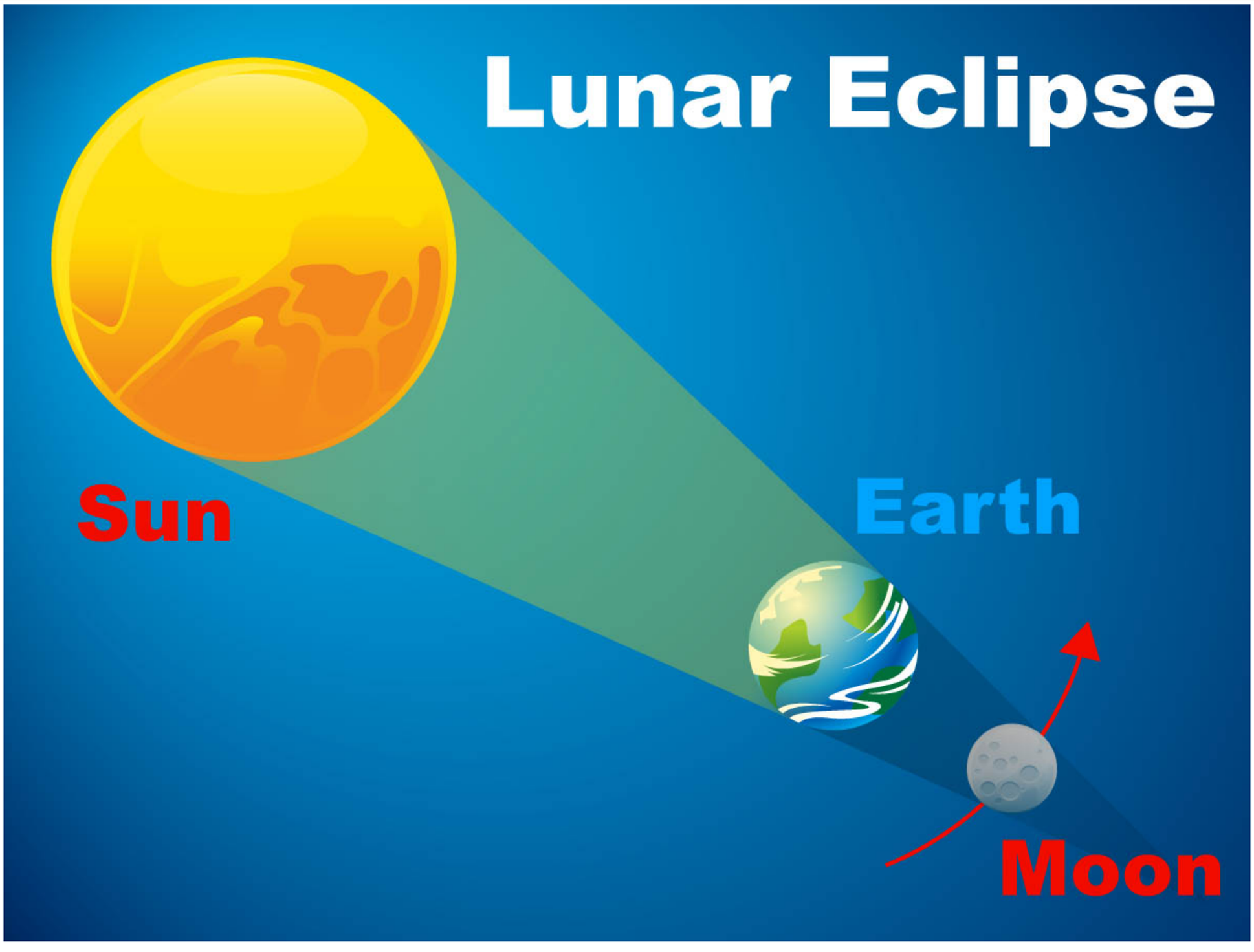
Viewing a Solar Eclipse

Viewing a solar eclipse

You have to be in the penumbral or umbral path to see a solar eclipse as the Moon's shadow crosses the face of the Earth.

Some people never have the chance to view a solar eclipse.

Lunar Eclipses



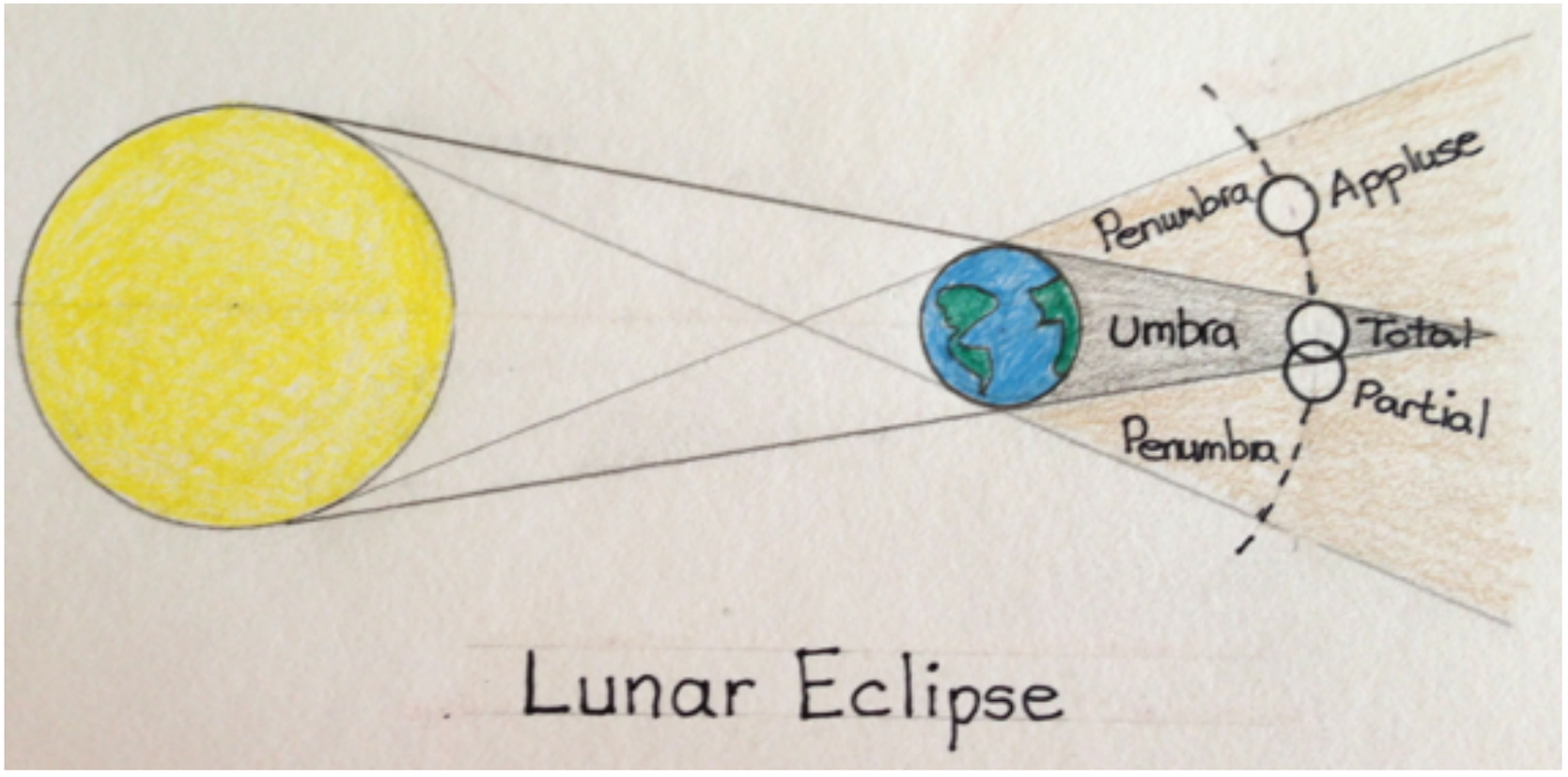
Lunar Eclipses

Three Types of Lunar Eclipses

Appulse lunar eclipse

Total lunar eclipse

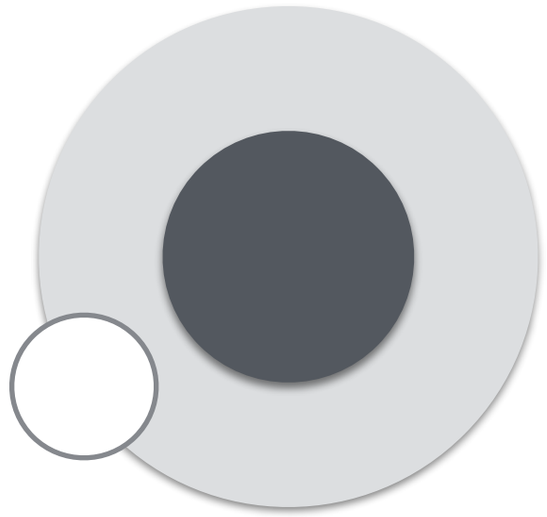
Partial lunar eclipse



Appulse Lunar Eclipses

Appulse lunar eclipse (A)

An appulse lunar eclipse occurs when the Moon only enters the penumbra of the Earth and does not enter the umbra. Also known as a *penumbral eclipse*.



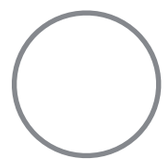
Partial Lunar Eclipses

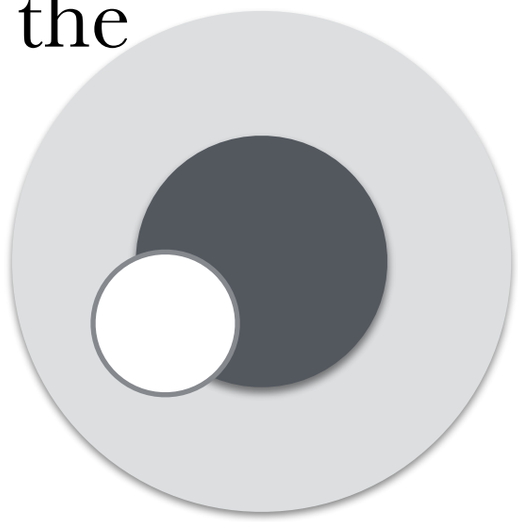
Partial lunar eclipse (P)

An eclipse where the Moon enters the umbra of the Earth but is not fully in it. Part of the Moon is still in the Earth's penumbra.

When the Moon is within 12°15' of the node the eclipse may be partial.

When the Moon is less than 9°30' conjunct the node the eclipse will be partial.



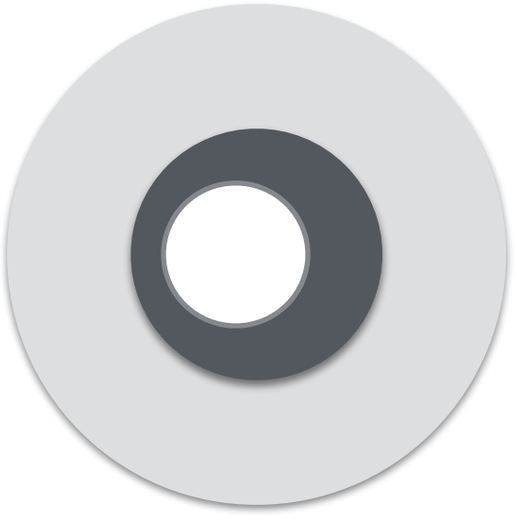


Total Lunar Eclipses

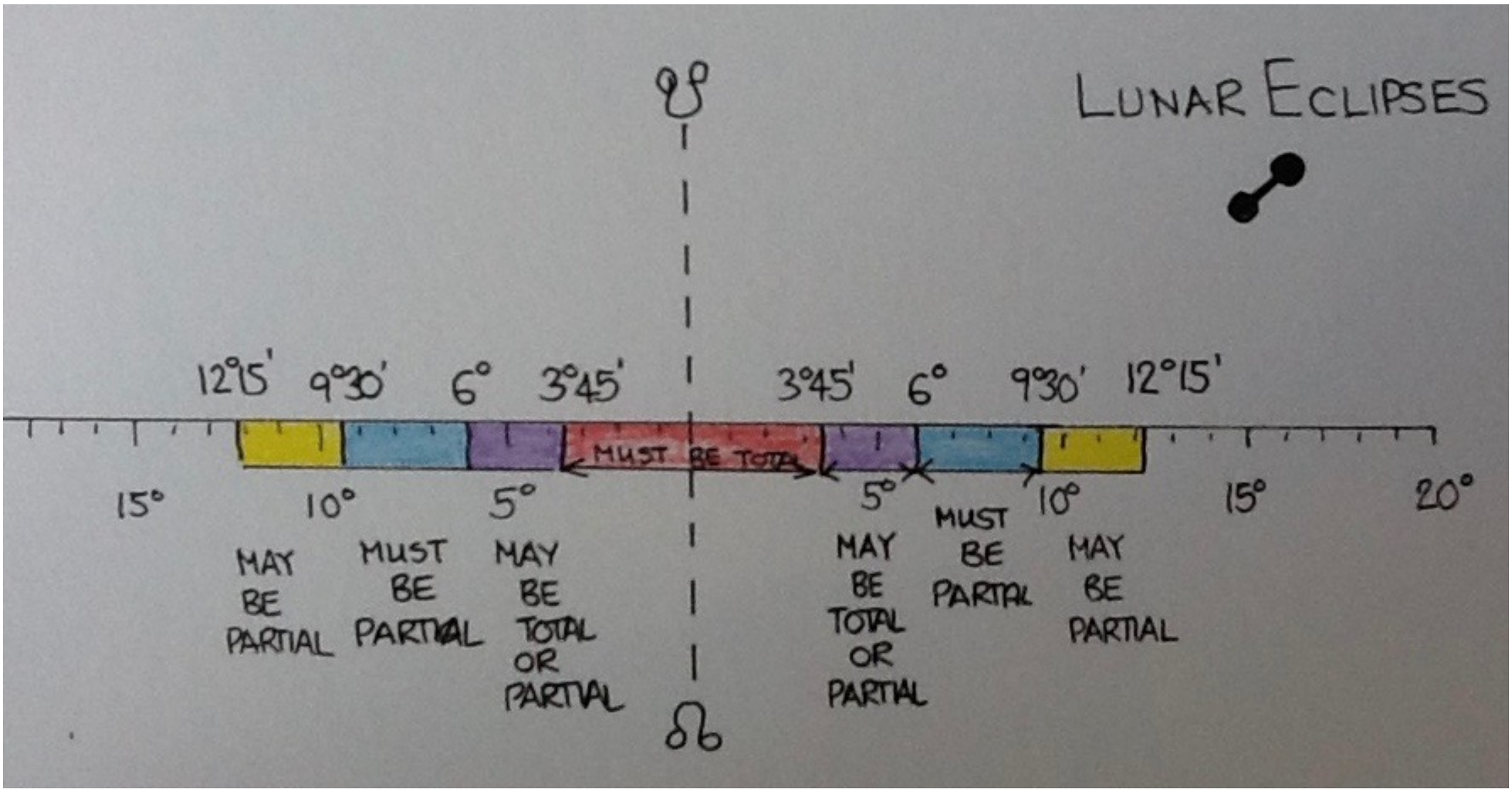
Total lunar eclipse (T)

A total lunar eclipse is one where the Moon is totally inside the Earth's umbra.

When the Moon is less than 3°45' conjunct the node the eclipse will be total.

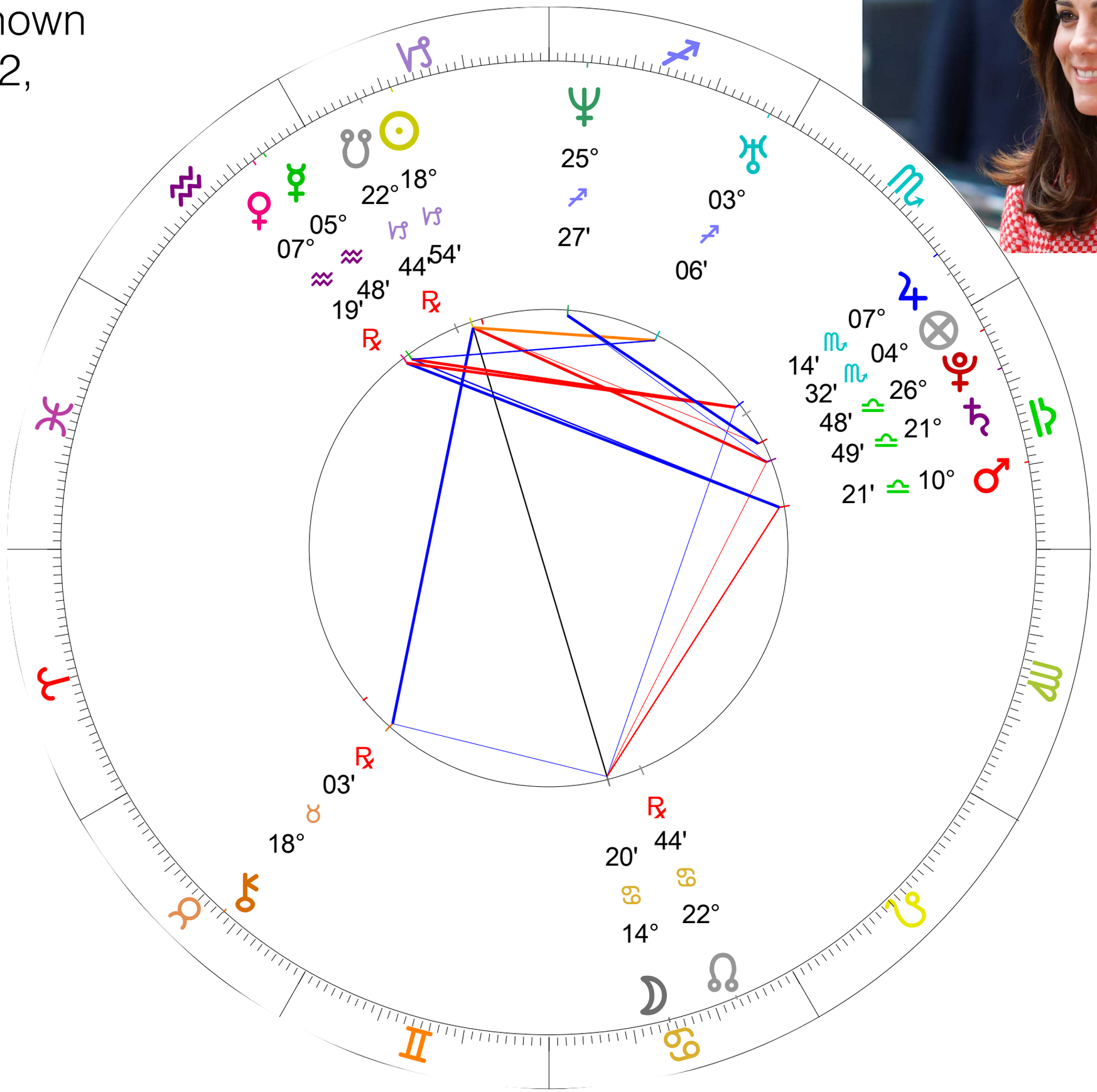


LUNAR ECLIPSES



HRH Catherine, Duchess of Cambridge

Time unknown
9 Jan 1982,
Reading,
England



Measuring the Intensity of a Lunar Eclipse

Measuring the intensity of an eclipse

Obscuration and Magnitude of a lunar eclipse

The magnitude of a lunar eclipse is the percentage of the Moon's diameter covered or obscured by the shadow of the Earth *at the greatest phase*.

Time of greatest eclipse

Measured in seconds and not the same as the exact longitudinal opposition.

Greatest eclipse is defined as the instant when the axis of the Moon's shadow passes closest to Earth's center.

For total eclipses, the instant of greatest eclipse is nearly equal to the instant of greatest magnitude and greatest duration.

However, for annular eclipses, the instant of greatest duration may occur at either the time of greatest eclipse or near the sunrise and sunset points of the eclipse path.

Orbs for Eclipses

Orbs for Eclipses

A tight orb of 1° 30’ is ideal for eclipse work.

Orbs for eclipses

The use of orbs is a personal choice.

If in doubt make the orb tighter say at 1° which is a good place if you are starting out with eclipse work.

Aspects for Eclipses

Aspects to Eclipses

Conjunctions and oppositions

Primary importance as eclipses only happen at the conjunction and opposition to the Sun.

Squares and other aspects

Secondary importance.

Eclipse Influence

How long an Eclipse influence lasts

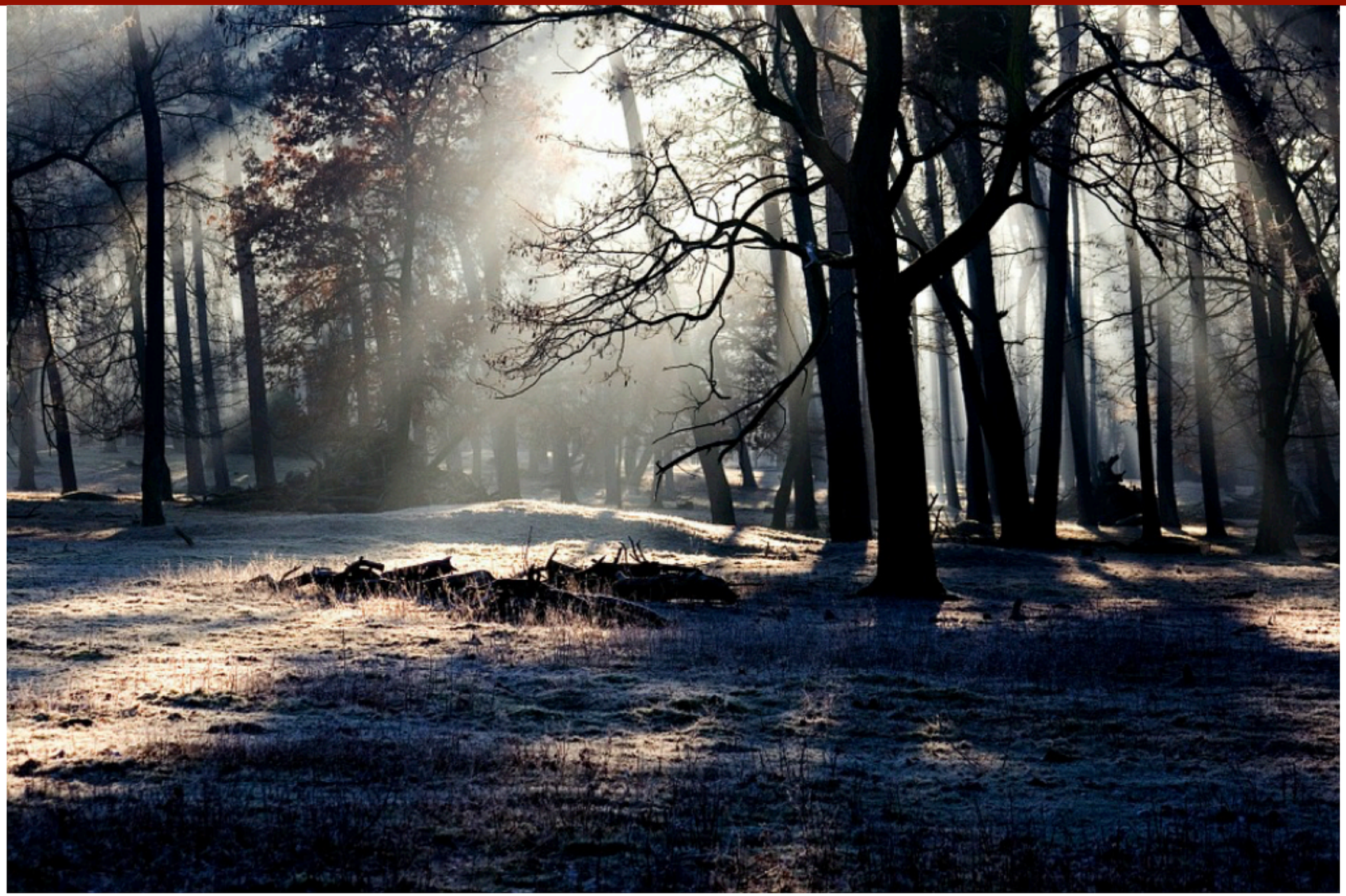
Solar eclipses

One month for each minute of the eclipse.

Lunar eclipses

One day for each minute the eclipse lasts

Saros Cycles



Saros Numbering

Saros Numbering

Astronomers

NASA

Consecutive numbers

Saros145

Saros Numbering

Astrologers

including Brady

Number 1-19 then repeats

Saros Series 1 N

Saros Cycles

The Saros Series or Cycles

Saros meaning

Saros is a Greek word which translates as *repetition* or *to be repeated*.

Discovered by Suidas a Greek astronomer and mathematician.

Saros Cycles

The Saros series

The recurrence of solar eclipses is governed by the Saros cycle.

One Saros cycle is approximately 6,585.3 days or 18 years, 11 days and 8 hours.

When two eclipses are separated by a period of one Saros they share a very similar geometry.

The two eclipses occur at the same node, and with the Moon at nearly the same distance from Earth and around the same time of the year.

All Saroses

All Saroses and all eclipses are like a forest.

Saros Family

Saros family

The Saros is a way to collect eclipses into families or series. (The tree) Each series typically lasts twelve to thirteen centuries and contains seventy or more eclipses.

The Original Eclipse

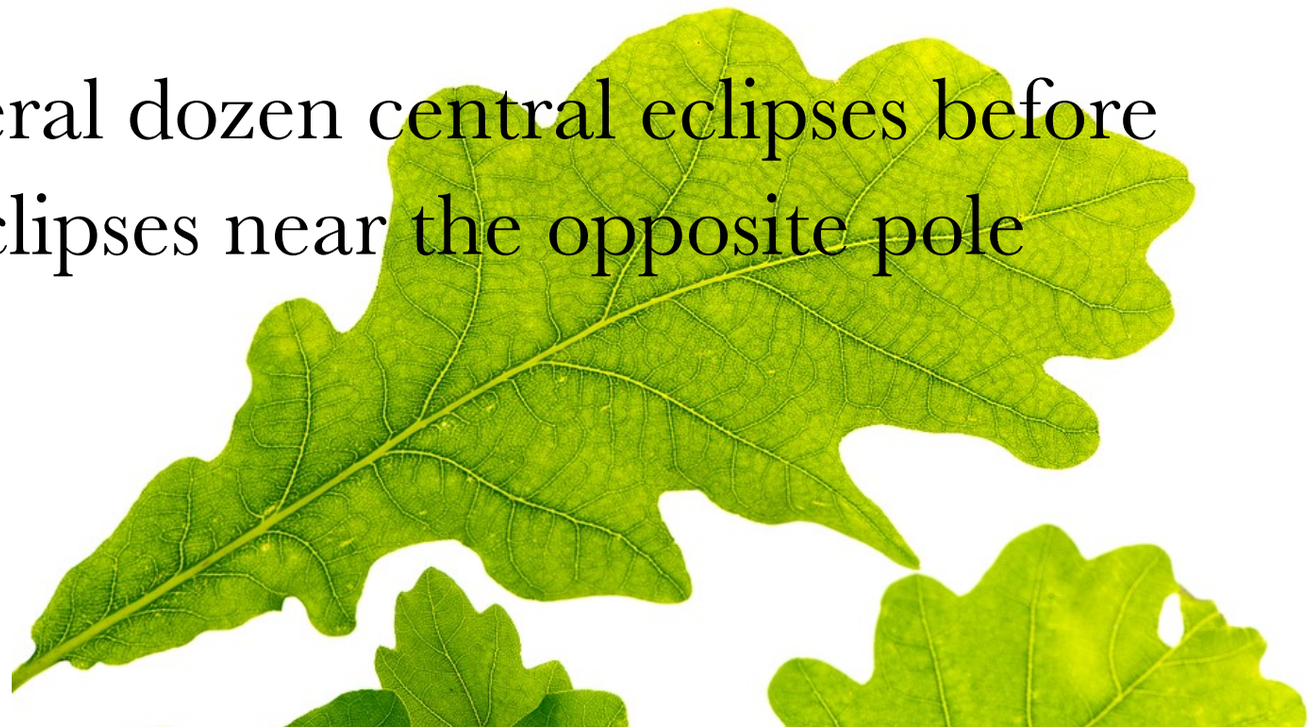
Original eclipse

Each individual eclipse in a Saros is like a leaf.

Every Saros series begins with a partial eclipse near either the north or south pole of the Earth.

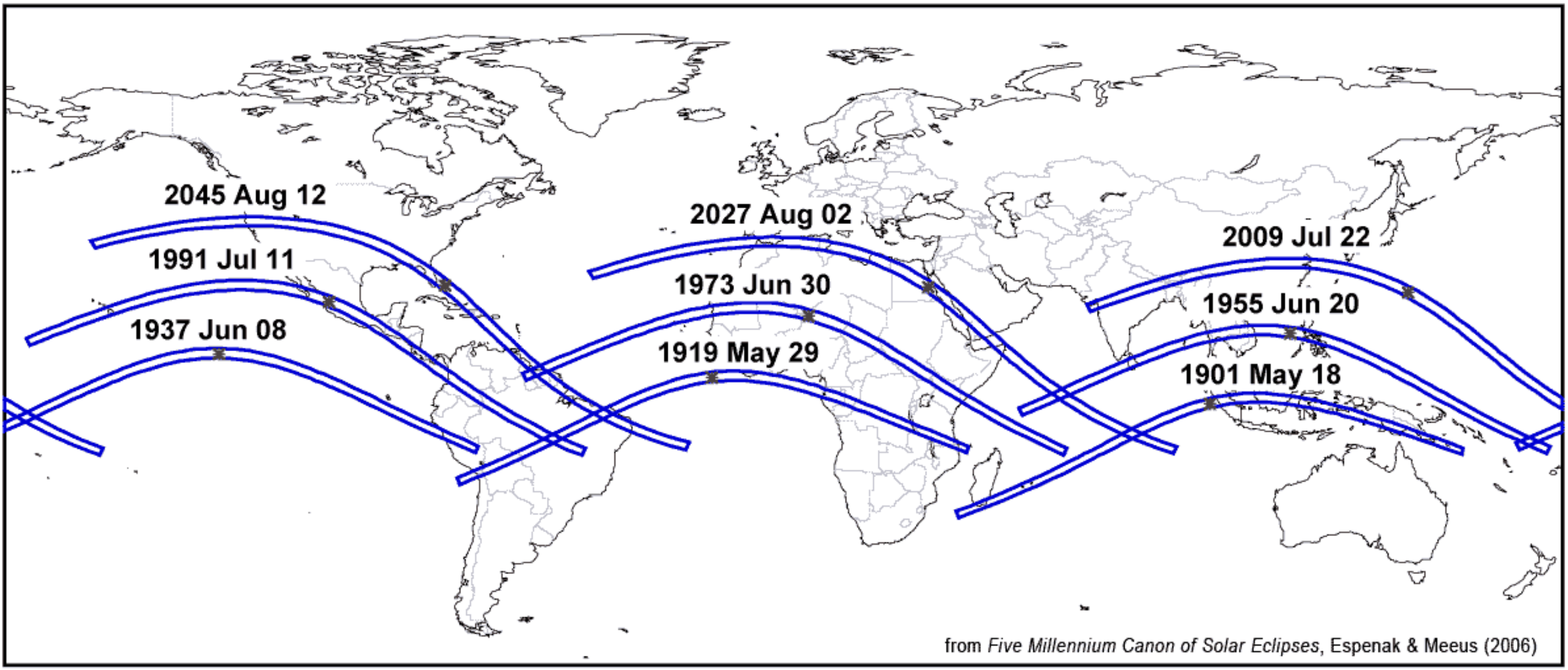
Each Saros series is called either north (N) or south (S) from the pole of the original eclipse.

The series will then produce several dozen central eclipses before ending with a group of partial eclipses near the opposite pole



Where Saros Start

Figure 1 — Eclipses from Saros 136: 1901 to 2045



from *Five Millennium Canon of Solar Eclipses*, Espenak & Meeus (2006)

The Concept of Saros

The concept of the Saros Series

The saros is a larger pattern that happens and much is unnoticed to the casual observer.

- The concept of Saros cycles is the forest
- A Saros family is a tree
- An individual eclipse is a leaf

Each Saros has its own family characteristics much like all oak trees are similar.

Maths of Saros Cycles

Mathematics of Saros

A Saros arises from a convenient mathematical calculation between three of the Moon's orbital cycles which vary slightly over time.

Synodic month

A synodic month is the time from a New Moon to the next New Moon and is equal to 29d 12h 44m 03s.

Anamolistic month

An anomalistic month is the time between one perigee to the next perigee and is equal to 27d 13h 18m 33s.

Draconic month

A draconic month is the time from the node back to the same node and is equal to 27d 05h 05m 36s.

Saros Maths

Saros maths

The Saros is the multiplication of the three Moon movements that line up almost perfectly. One Saros is equal to 223 synodic months, however, 239 anomalistic months and 242 draconic months are also equal (within a few hours) to this same period:

223 Synodic Months = 6585.3223 days = 6585d 07h 43m
239 Anomalistic Months = 6585.5375 days = 6585d 12h 54m
242 Draconic Months = 6585.3575 days = 6585d 08h 35m

With a period of approximately 6,585.32 days (18 years 11 days 8 hours), the Saros is valuable tool in investigating the periodicity and recurrence of eclipses.

The Concept of Saros

Saros series North

Begin at the North pole and move down the face of the Earth

Saros series South

Begin at the south pole and work up the face of the Earth.

There are 70-72 eclipses in each saros.

Numbering of the Saros cycles

Saros cycles are number from 1 to 19 and north or south so usually 38 Saroses are alive at any one time.

But they are at different places in their lives and can be new, middle-aged or old.

The Life of Saros

Saros eclipse

Each Saros has an eclipse every 18 years.

The life of a Saros

A Saros family of 70 eclipses, with one eclipse every 18 years, lives for 1260 years (18 x 70 = 1260).

A Saros family of 72 eclipses, with one eclipse every 18 years, lives for 1316 years (18 x 72 = 1316).

Saros odd and even numbering

All north node solar eclipses have odd numbers.

All south node solar eclipses have even numbers.

Old to New Saros

Saroses death and birth

Changing of old to new, but having the same number, occurs at the

solar-lunar-solar

eclipse season sequence which may occur at any time.

The Orb Tells All

Saros new and old

Just by looking at the closeness of the orb you can tell where in the Saros series this particular eclipse lies.

The tighter the orb the middle of the family.
The larger the orb the beginning or ending of the family.

In a New series we find the Moon ***applying*** to the node and in an Old series we find the Moon ***separating*** from the node.

Old to New Saros

The first eclipse of a Saros

- Degree and sign
- Sign ruler
- Decanate ruler

After the first eclipse of a Saros the subsequent eclipses are stronger when in the same element as the original Saros eclipse chart.

The original eclipse chart determines the whole nature of the Saros family.

Saros (145) SS 1N

Statistics for Solar Eclipses of Saros 145

Solar eclipses of Saros (145) SS 1N all occur at the Moon's ascending node (NN).

The Moon moves southward with each eclipse.

First eclipse Jan 4, 1639
Last eclipse Apr 17, 3009

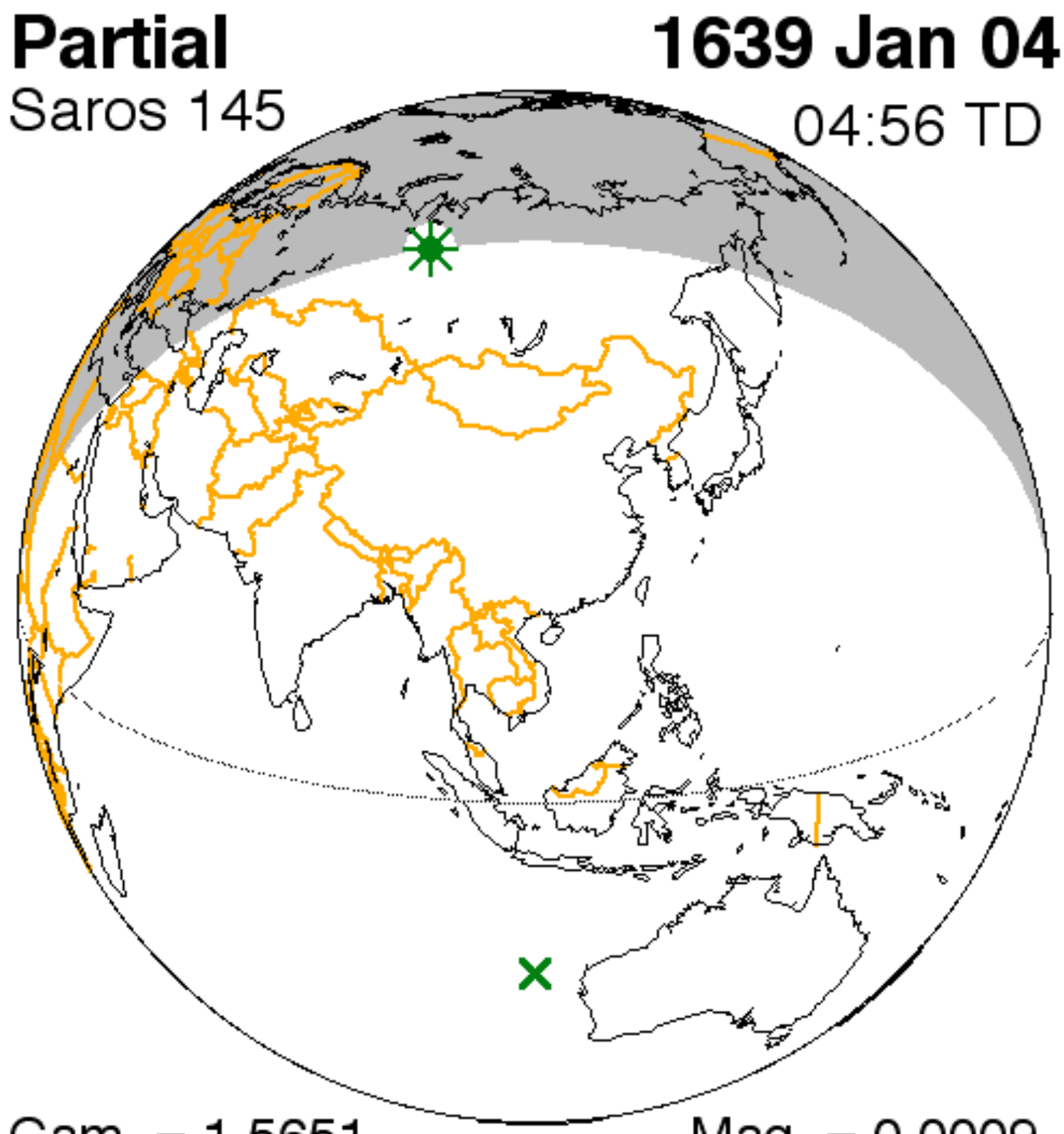
Duration of Saros 145 = 1370.29 years.

Saros Facts

Saros facts

- Only solar eclipses are part of a Saros series or cycle that astrologers use.
- Each eclipse in a Saros cycle occurs almost 18y 11d 8h apart.
- The 8h shows the trine movement.
- The next eclipse in a Saros cycle will happen just about a trine further in the chart than the previous eclipse.
- There are typically 70-72 eclipses in each Saros.
- Saroses have odd numbers for north eclipses and even numbers for south eclipses.
- Saros eclipses occur at the same node.

The blue line is the Eclipse path.



Five Millennium Canon of Solar Eclipses (Espenak & Meeus, 2006)

Animation by Dan McGlaun, 2007

Moon Eclipses Saturn

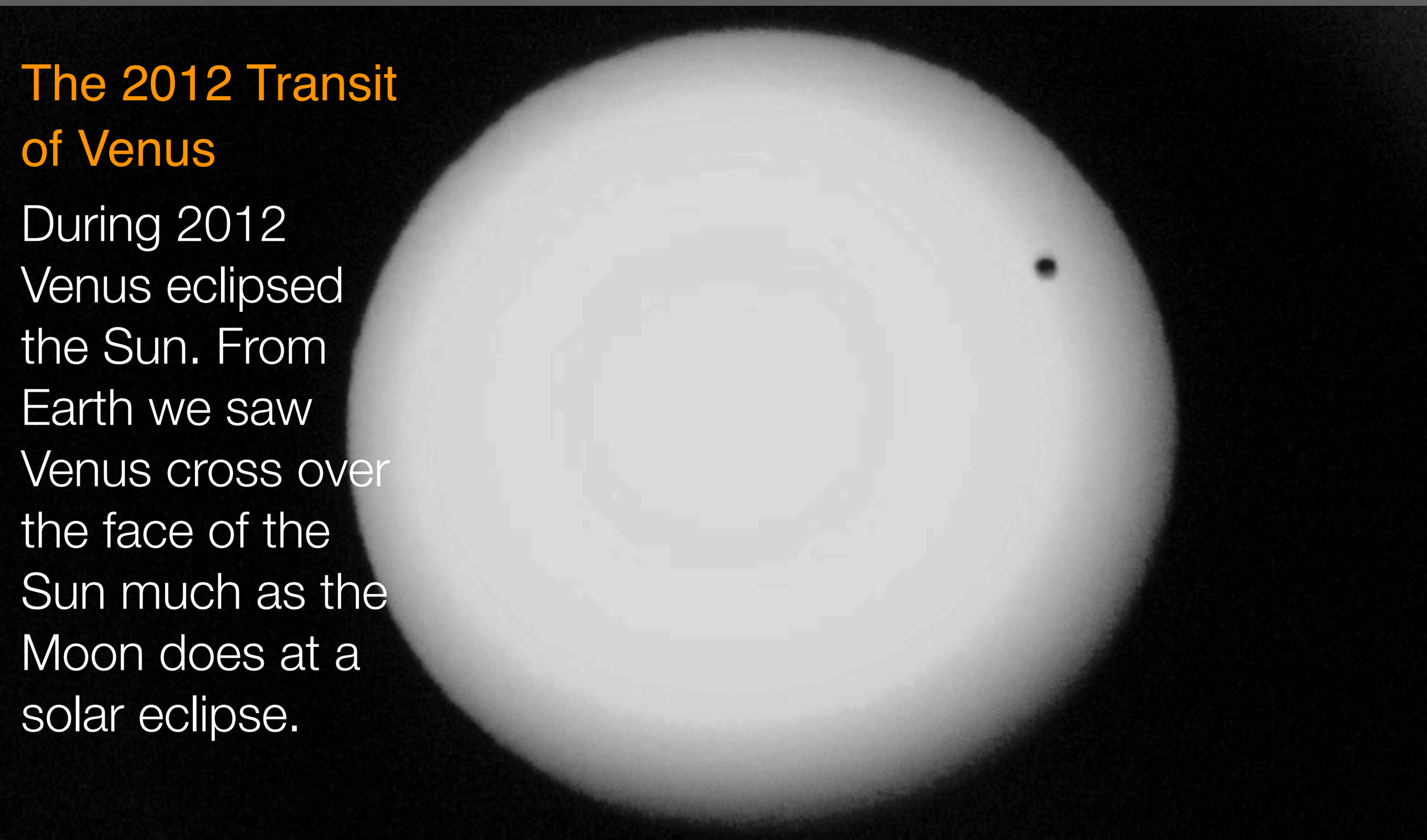
The Moon eclipses Saturn

The Moon also eclipses the outer planets but as we cannot see them they are not in our conscious and the effect of this type of eclipse will be negligible.

Venus Eclipses the Sun

The 2012 Transit of Venus

During 2012 Venus eclipsed the Sun. From Earth we saw Venus cross over the face of the Sun much as the Moon does at a solar eclipse.



3 Ways to Interpret Eclipses

In a General way

This shows how the eclipse will affect everyone and the nature of the eclipse.

In a Personal way

As it relates to your chart. Exploring the house placement and the aspects of conjunction and opposition the eclipse makes to planets and angles in your chart.

In a Collective way

Interpret the eclipse through the meaning of the original eclipse of the Saros cycle. Know the original message of the first eclipse, it's element and sign.

Interpreting Eclipses in General

How to Interpret an Eclipse in General

How the eclipse will affect everyone and the general nature of the eclipse. The eclipse itself can be interpreted and in fact should be for its inherent potentials. An eclipse chart can be read by everyone and in a general manner.

The eclipse chart

The general eclipse will be the same for all the Earth you need to cast the eclipse chart in a way that can be interpreted no matter where you are on Earth.

Eclipse house system

Set your calculation to “Aries on first” house system.

General - The Nodes

North node interpretation

Gain, future, the tide is coming in and as it does so it bring things to you.

South node interpretation

Release the tide is going out, releasing your from baggage and stuff that no longer serves you.

General - Type

Solar eclipse interpretation

Self-examination

Lunar eclipse interpretation

Relationship evaluation (you and others)

In A Personal Way

In a personal way

As it relates to your chart.

Exploring the house placement and the aspects of conjunction and opposition the eclipse makes to planets and angles in your chart.

Collective Way

In a collective way

Interpret the eclipse through the meaning of the original eclipse of the Saros cycle.

Know the original message of the first eclipse, it's element and sign.

Short Break

Part 2
PreNatal Eclipses

by Alison Price

Prenatal Eclipses

Prenatal Eclipses

Your Prenatal Eclipse

Your prenatal eclipse

The prenatal eclipse is the last eclipse that occurred before you were born.

It can be either a solar eclipse or a lunar eclipse.

Your prenatal eclipse is important as, although you were still a fetus, your soul had incarnated.

Prenatal Eclipses

How to spot a prenatal eclipse in a natal chart

Eclipses happen at six month intervals so in some natal charts there will be two prenatal eclipse seasons, the prenatal and the pre-prenatal eclipse season.

If your were born on an eclipse or the day before you may have had two eclipse seasons that occurred whilst you were still in the womb.

Most people only have one prenatal eclipse season.

Prenatal Eclipses

Prenatal Eclipse

Only take the most recent eclipse when looking at prenatal eclipses as we want the eclipse immediately before your birth.

Premature Births

If for some reason you were born at less than six months (that is a premature baby), you may not have a prenatal eclipse that occurred whilst your were in your mother's womb.

This is a rare case but requires further research.

Find Your Prenatal Eclipse

Find your pre-natal eclipse and complete the form

Look at your chart and find the Sun.

Move clockwise to find the first node.

Check in the ephemeris for the solar or lunar eclipse before your birth.

It will be some time during the six months before your birthdate.

Prenatal Eclipses Exercise

Look in the ephemeris and answer the following questions:

Is it a solar or lunar eclipse?

Is it on the north or the south node?

What is the sign?

Which planet is the dispositor?

Which house does it fall in your natal chart?

Does it conjoin any natal planet or point?

Does it oppose any natal planet or point?

Prenatal Eclipses

Interpreting your pre-natal eclipse

Cast the chart (at your birth place)

Cast the chart for the first eclipse in the Saros for your prenatal eclipse.

Eclipses will recur at age 18, 36, 54, 62, 80 and 96.

In which year will your own prenatal eclipse Saros have another eclipse?

The Great North American Eclipse August 21, 2017

Where to Get Eclipse Data

Where to Get Eclipse Data

Eclipses keep coming. There are four, five, six or more eclipses that happen each year you can consult eclipse tables and get the exact time for the eclipses.

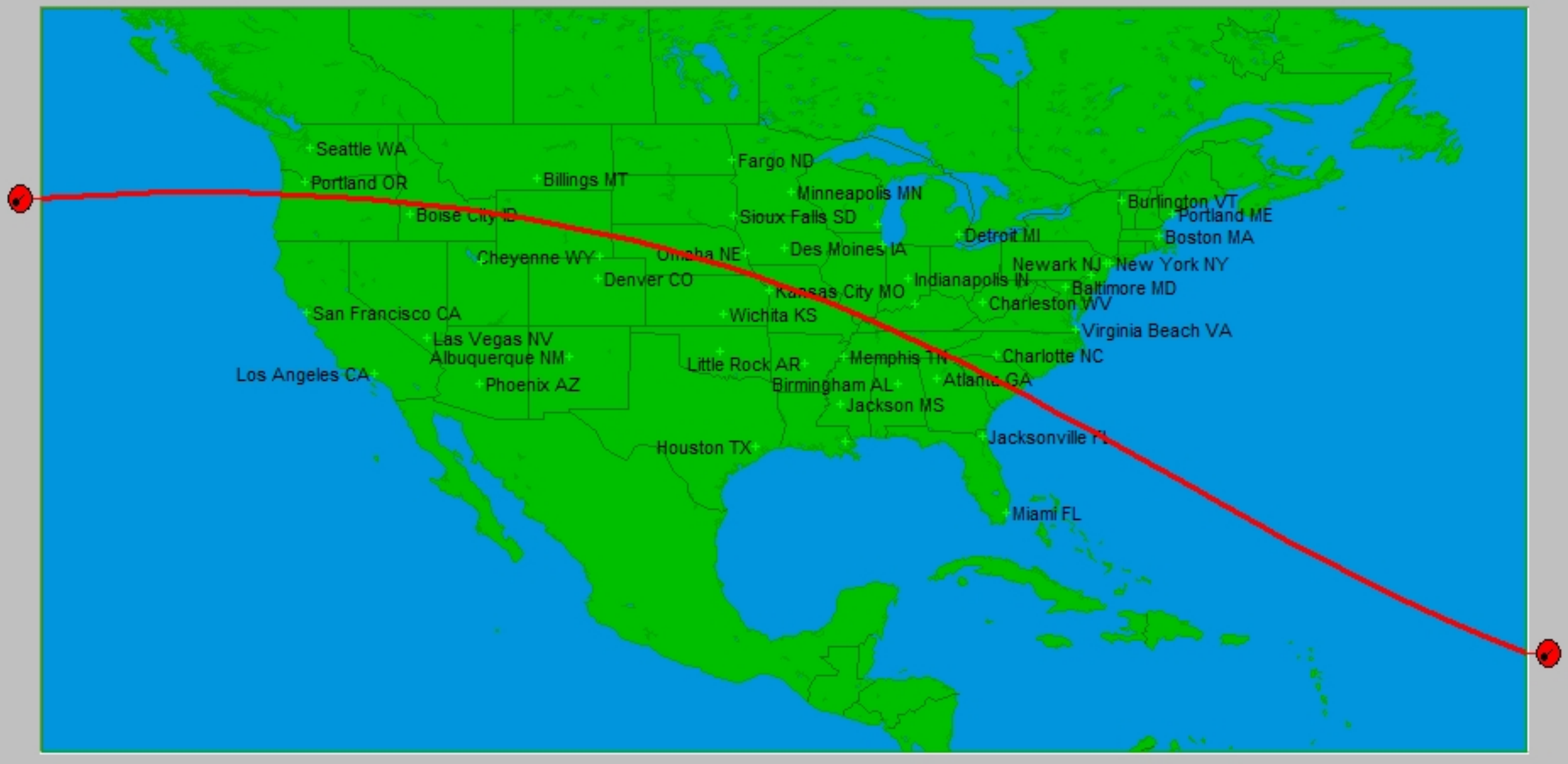
Solar Fire

If you have the world class astrology software Solar Fire you can search for eclipses and cast the exact eclipse chart with the click of a button.

This chart can be used for general eclipse interpretation and then as a bi-wheel for personal interpretations.

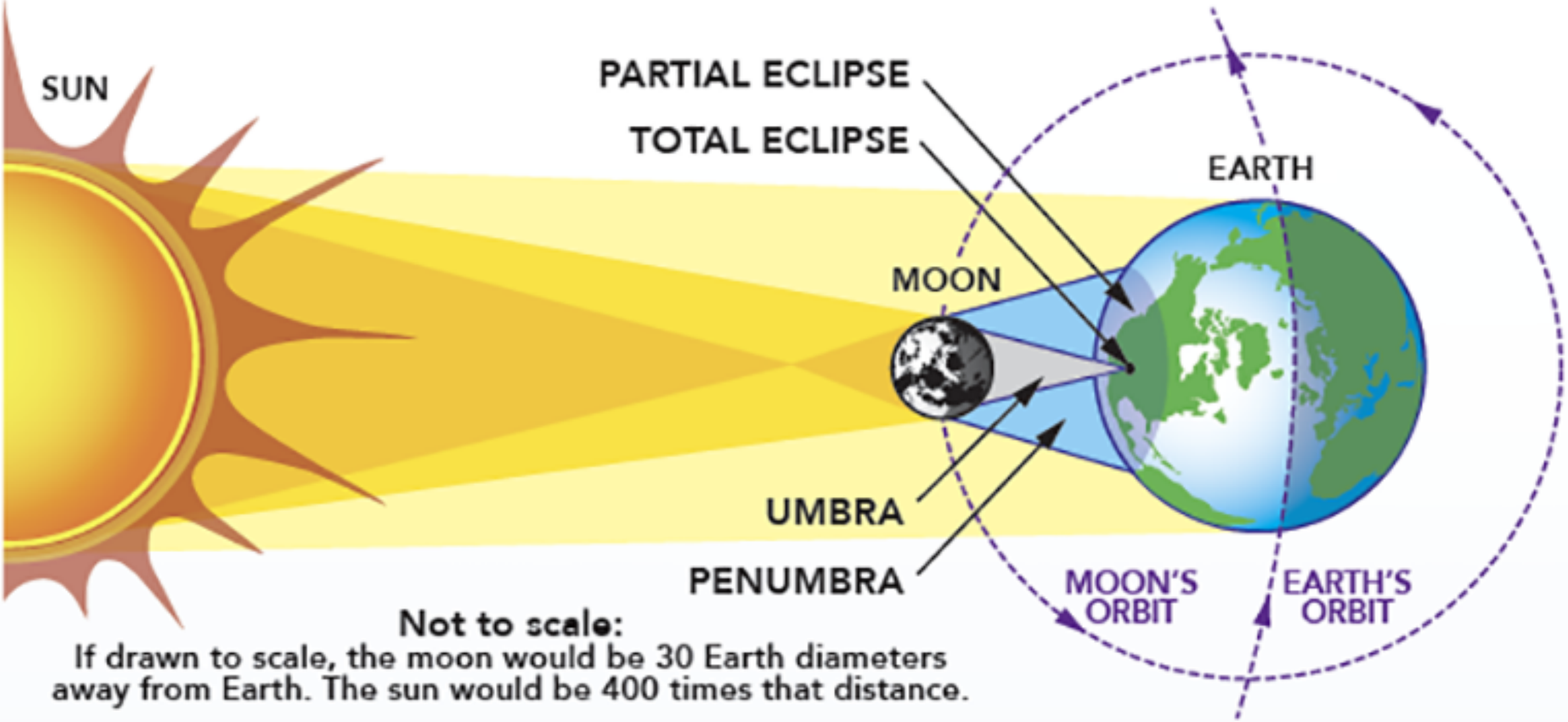
Nasa.com

NASA eclipse pages this site has eclipse path information for each eclipse for years ahead and before and find a wealth of data.


Seattle WA
Portland OR
Billings MT
Fargo ND
Minneapolis MN
Burlington VT
Portland ME
Boise City ID
Sioux Falls SD
Detroit MI
Boston MA
Cheyenne WY
Omaha NE
Des Moines IA
Newark NJ
New York NY
Denver CO
Indianapolis IN
Baltimore MD
Kansas City MO
Charleston WV
San Francisco CA
Wichita KS
Virginia Beach VA
Las Vegas NV
Albuquerque NM
Little Rock AR
Memphis TN
Charlotte NC
Los Angeles CA
Phoenix AZ
Birmingham AL
Atlanta GA
Jackson MS
Houston TX
Jacksonville FL
Miami FL

TOTAL SOLAR ECLIPSE: Monday • August 21, 2017

This will be the first total solar eclipse visible in the continental United States in 38 years.



Not to scale:
If drawn to scale, the moon would be 30 Earth diameters away from Earth. The sun would be 400 times that distance.


25%
50%
75%
90%
90%
75%
50%
25%

Total Solar Eclipse of 2017 Aug 21

Ecliptic Conjunction = 18:31:19.6 TD (= 18:30:11.2 UT)
Greatest Eclipse = 18:26:40.3 TD (= 18:25:31.8 UT)

Eclipse Magnitude = 1.0306 Gamma = 0.4367

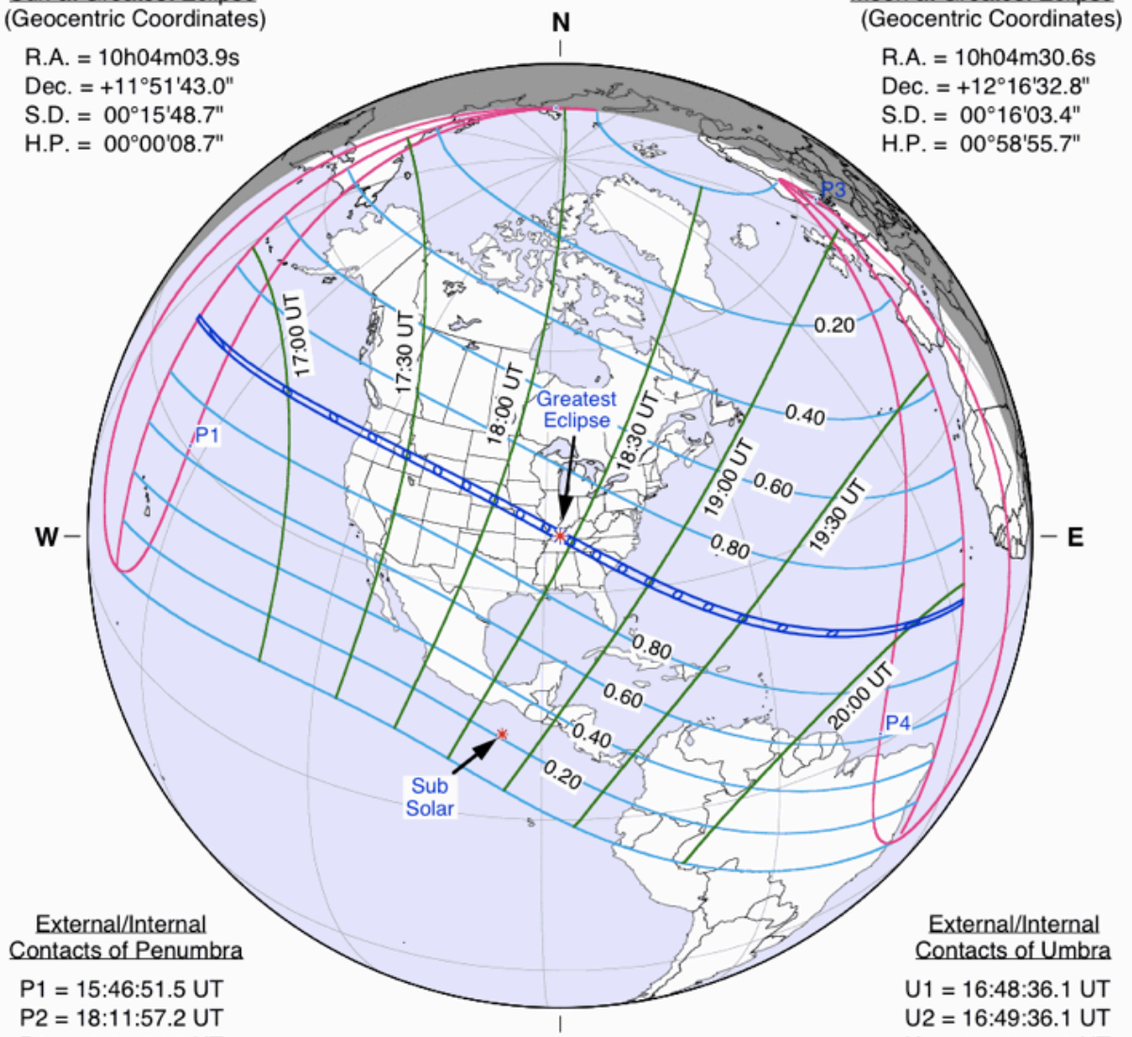
Saros Series = 145 Member = 22 of 77

Sun at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 10h04m03.9s
Dec. = +11°51'43.0"
S.D. = 00°15'48.7"
H.P. = 00°00'08.7"

Moon at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 10h04m30.6s
Dec. = +12°16'32.8"
S.D. = 00°16'03.4"
H.P. = 00°58'55.7"



External/Internal Contacts of Penumbra

P1 = 15:46:51.5 UT
P2 = 18:11:57.2 UT
P3 = 18:39:24.9 UT
P4 = 21:04:23.5 UT

Constants & Ephemeris

ΔT = 68.4 s
k1 = 0.2725076
k2 = 0.2722810
Δb = 0.0" Δl = 0.0"
Eph. = JPL DE405

Circumstances at Greatest Eclipse: 18:25:31.8 UT

Lat. = 36°58.0'N Sun Alt. = 63.9°
Long. = 087°40.3'W Sun Azm. = 197.9°
Path Width = 114.7 km Duration = 02m40.1s

Circumstances at Greatest Duration: 18:21:49.2 UT

Lat. = 37°35'N Sun Alt. = 63.8°
Long. = 089°07'W Duration = 02m40.2s

0 1000 2000 3000 4000 5000
Kilometers

External/Internal Contacts of Umbra

U1 = 16:48:36.1 UT
U2 = 16:49:36.1 UT
U3 = 20:01:39.6 UT
U4 = 20:02:34.4 UT

Geocentric Libration
(Optical + Physical)

l = 4.64°
b = -0.57°
c = 21.90°

Brown Lun. No. = 1171

F. Espenak, NASA's GSFC
eclipse.gsfc.nasa.gov
2014 Feb 22

Eclipse Interpretation

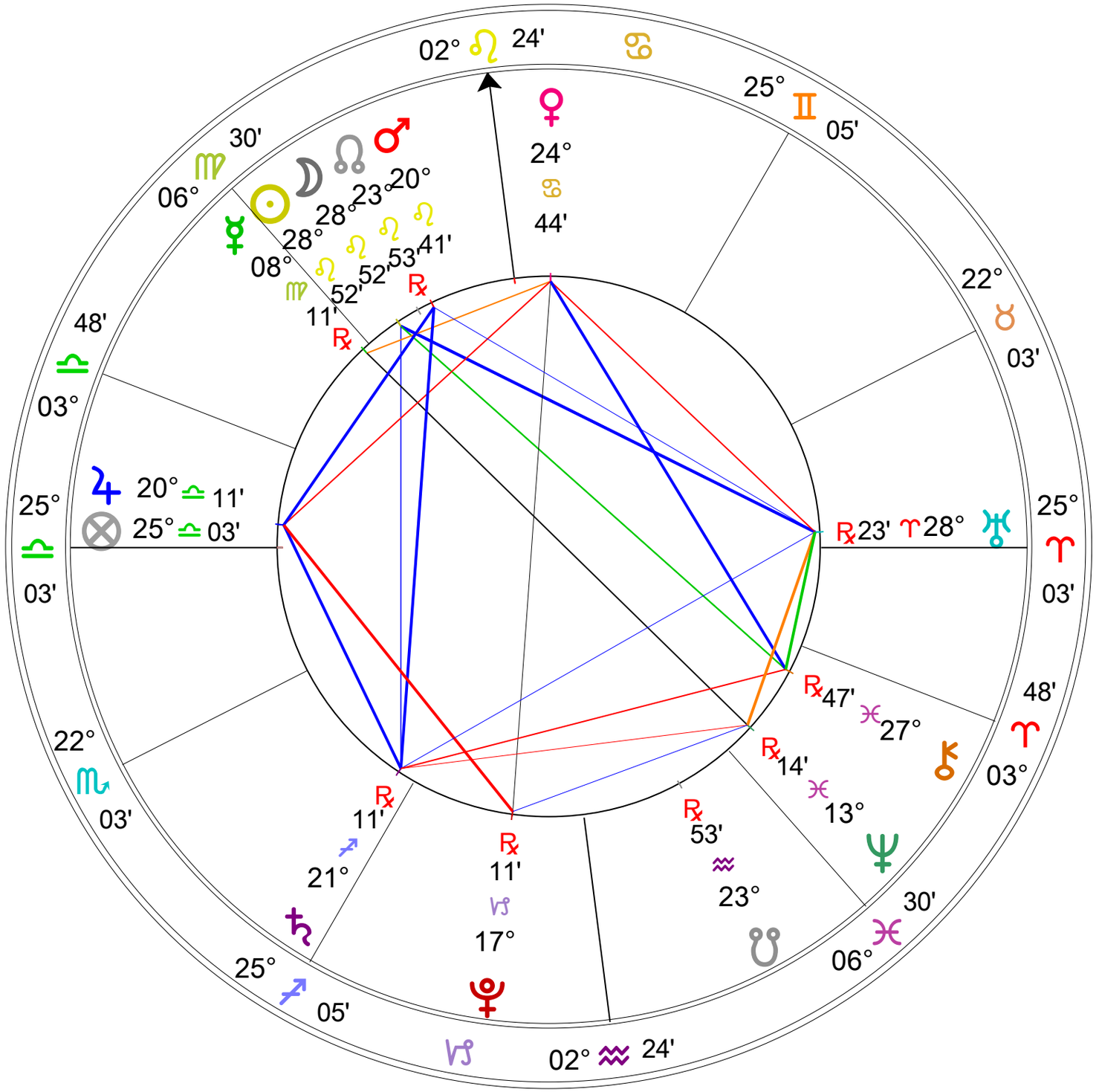
3 Steps to Eclipse Interpretation

Step 1 General Interpretation

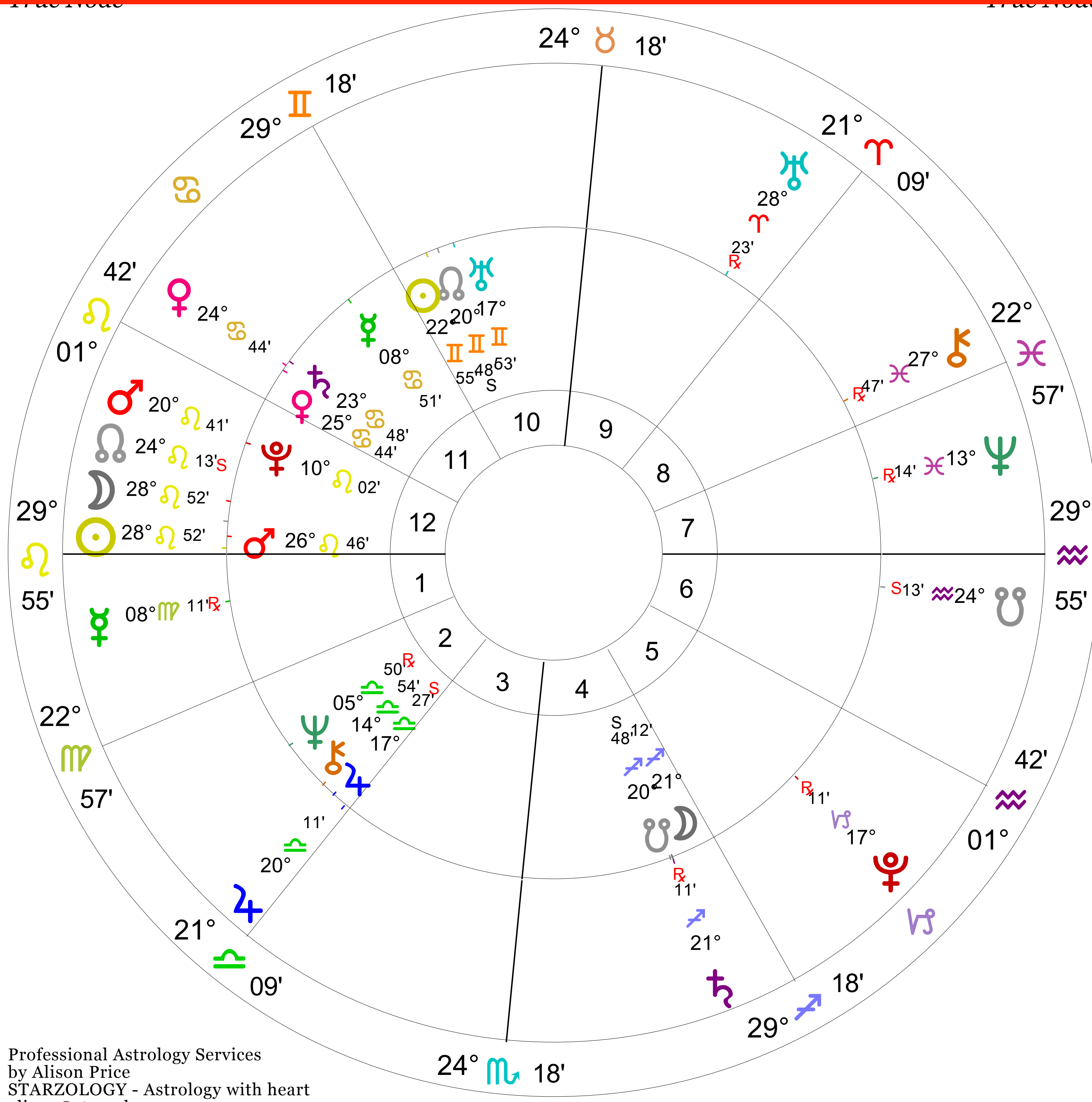
Step 2 Personal Interpretation

Step 3 Collective Interpretation

Step 1: The Eclipse Chart (General Interpretation)



Step 2: Bi-wheel (Personal interpretation)



Professional Astrology Services
by Alison Price
STARZOLOGY - Astrology with heart
alison@starzology.com
www.starzology.com

Eclipse Interpretation in Relation to Your Chart

What to look for

The eclipse natal house

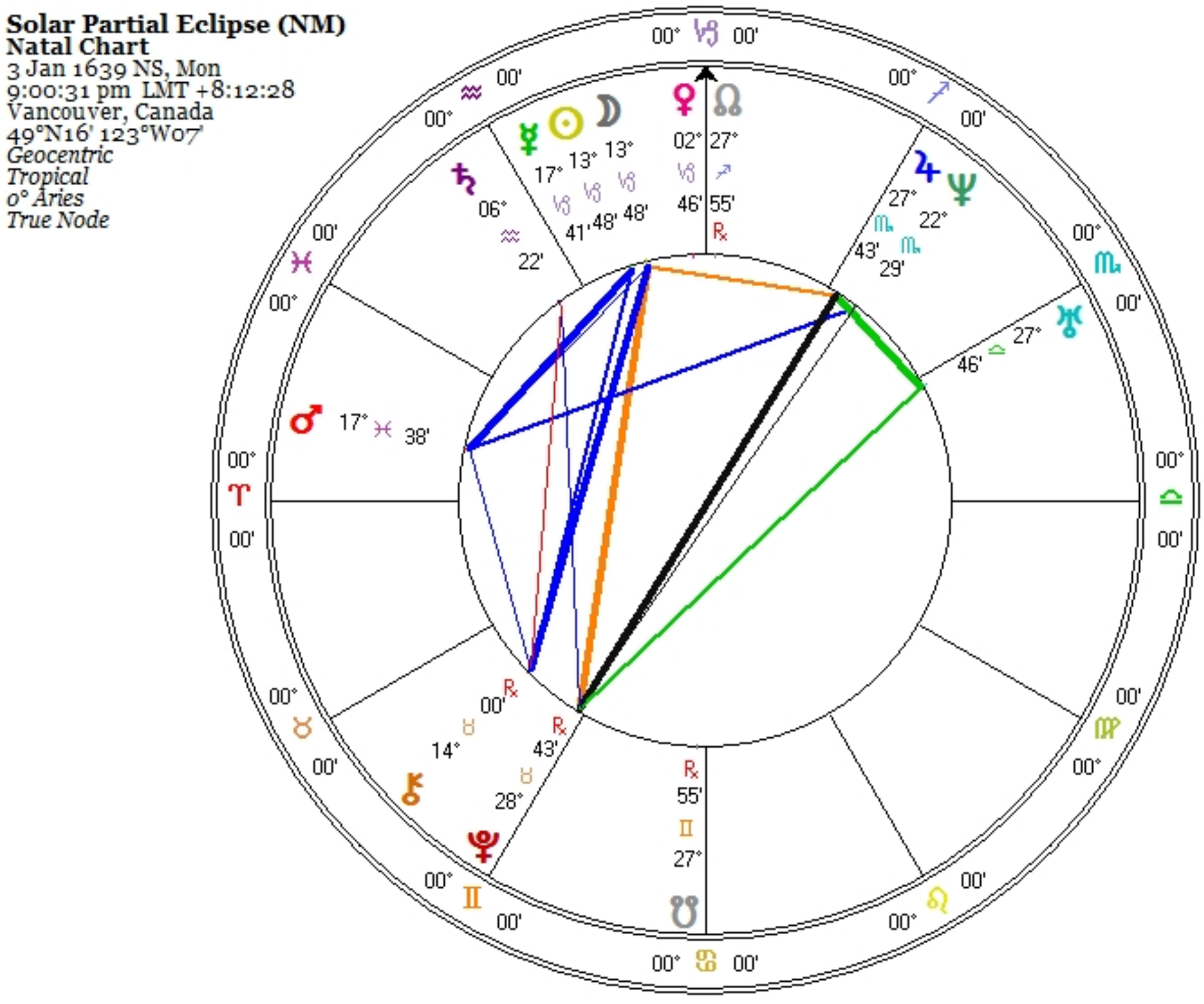
- Your natal house placement of the eclipse Sun and Moon
- Your natal house axises (for lunar eclipses)

The solar eclipse aspects to your natal chart

- Conjunctions to planets and points in your natal chart
- Oppositions to planets and points in your natal chart

Note: A conjunction to you natal Sun means the eclipse will be in your Solar Return chart for the next year.

Step 3: The Saros Birth Chart (Collective Interpretation)



Eclipse Viewing

Eclipse Viewing

Date: August 21, 2017

Time: From 9:00 am

Maximum: 10:21am

Where: Vancouver Art Gallery Cafe

Bring

Your eclipse glasses.

Thank You

Astrology Classes, Charts and Consultations

Syndicated Horoscopes

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email alison@starzology.com