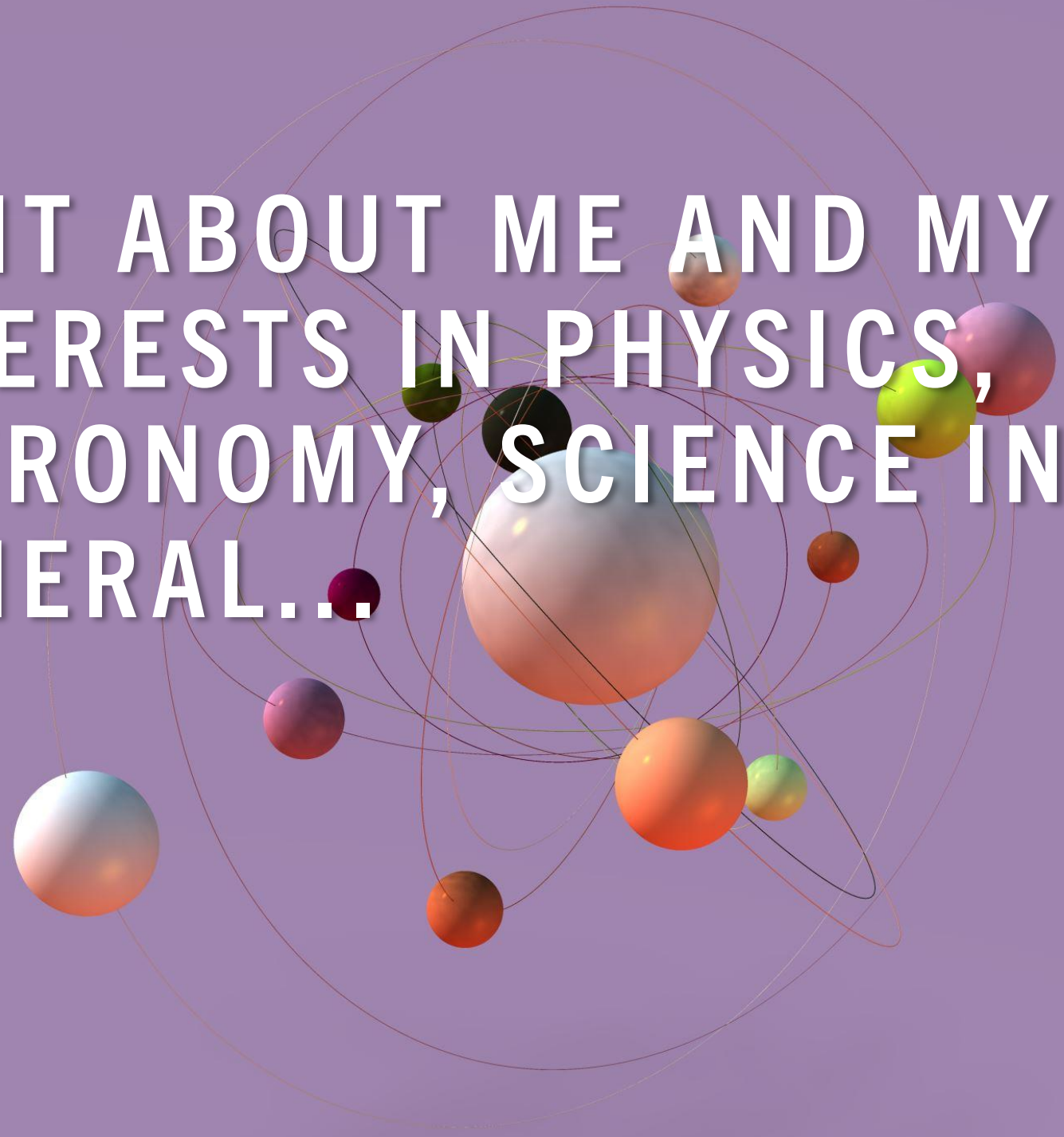
Astronomy Ireland

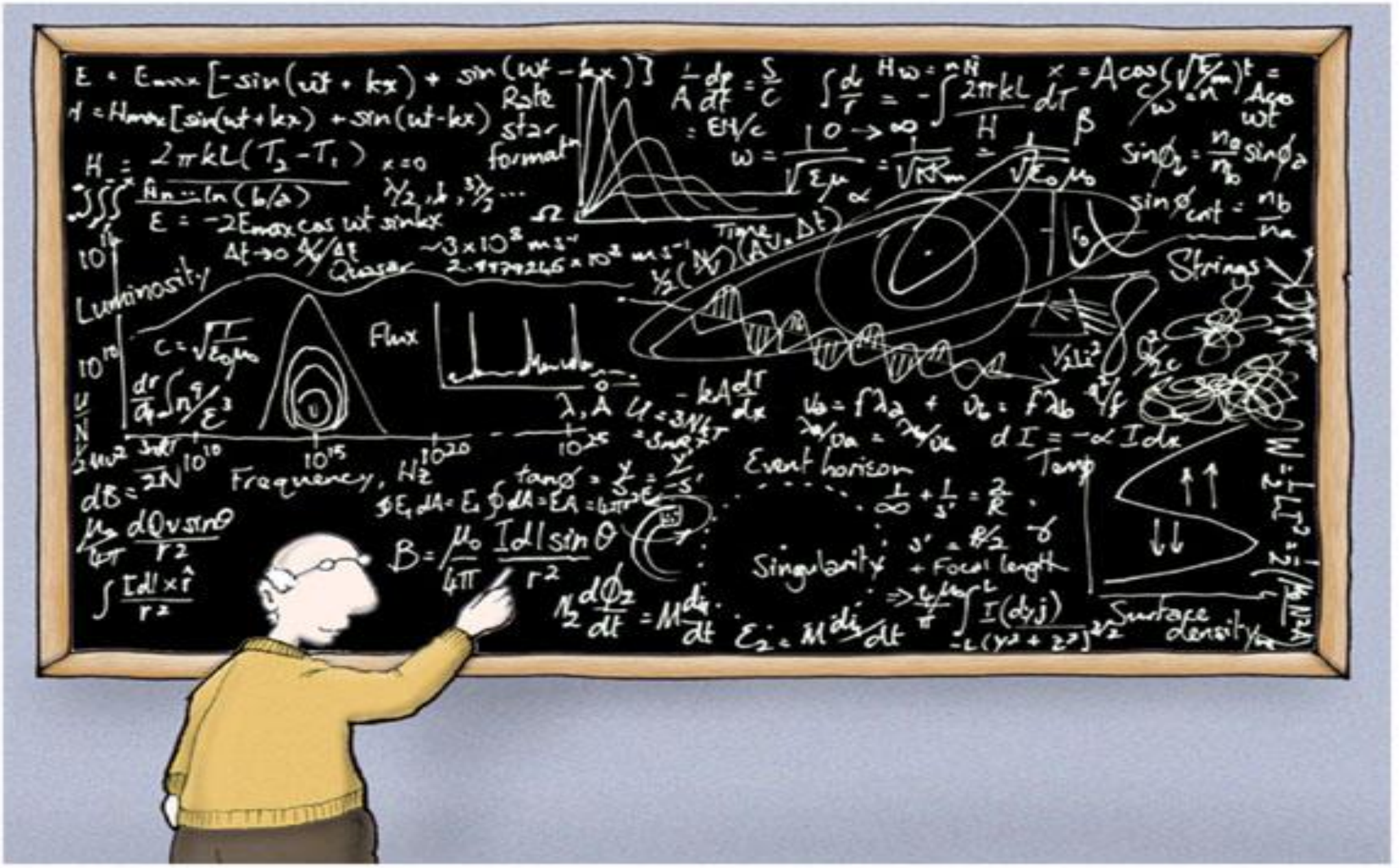
Evening Classes
Week One

HOW THE SKY MOVES (RELATIVE TO US!)-UPDATED FOR 2026

Presented by John Campbell

A BIT ABOUT ME AND MY INTERESTS IN PHYSICS, ASTRONOMY, SCIENCE IN GENERAL...

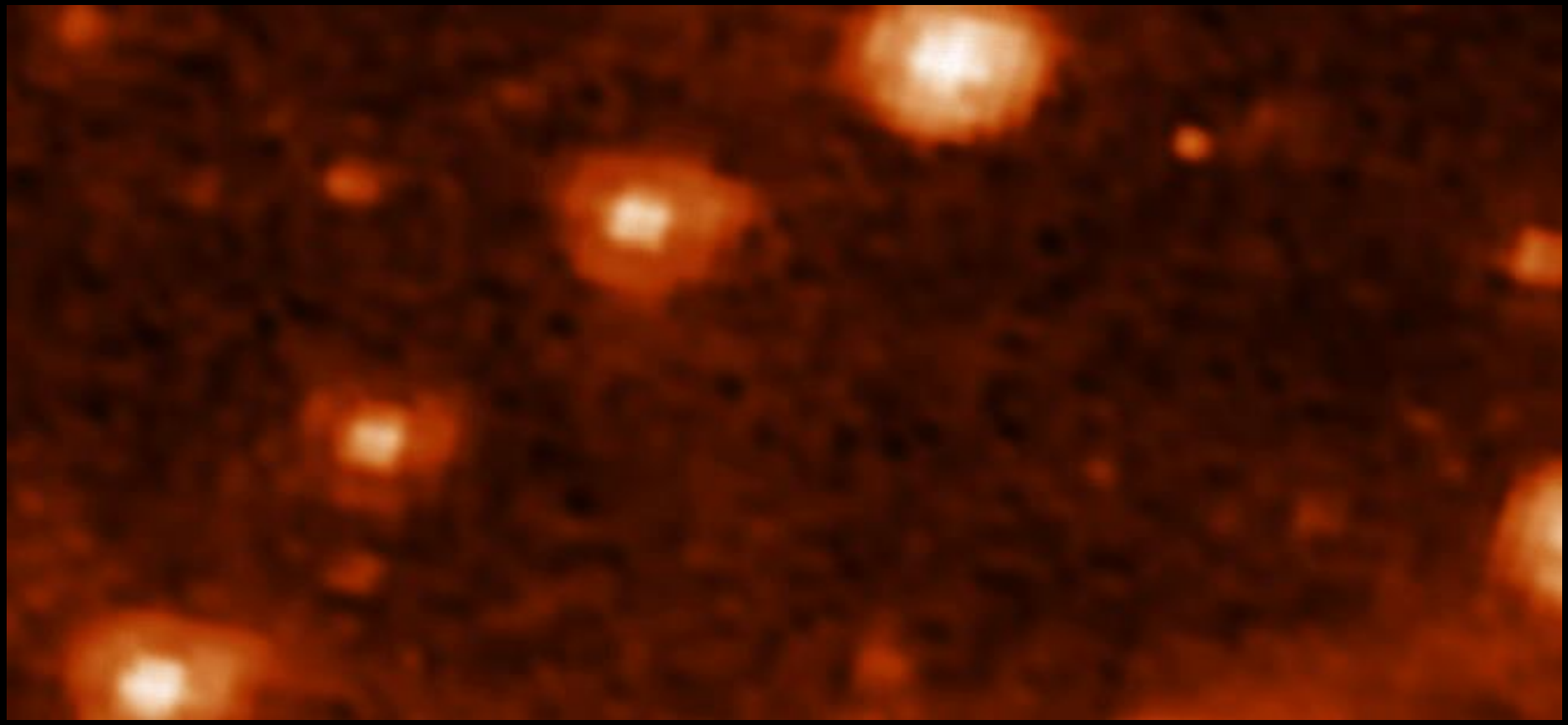




Astrophysics made simple

GREAT TIME TO BE INTERESTED IN ASTRONOMY AND SPACE SCIENCE AS LOTS OF NEW OBSERVATIONS ARE BEING MADE – JAMES WEBB SPACE TELESCOPE SURPASSES THE SPITZER SPACE TELESCOPES VIEW OF THE UNIVERSE

- JWST Enhanced view of the Small Magellanic Cloud

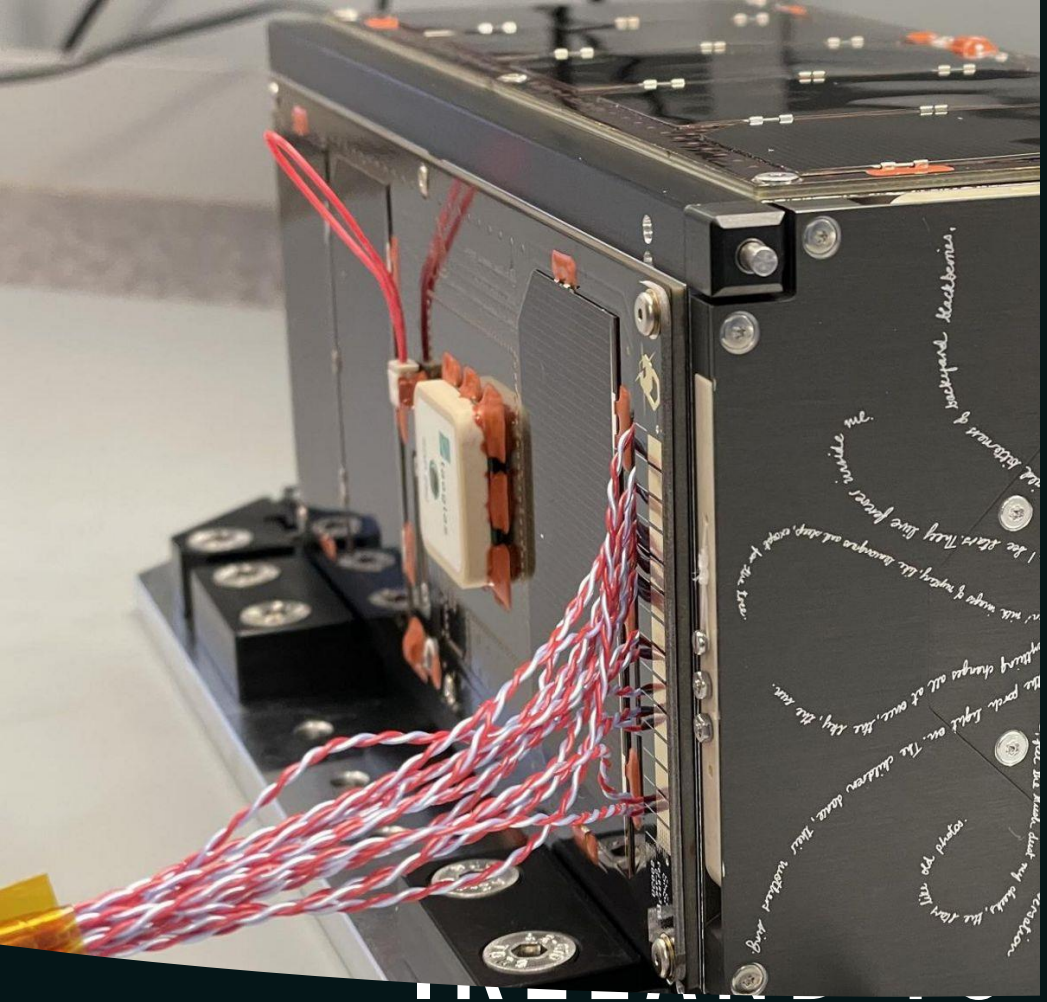


MEANWHILE SCIENTISTS ARE CRASHING DARTS INTO ASTEROIDS TO "ENGINEER" THE SOLAR SYSTEM



ARTISTS DEPICTION...





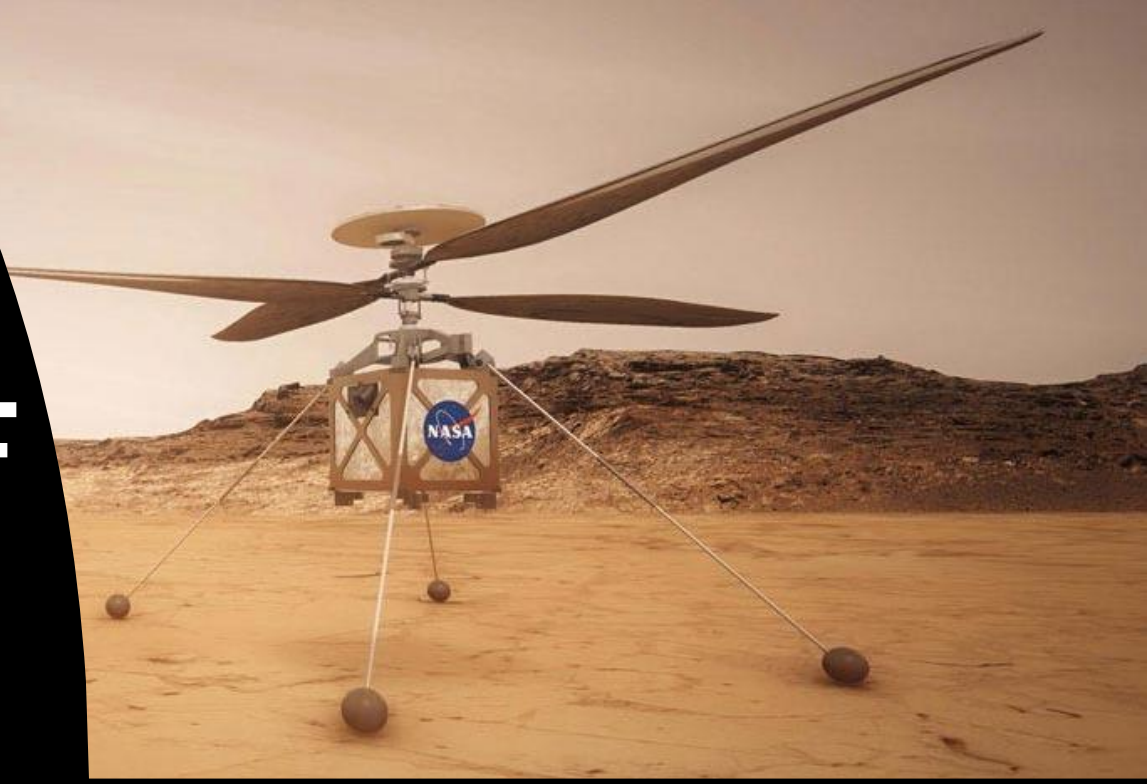
EIRSAT-1
Educational Irish Research Satellite

LAUNCH ITS FIRST SATELLITE

- A Student CubeSat with
- scientific payload
- on board (gamma ray detector)

NEW KINDS OF ROBOTIC SPACECRAFT

- From Drones on Mars to
- Proposed Drones on Titan
- (Saturn's Largest Moon)





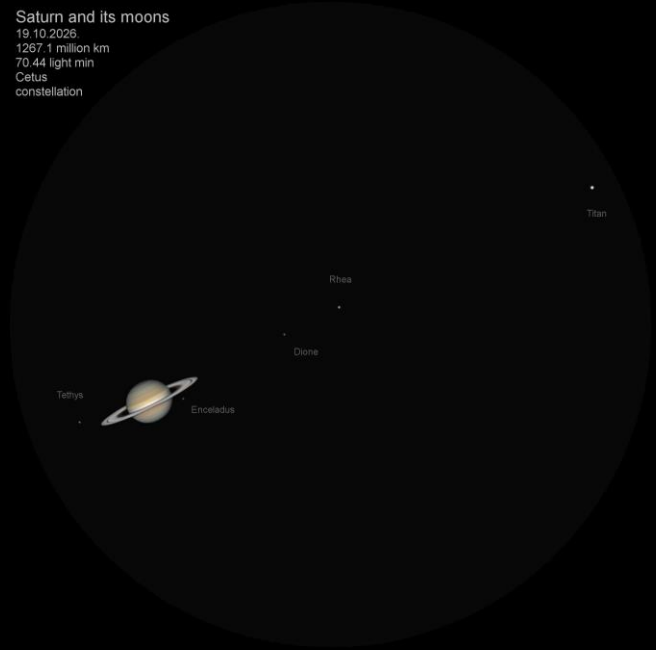
(MEANWHILE ON EARTH...FOR NOW!)
"LOCAL" SPACE TOURISM IS A THING!

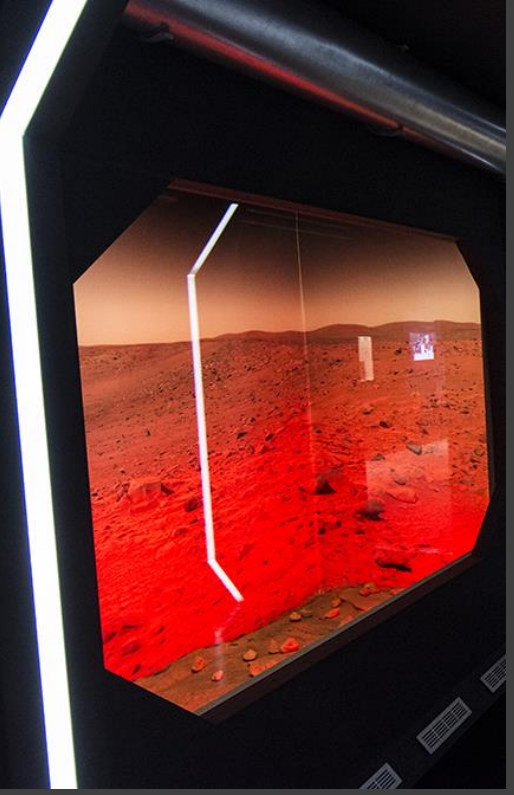
















TECHNOLOGIES CONDENSING THE UNIVERSE INTO OUR LIVES

- Augmented/Virtual Reality,
- Alien Art Generated by AI (not a dirty word!)
- World-Building and Immersive Experiences
- In Museums, Theme Parks, Online Games Etc
- (perhaps preparing us for Space Tourism
- as a concept)
- Preparing us for NASA-Style Robots in our lives
- All helping to make astronomy and space science less abstract and more Of an experience everyone can partake.


What a time to be alive.

WITH NEW EVENTS HAPPENING ALL THE TIME

- Such as a visit from a 50,000 year period
- comet – a rare green object in the night sky!
- Comet ZTF – February 2023



All Underdogs compared to our last visitor - comet tsuchinshan-atlas


45 minutes after sunset
Path of Comet Tsuchinshan-ATLAS (C/2023 A3)
29
28
27
26
25
24
23
22
21
20
19
18
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15
14
13
SERPENS CAPUT
OPHIUCHUS
SCORPIUS
Antares
LIBRA
Venus
VIRGO
Oct



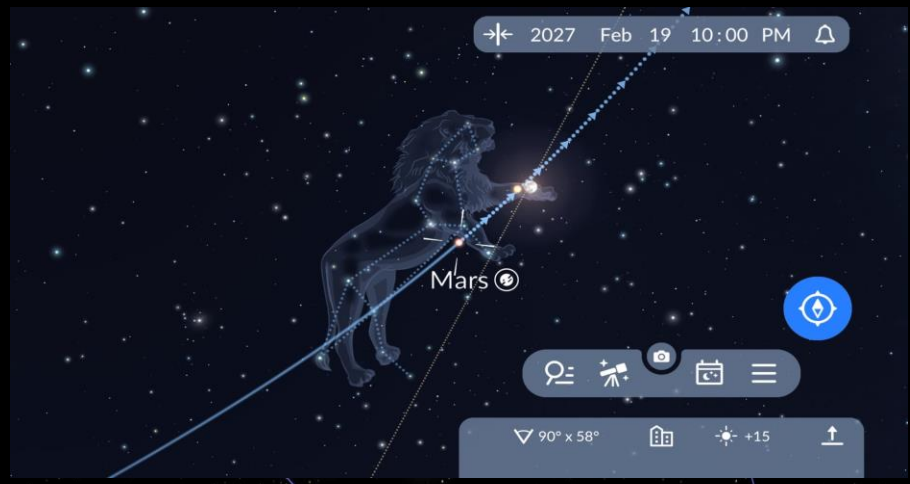

Ophiuchus
Corona Borealis
Ursa Major
Nov 3
Oct 29
Boötes
Serpens
Oct 24
Oct 19
Oct 14
Unukalhai
Arcturus
C/2025 A6 (Lemmon)
The best comet of fall 2025

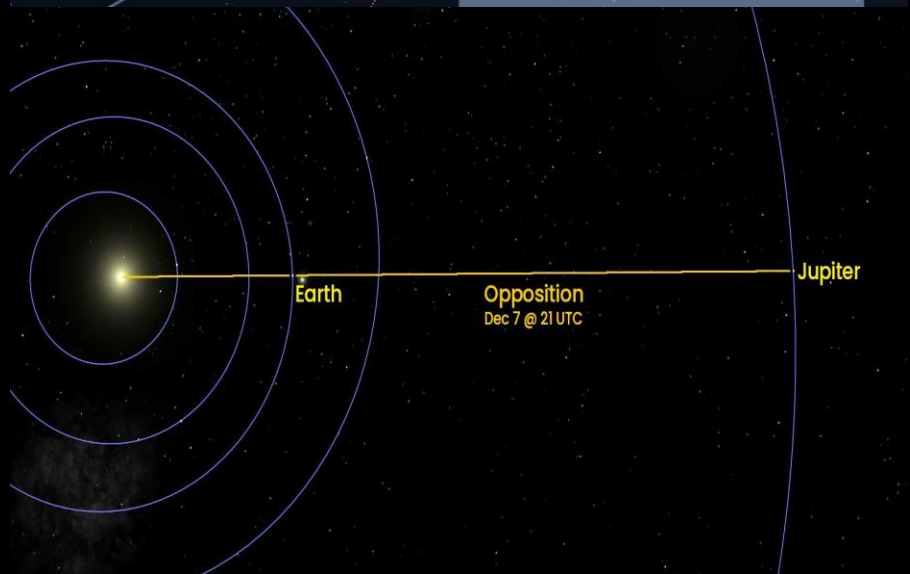
WHAT TO EXPECT TO SEE?
-DEPENDS LARGELY ON THE TIME OF YEAR...AND THE YEAR!
PLANETS VARY IN THEIR VISIBILITY FROM EARTH (MORE NEXT WEEK) BUT SOME ARE CONSISTENT IN THE EVENING SKIES NOW UNTIL MARCH – LIKE SATURN (WINTER 2026 HIGHLIGHT)



JUPITER AND MARS WILL BOTH BE VERY VISIBLE IN THE "COSMIC SIGNPOST" CONSTELLATION LEO IN FEB 2027 (THIS WEEKS CLASS AND NEXT WEEKS CLASS WILL HOPEFULLY GET YOU FAMILIAR WITH WHAT THIS MEANS TO PREPARE!)

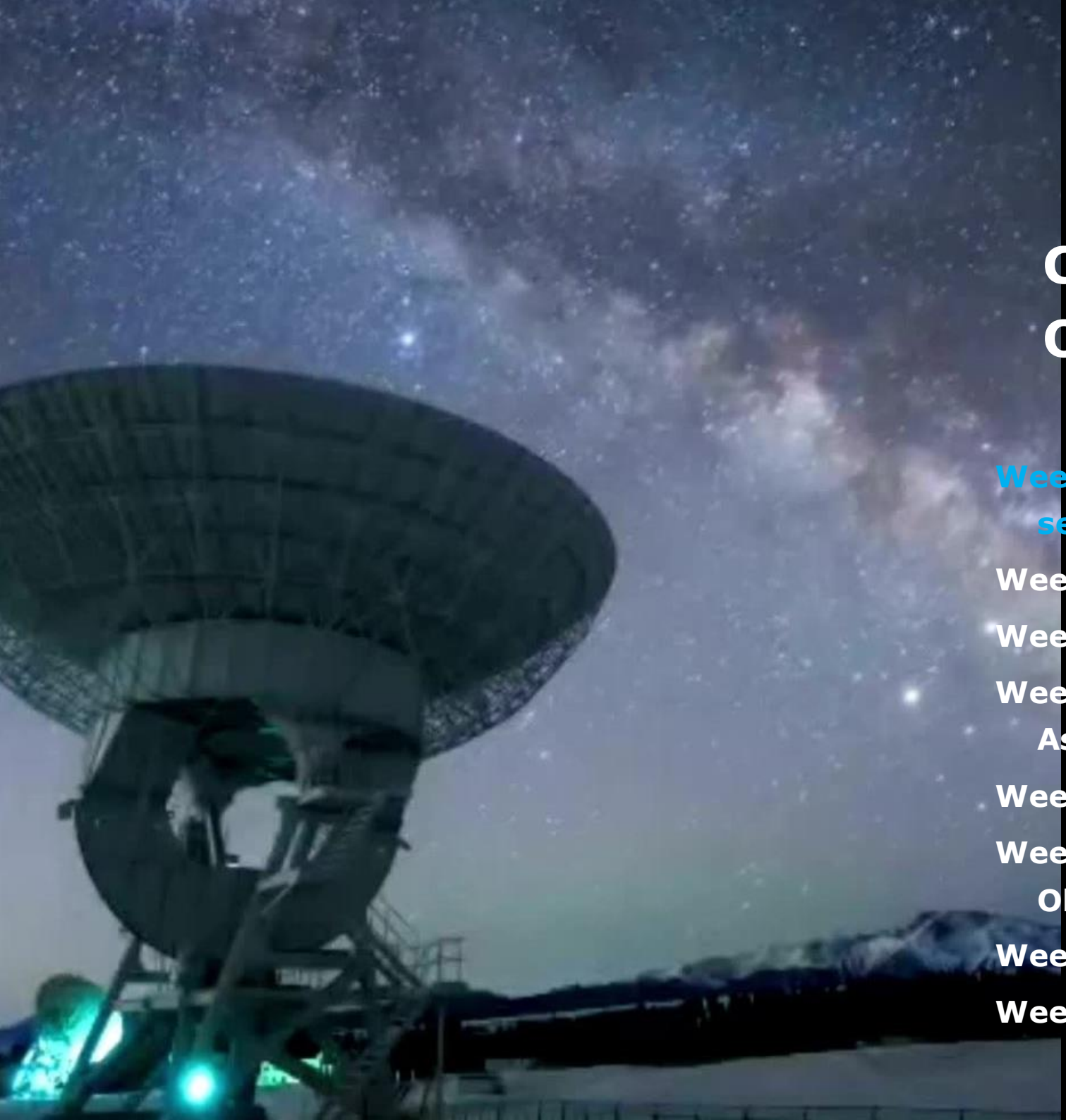






BE PREPARED!!! - FOR THE LION, THE KING AND MARS (OR IS IT SCARS?!)





COURSE OUTLINE

Week 1: The Sky as we see it

Week 2: The Planets

Week 3: The Stars

Week 4: History of Astronomy

Week 5: Telescopes

Week 6: Deep Sky Objects

Week 7: Cosmology

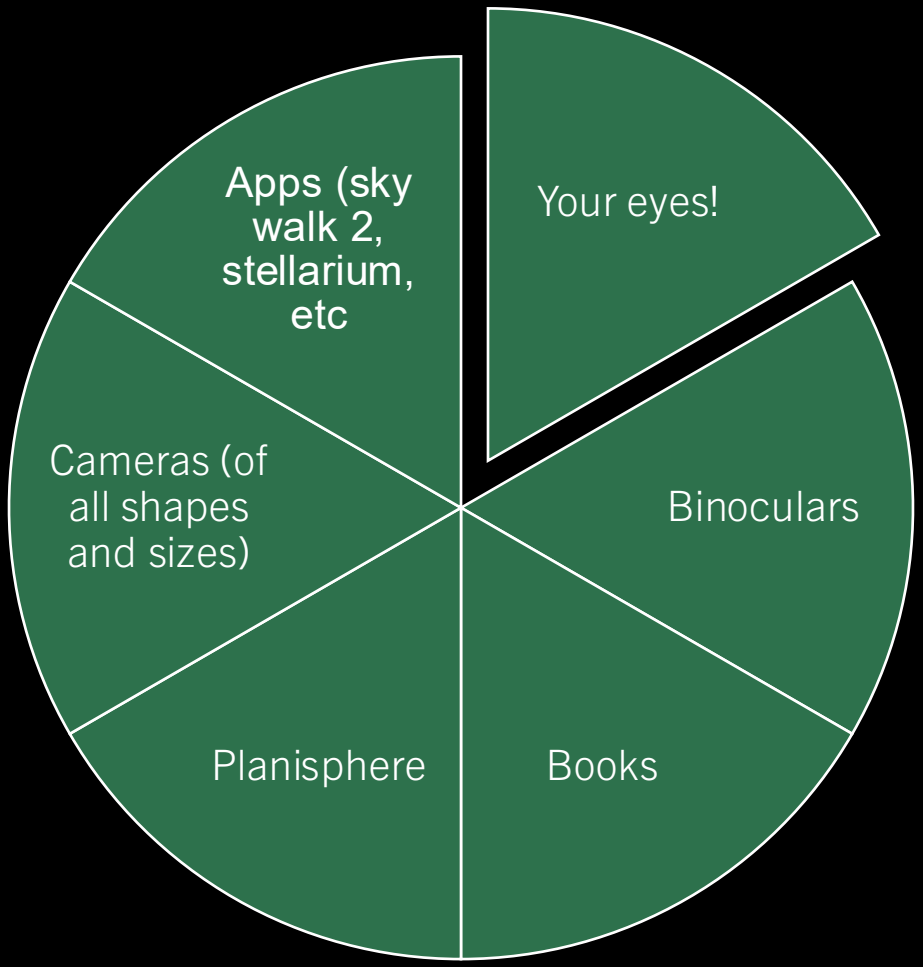
Week 8: Alien Worlds

LIVE TELESCOPE CLASS IN WEEK 3 IN HQ IN BLANCHARDSTOWN (ROSEMONT PARK)

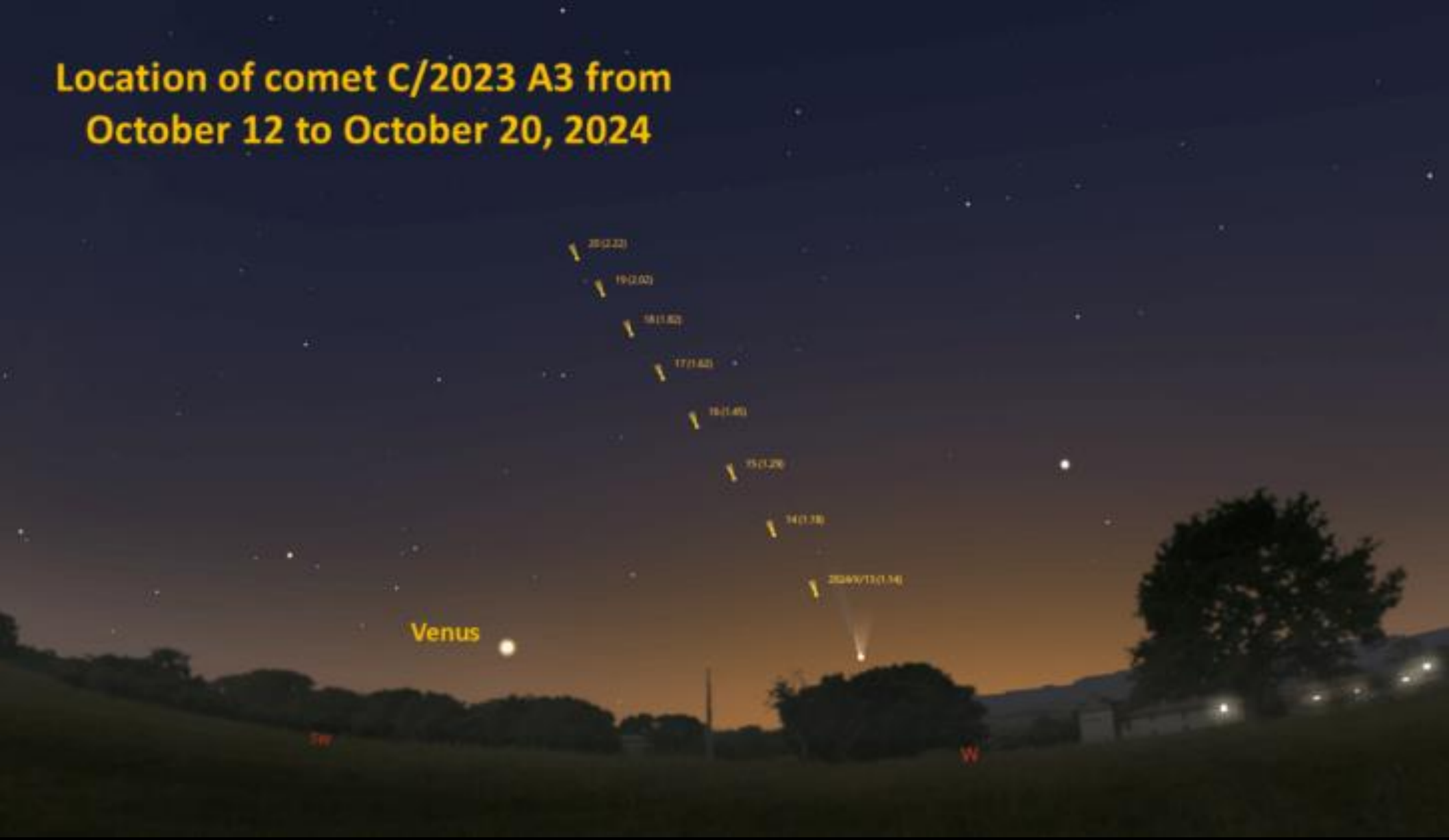
- 17th of November
- Weather Permitting
- Telescope Class – 3 Major types refractor, reflector and cassegrain
- Other types might be there – Dobsonian, Maxitov
- Volunteer experience – a lot of expert amateur astronomers to share their experience and telescopes!
- Best chance to view Planets (Saturn, Jupiter maybe Mars) and Deep Sky Objects (Orion Nebula and Pleaides) !!!

EQUIPMENT FOR ASTRONOMY









RECOMMEND USING BINOCULARS FOR THEIR PORTABILITY AND EASE OF USE EVENING BY EVENING TO SEE THE COMET AND PLANETS FOR EXAMPLE SATURN

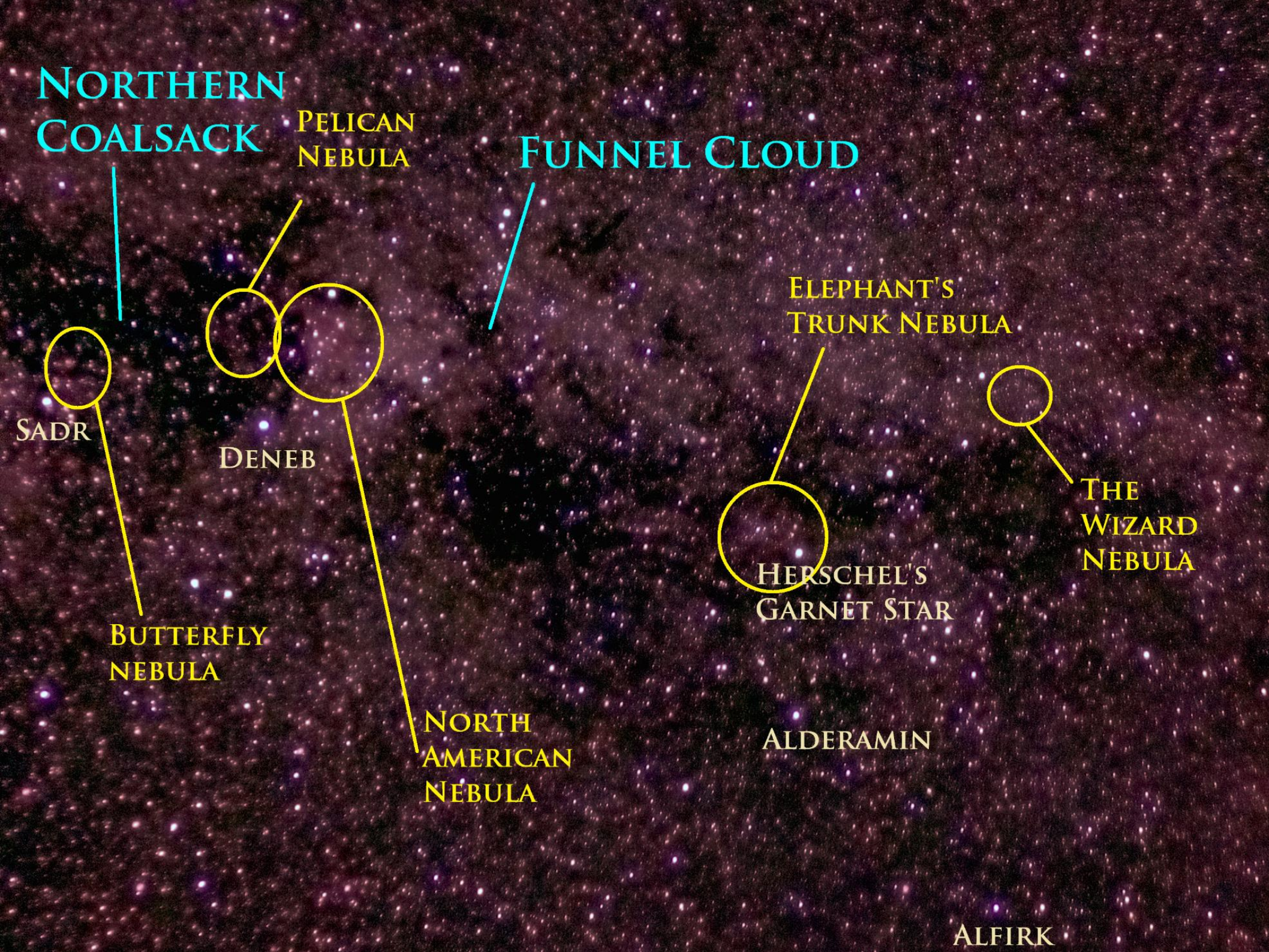


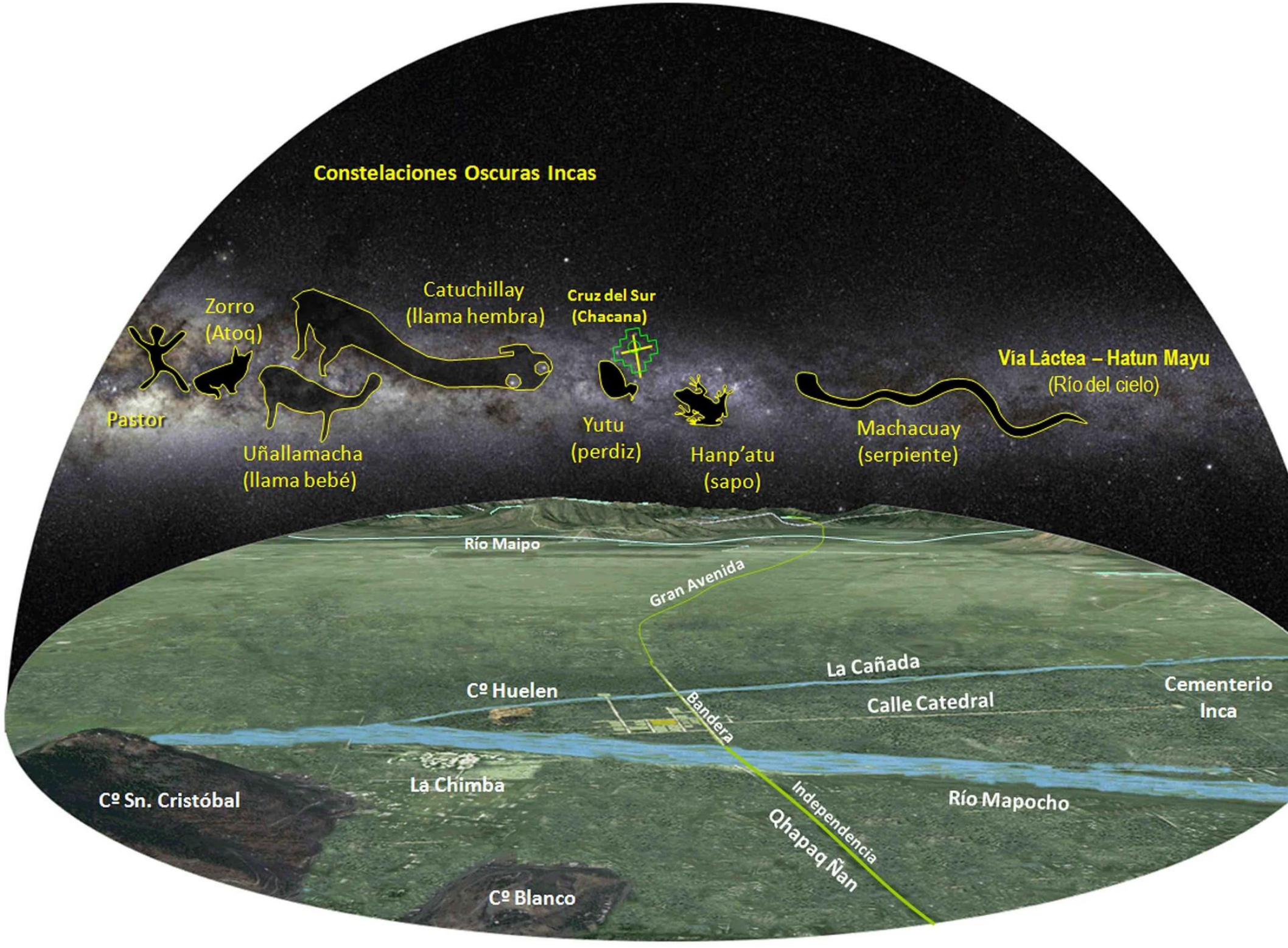


WHAT CAN I SEE?

- **Stars & Constellations**
- The Moon and Planets (W2)
- Galaxies & Nebulae (W6)
- The Sun (CAREFUL!)



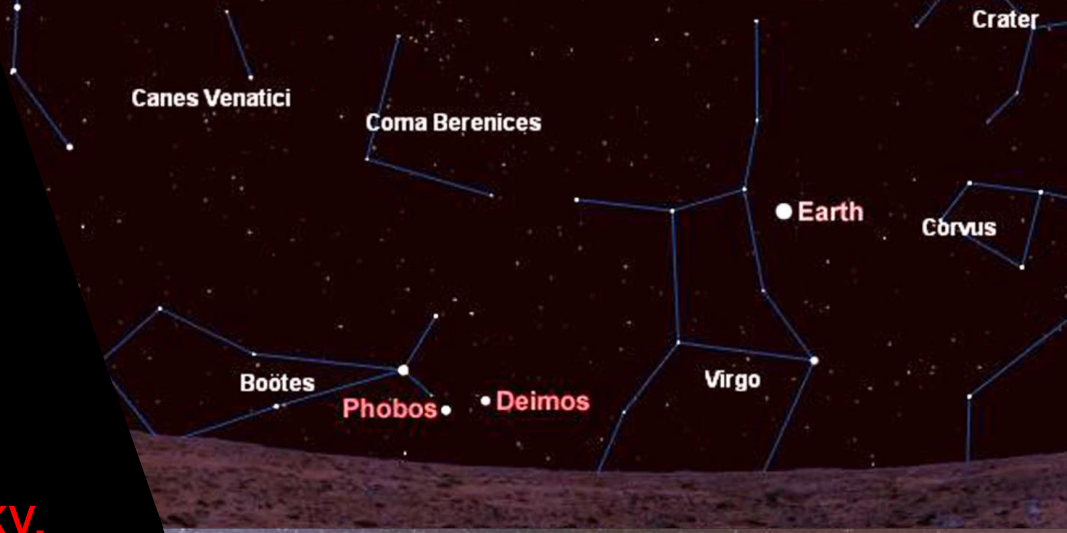

Northern Coalsack
Pelican Nebula
Funnel Cloud
Elephant's Trunk Nebula
Sadr
Deneb
The Wizard Nebula
Herschel's Garnet Star
Butterfly nebula
North American Nebula
Alderamin
Alfirk


Constelaciones Oscuras Incas
Zorro
(Atoq)
Catuchillay
(llama hembra)
Cruz del Sur
(Chacana)
Vía Láctea – Hatun Mayu
(Río del cielo)
Pastor
Uñallamacha
(llama bebé)
Yutu
(perdiz)
Hanp'atu
(sapo)
Machacuay
(serpiente)
Río Maipo
Gran Avenida
La Cañada
Cº Huelen
Calle Catedral
Cementerio
Inca
Bandera
La Chimba
Cº Sn. Cristóbal
Río Mapocho
Independencia
Qhapaq Ñan
Cº Blanco

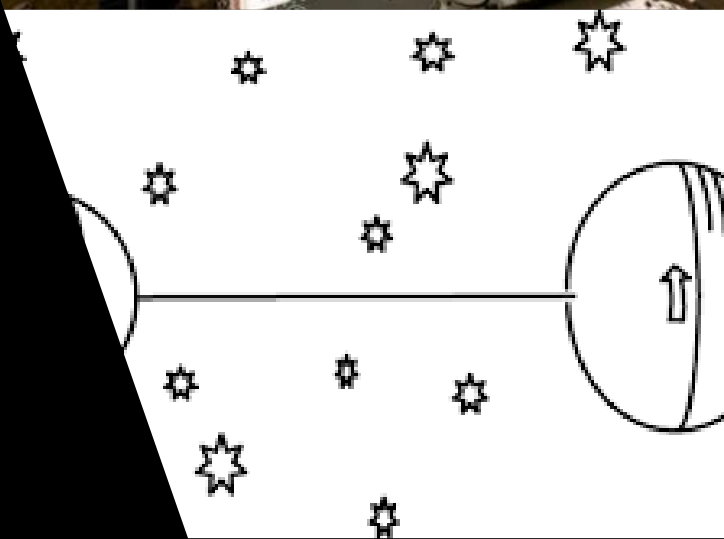
THE GOAL OF THIS CLASS IS....

- To Convince You that the Night Sky,
- Containing the Stars, Planets, Galaxies, etc
- Appears to Move relative
- to the Earth (or any other planet)
- Spinning!

- To give you some information on how to
- Navigate the night sky
- With your unaided eye

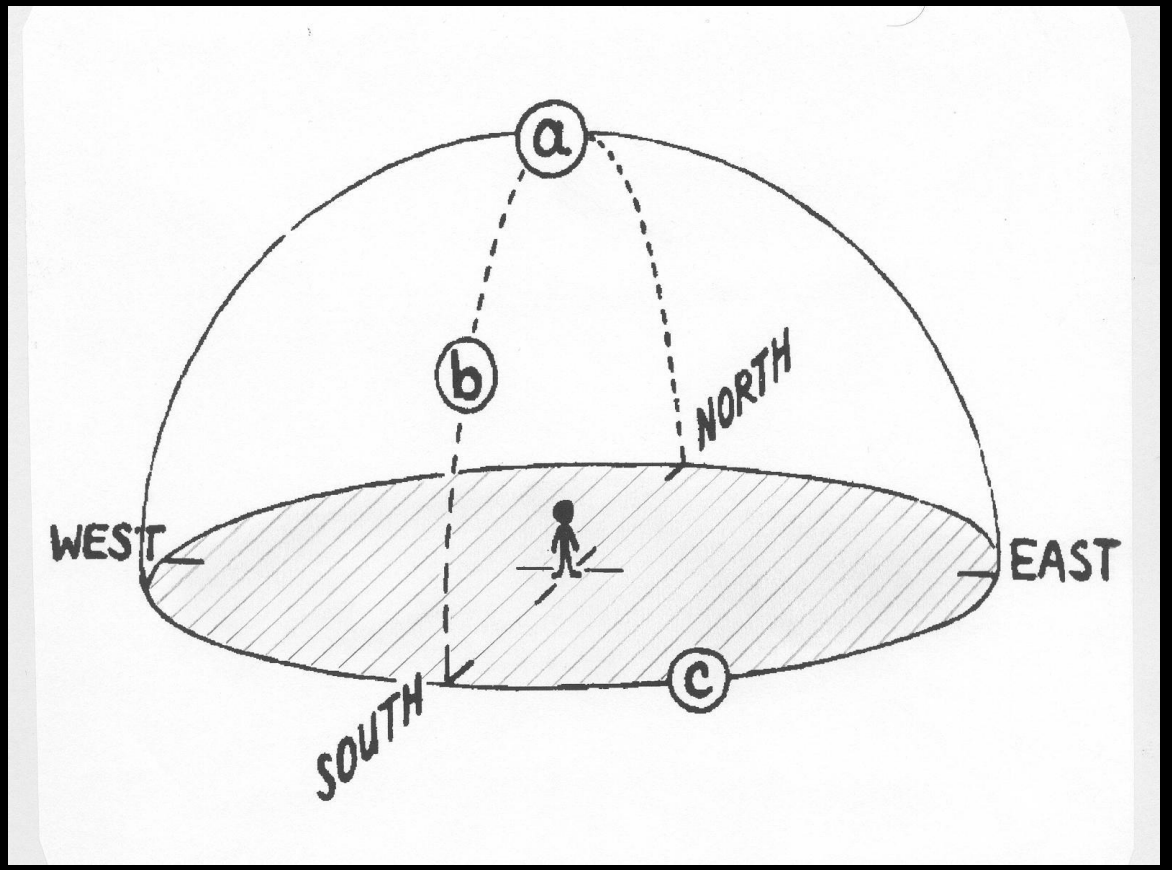






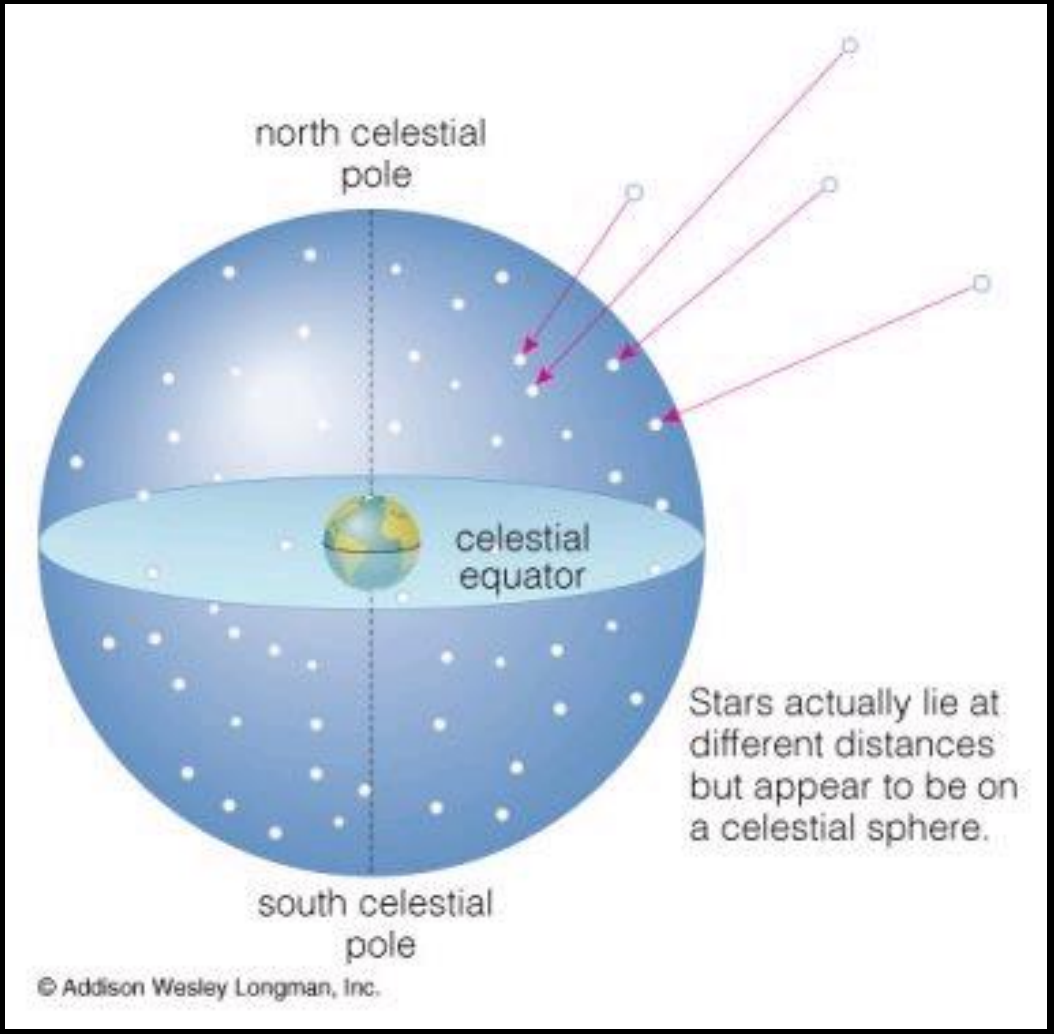
The night sky is like an up-turned bowl above the astronomer's head.

- a: Zenith
- b: Meridian
- c: Horizon

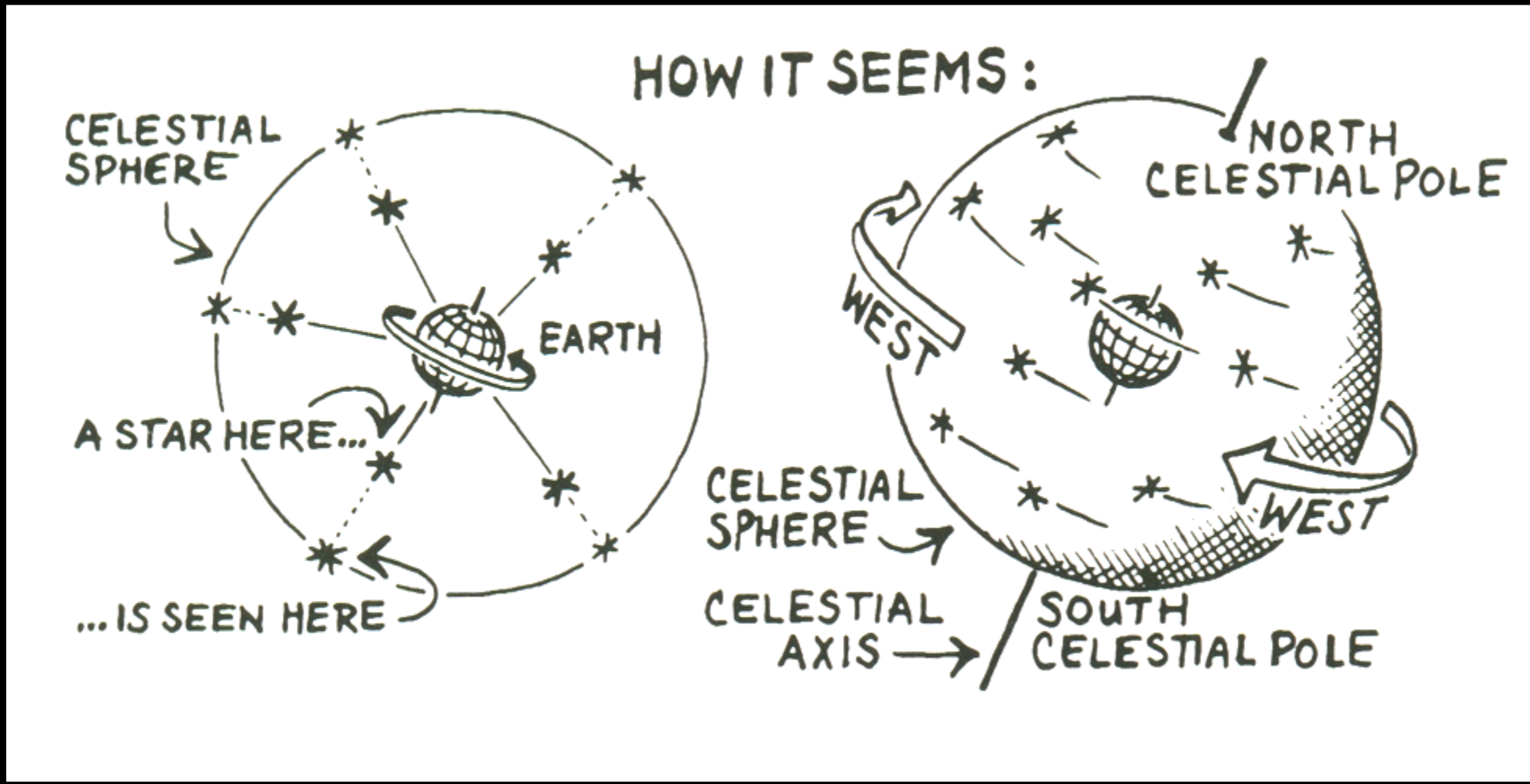


The Celestial Sphere

- We can pretend the
- night sky is a sphere,
- because all its stars
- are so far away from
- us, they don't appear
- to move at all.



The Celestial Sphere appears to spin because we see it from the surface of the spinning Earth.

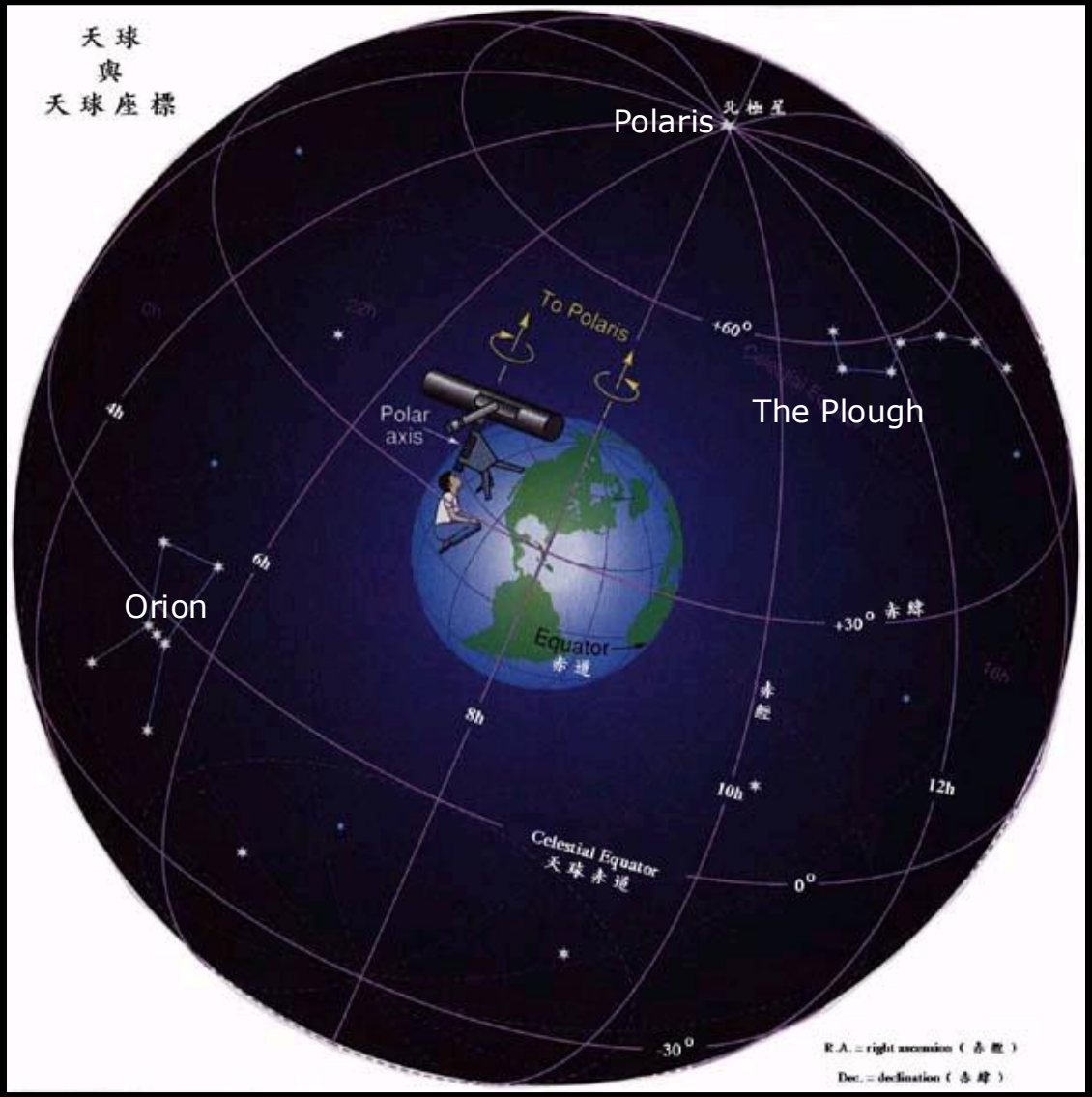




Stars appear fixed on the Celestial Sphere.

Note the positions of –

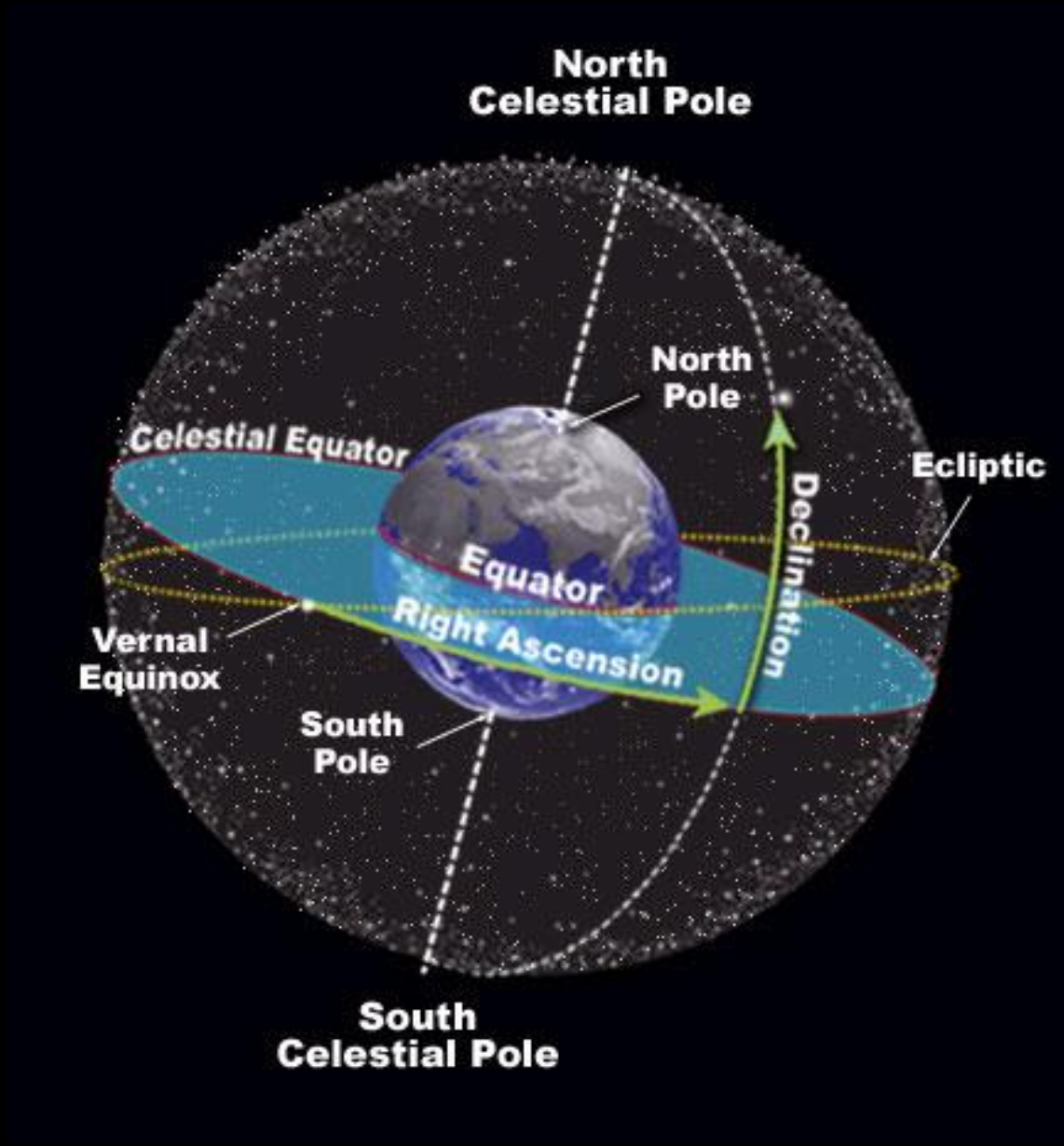
- **The Plough**
- **(Or Big Dipper)**
- **Polaris**
- **Orion**



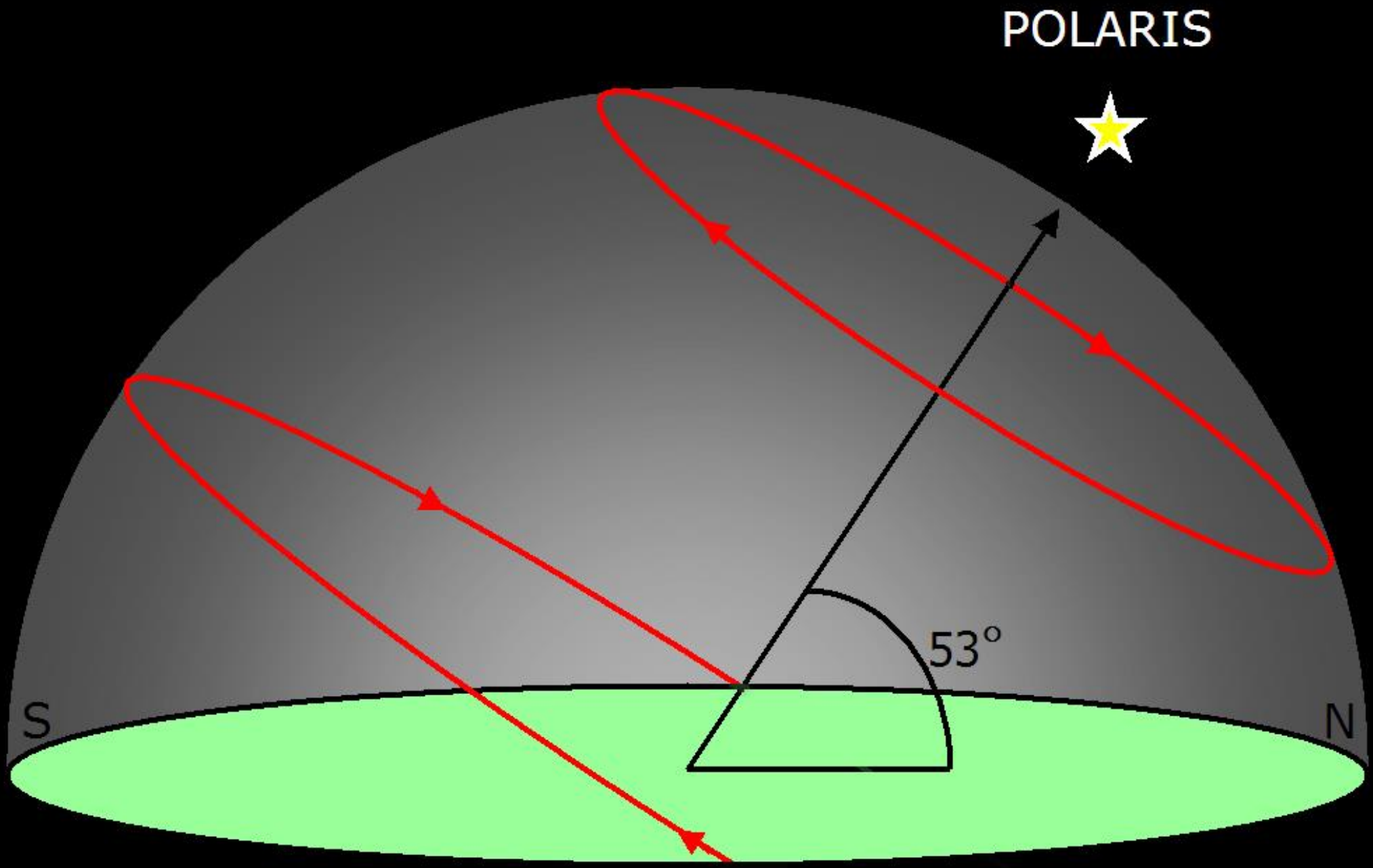
Celestial Coordinates

Declination is equivalent to latitiude and is measured in degrees.

Right Ascension is equivalent to longitude and is measured in hours, minutes and seconds.



The View from Leixlip - 53° North at roughly 8pm





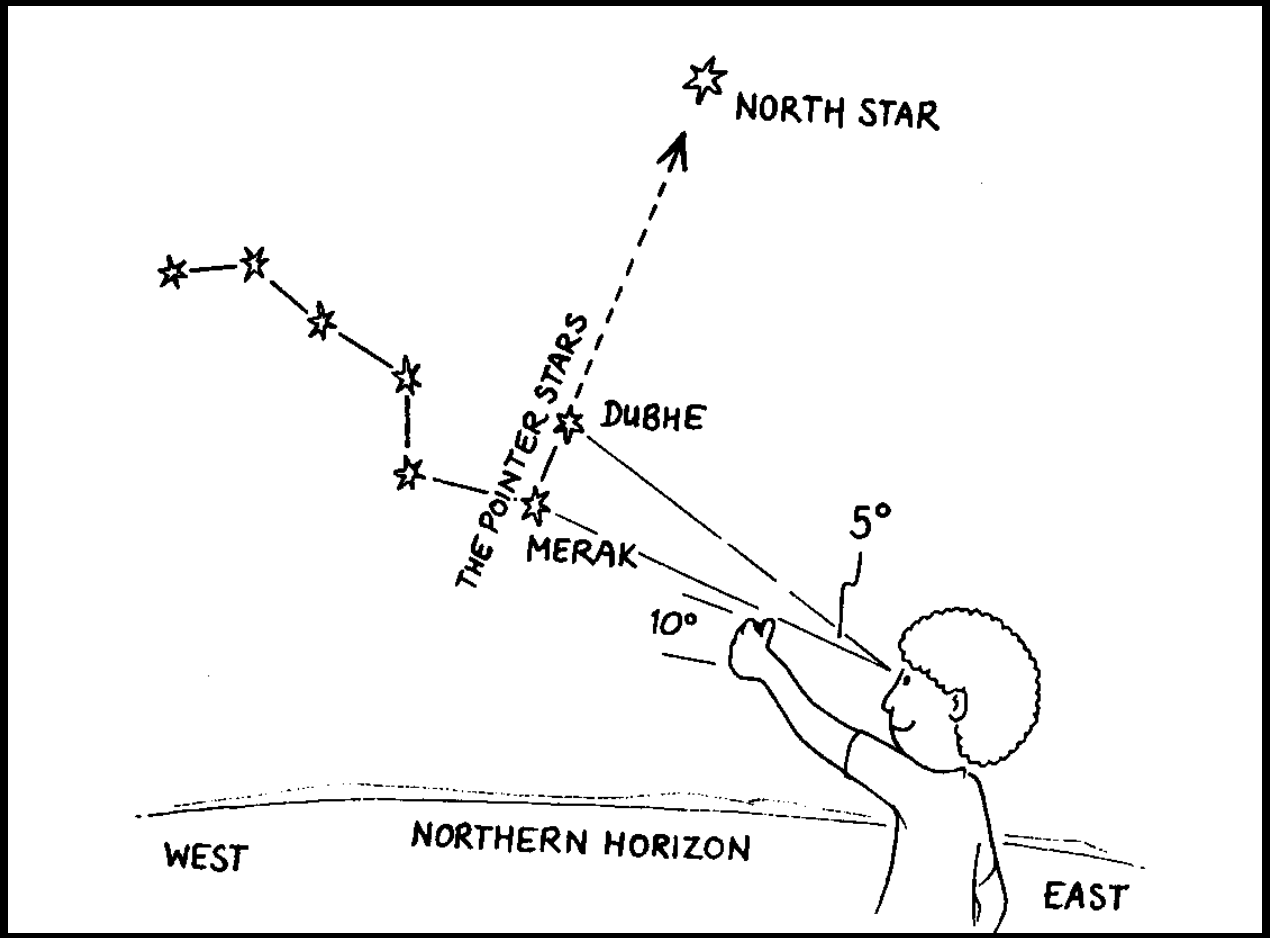
PATH OF THE POLE TH
PRECESSIONAL

- Precession of
- the Equinoxes

- The spinning
- Earth wobbles on its axis once every 26,000 years.

- So Our current "Pole Star" was not always
- Polaris

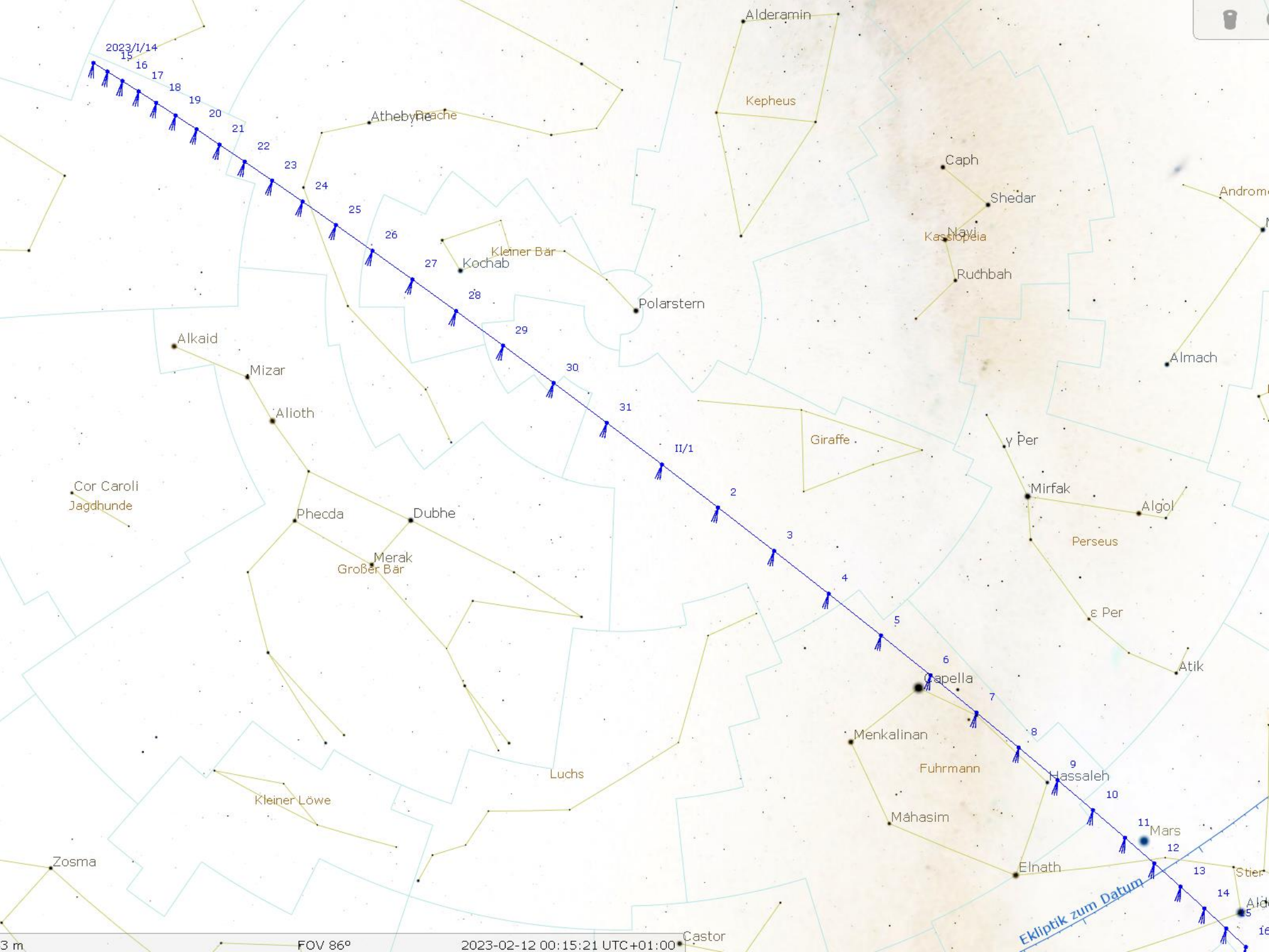
Polaris stays in the same place – always directly North, 53° above the horizon.



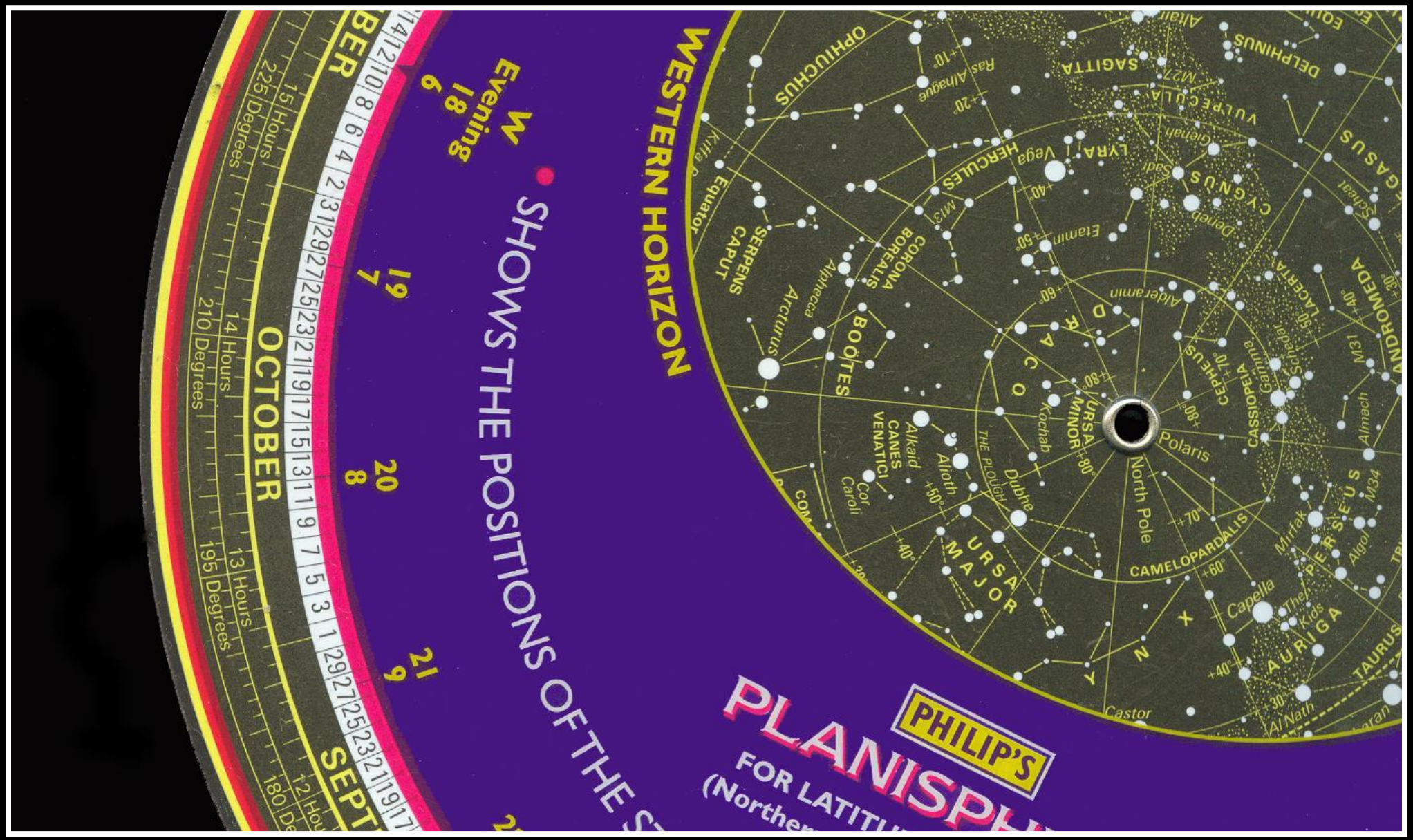


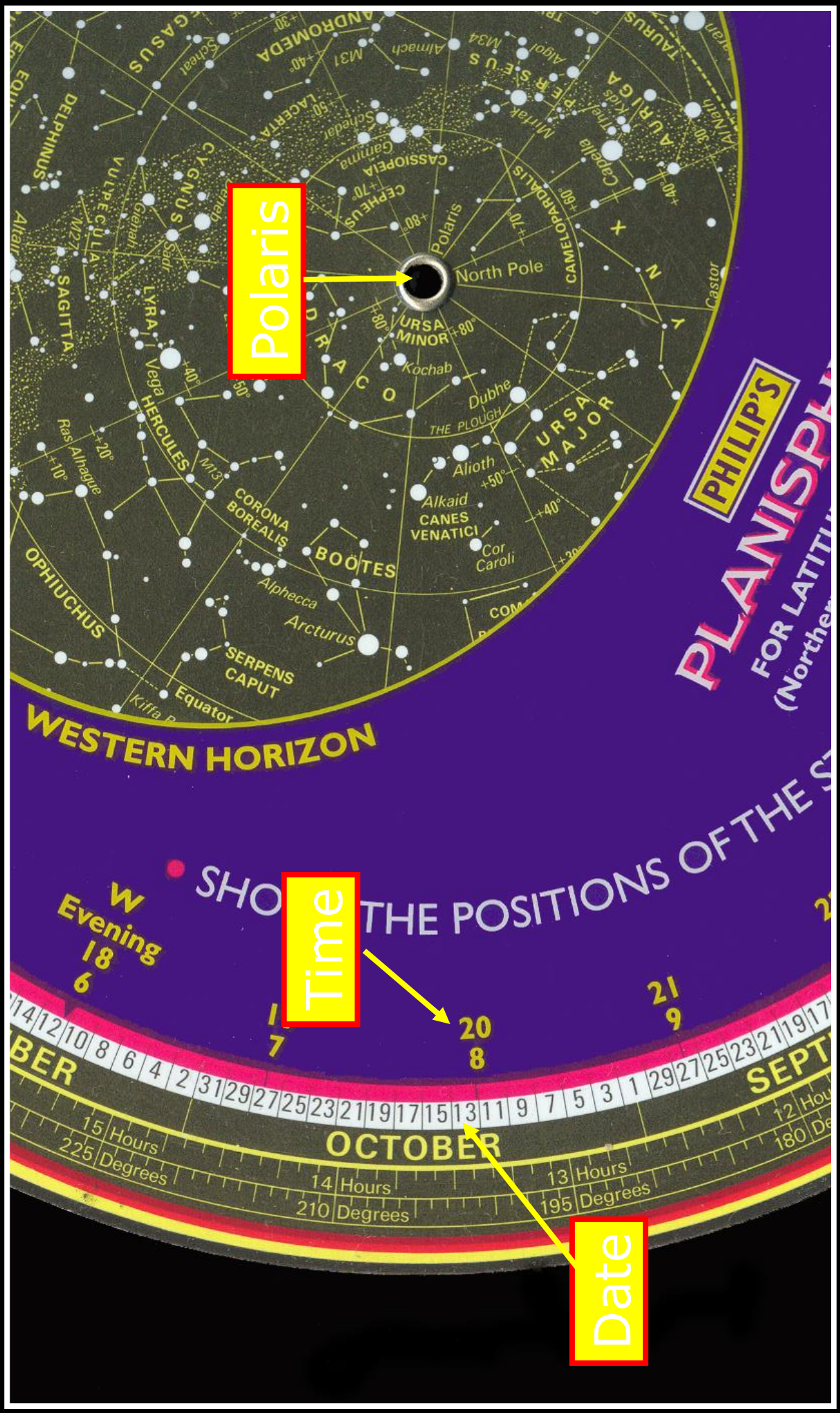


Examples of Benefits of learning the constellations – tracking an upcoming rendezvous with a Comet!
Comet ZTF

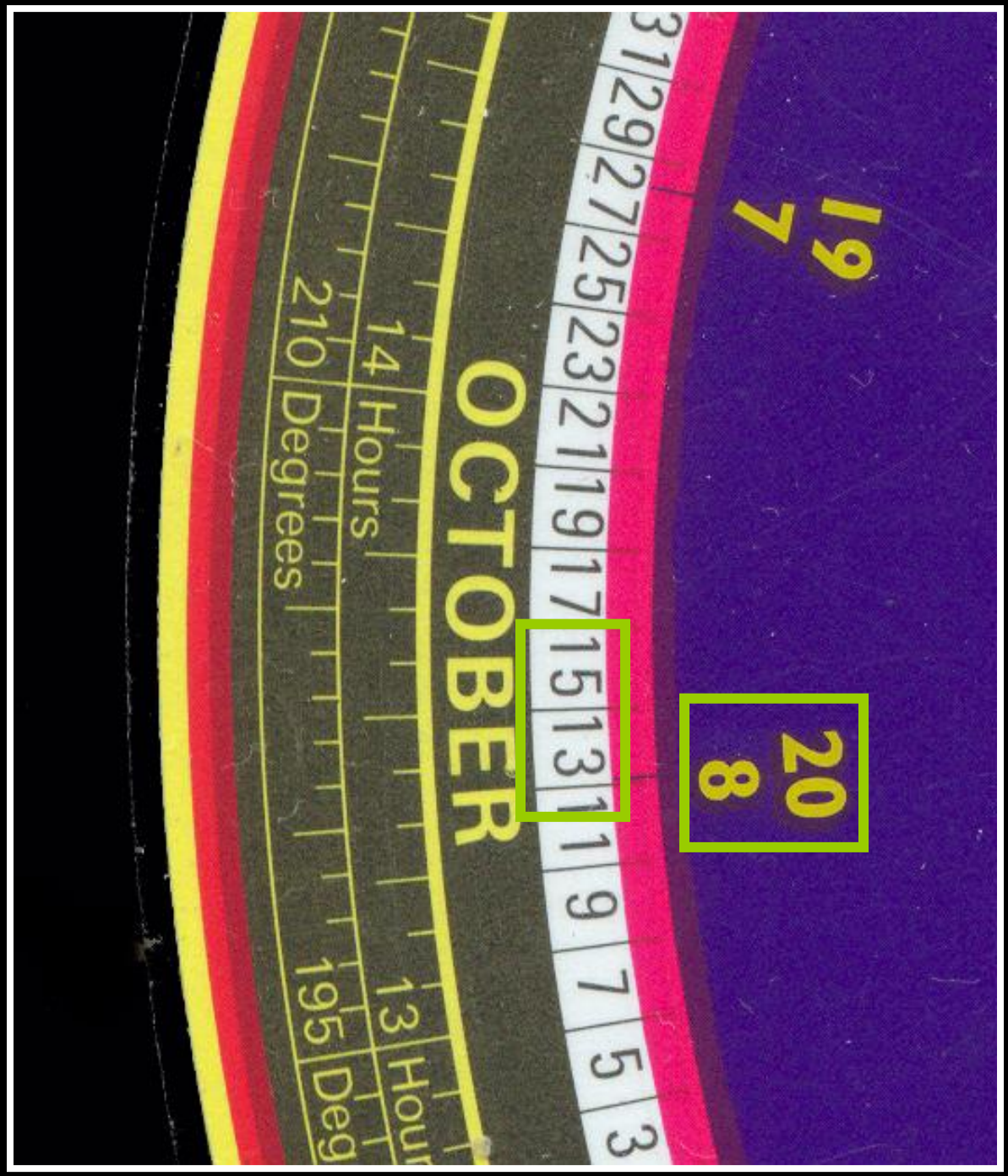

2023/I/14
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Alderamin
Kepheus
Athebyne
Caph
Shedar
Navi
Kassiopeia
Ruchbah
Kleiner Bär
Kochab
Polarstern
Alkaid
Mizar
Alioth
Almach
Giraffe
γ Per
Mirfak
Algol
Perseus
ε Per
Atik
Cor Caroli
Jagdhunde
Phecda
Dubhe
Merak
Großer Bär
Capella
Menkalinan
Fuhrmann
Hassaleh
Mahasim
Mars
Elnath
Luchs
Kleiner Löwe
Zosma
Castor
Stier
Ekliptik zum Datum
3 m
FOV 86°
2023-02-12 00:15:21 UTC+01:00

Using A Planisphere

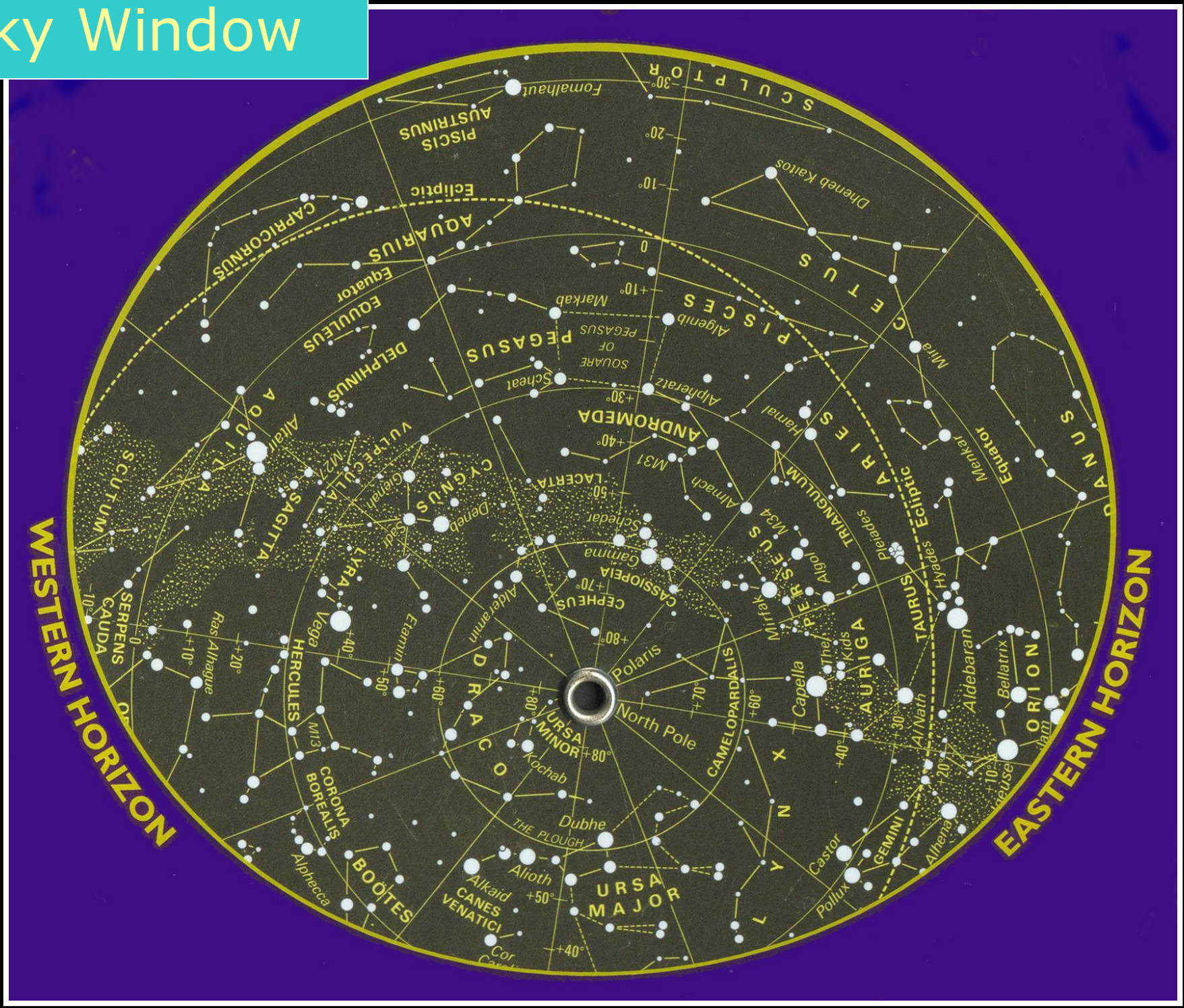



Polaris
Time
Date
PHILIP'S
PLANISPH
FOR LATITU
(Northern
WESTERN HORIZON
SHO THE POSITIONS OF THE S
W
Evening
18
6
20
8
21
9
OCTOBER
SEPT
15 Hours
225 Degrees
14 Hours
210 Degrees
13 Hours
195 Degrees
12 Hou
180 De
North Pole
Polaris
Kochab
Dubhe
THE PLOUGH
URSA MAJOR
URSA MINOR
CAMELOPARDALIS
CASSIOPEIA
CEPHEUS
DRACO
Alioth
Alkaid
CANES VENATICI
Cor Caroli
BOÖTES
CORONA BOREALIS
HERCULES
Vega
LYRA
SAGITTA
Ras Alhague
OPHIUCHUS
SERPENS CAPUT
Alphecca
Arcturus
Equator
Kiffa
Capella
Mirfak
Algol
Alnath
Castor
Pollux
Procyon
Sirius
Betelgeuse
Rigel
Aldebaran
Alnilam
Alnitak
Mintaka
Bellatrix
Elnath
Menkalinan
Alhena
Wezen
Adhara
Schedar
Caph
Gamma
Navi
Ruchbah
Segin
Achernar
Fomalhaut
Deneb
Altair
Tarazed
Sadr
Gienah
Albireo
Rasalhague
Kornephoros
Unukalhai
Zubenelgenubi
Zubeneschamali
Antares
Rasalgethi
Kaus Australis
Nunki
Ascella
Rukbat
Arkab Prior
Arkab Posterior
Sabik
Eltanin
Rastaban
Grafias
Kaus Media
Kaus Borealis
Pherkad
Yildun
Alderamin
Alfirk
Enif
Scheat
Markab
Algenib
Alpheratz
Mirach
Almach
Hamal
Sheratan
Mesarthim
Polaris Australis
Sigma Octantis
Achird
Ankaa
Acamar
Zaurak
Cursa
Beid
Rana
Zibal
Mirzam
Alhena
Alzirr
Wezen
Adhara
Sirius
Canopus
Rigil Kentaurus
Toliman
Hadar
Menkent
Agena
Alphard
Alphecca
Arcturus
Rasalgethi
Kornephoros
Vega
Sheliak
Sulafat
Deneb
Altair
Tarazed
Alshain
Sadr
Gienah
Albireo
Rasalhague
Cebalrai
Ras Alhague
Kornephoros
Unukalhai
Zubenelgenubi
Zubeneschamali
Antares
Rasalgethi
Kaus Australis
Nunki
Ascella
Rukbat
Arkab Prior
Arkab Posterior
Sabik
Eltanin
Rastaban
Grafias
Kaus Media
Kaus Borealis
Pherkad
Yildun
Alderamin
Alfirk
Enif
Scheat
Markab
Algenib
Alpheratz
Mirach
Almach
Hamal
Sheratan
Mesarthim
Polaris Australis
Sigma Octantis
Achird
Ankaa
Acamar
Zaurak
Cursa
Beid
Rana
Zibal
Mirzam
Alhena
Alzirr
Wezen
Adhara
Sirius
Canopus
Rigil Kentaurus
Toliman
Hadar
Menkent
Agena
Alphard
Alphecca
Arcturus
Rasalgethi
Kornephoros
Vega
Sheliak
Sulafat
Deneb
Altair
Tarazed
Alshain
Sadr
Gienah
Albireo
Rasalhague
Cebalrai
Ras Alhague

Match the time with the date



The Sky Window




2020.11.29
Full Moon
6:40 AM
loon is tonight, the Moon shows its full face
th.
Set
5:44 AM
Rise
4:34 PM
Culmination
11:35 PM
Set
6:40 AM
Nov 29
Nov 30
l Moon
Moon
Venus
Mars
Orion
Canis Major
a Major
Gemini
Auriga
ootes
Sirius
Arcturus
Remove Ads
LACERTA
Satellite
Deneb
Satellite
CYGNUS
2020.11.29
Sun
6:31 AM
10:20
4:51 PM
38°
Moon
4:34 PM
5:44 AM
79.7°
2020.12.03
Waning Gibbous (91%)
2020.12.04
Waning Gibbous (85%)
Venus
4:18 AM
3:20 PM
46.1°
Mars
2:00 PM
2:37 AM
65.9°
Apps are great but often need to be purchased – PS the light from a screen can spoil your night adapted eye
Jupiter
9:59 AM
8:16 PM
38°
Saturn
10:08 AM
8:28 PM
38.5°

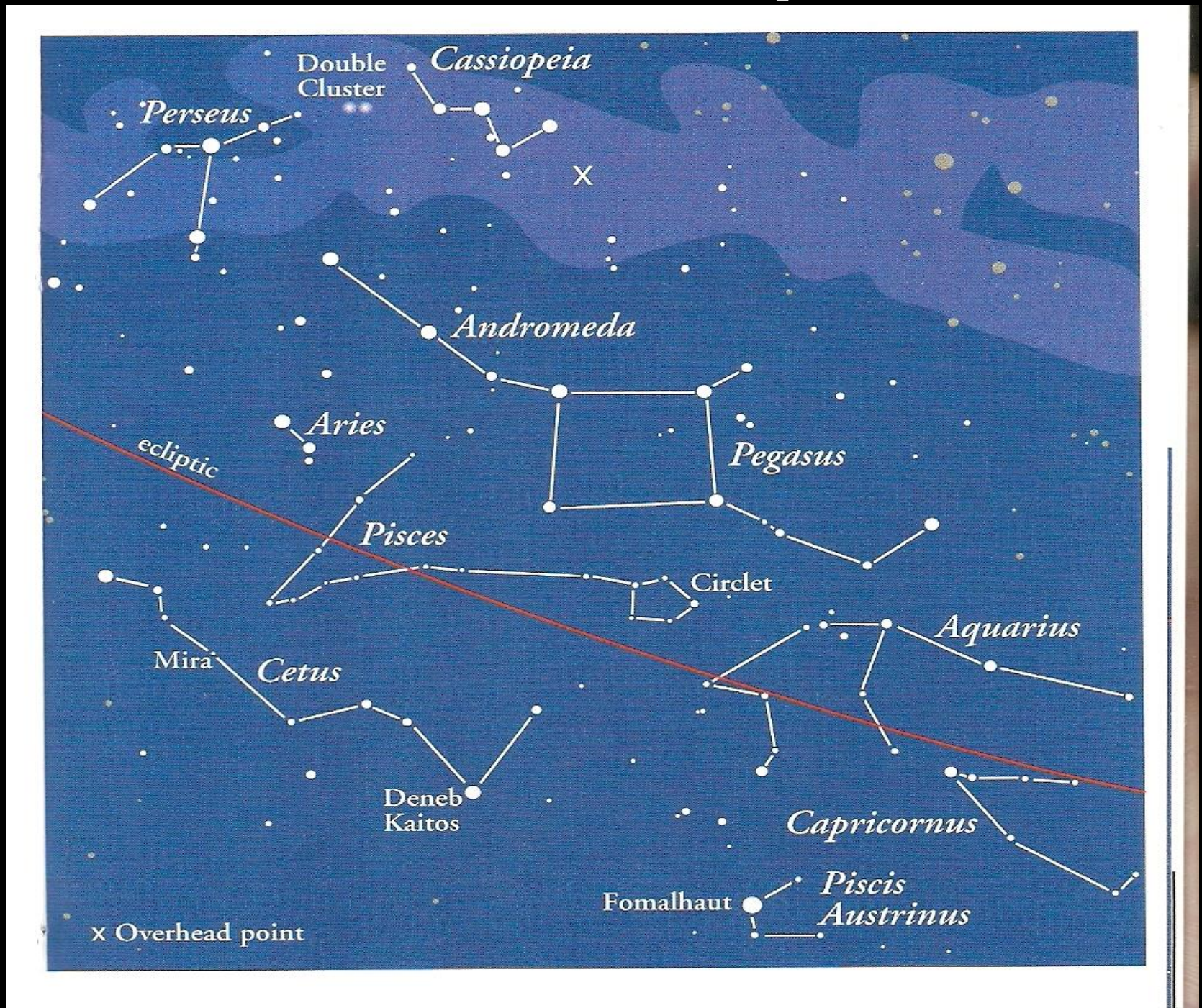


We can use the accurate skycharts in the astronomy Ireland magazine to guide us to what might be interesting in the night sky.

Chart has Moon, Planetary Locations Timestamped over the course of a Month

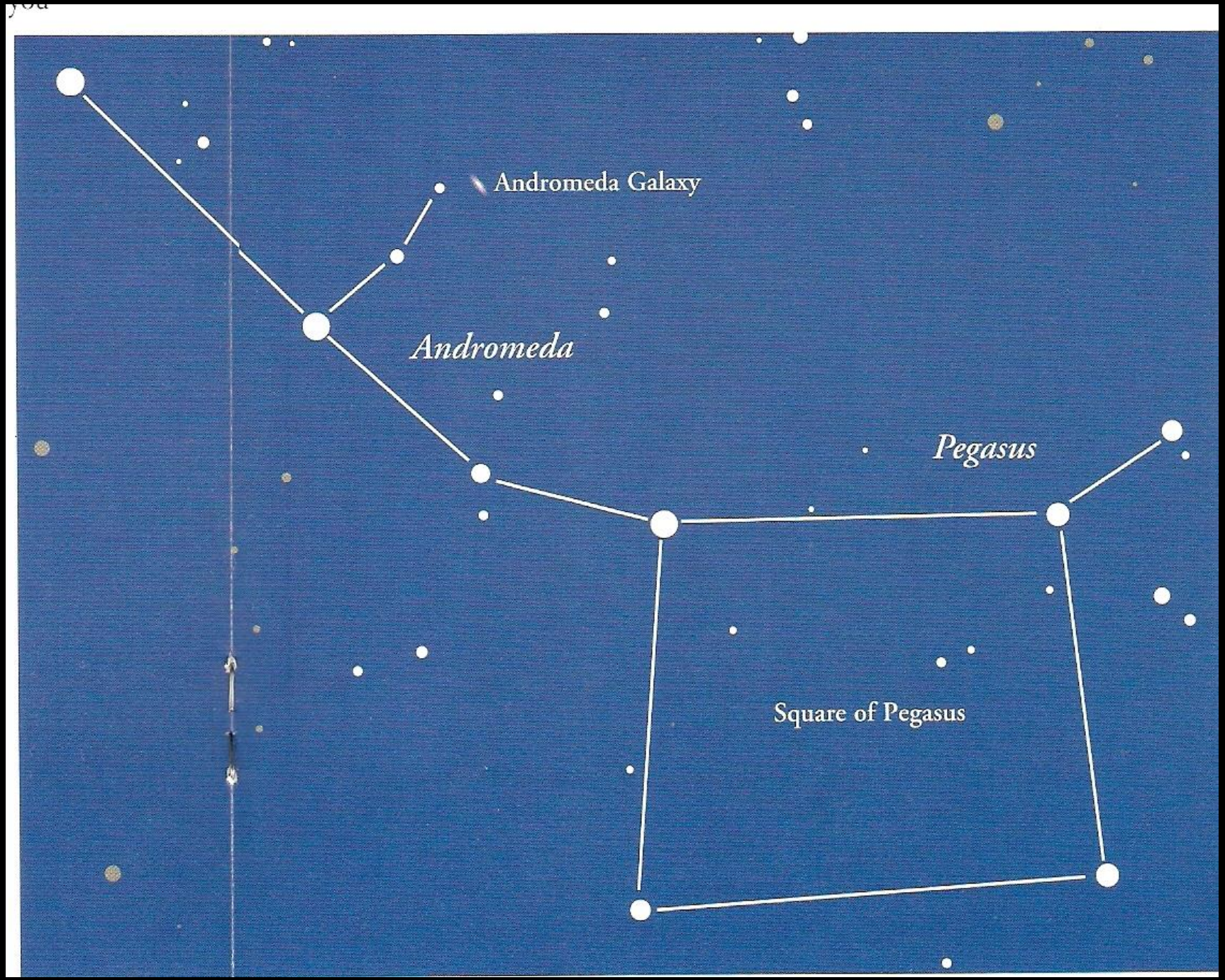
Keep up to date!

Summer and Autumn Sky- Andromeda

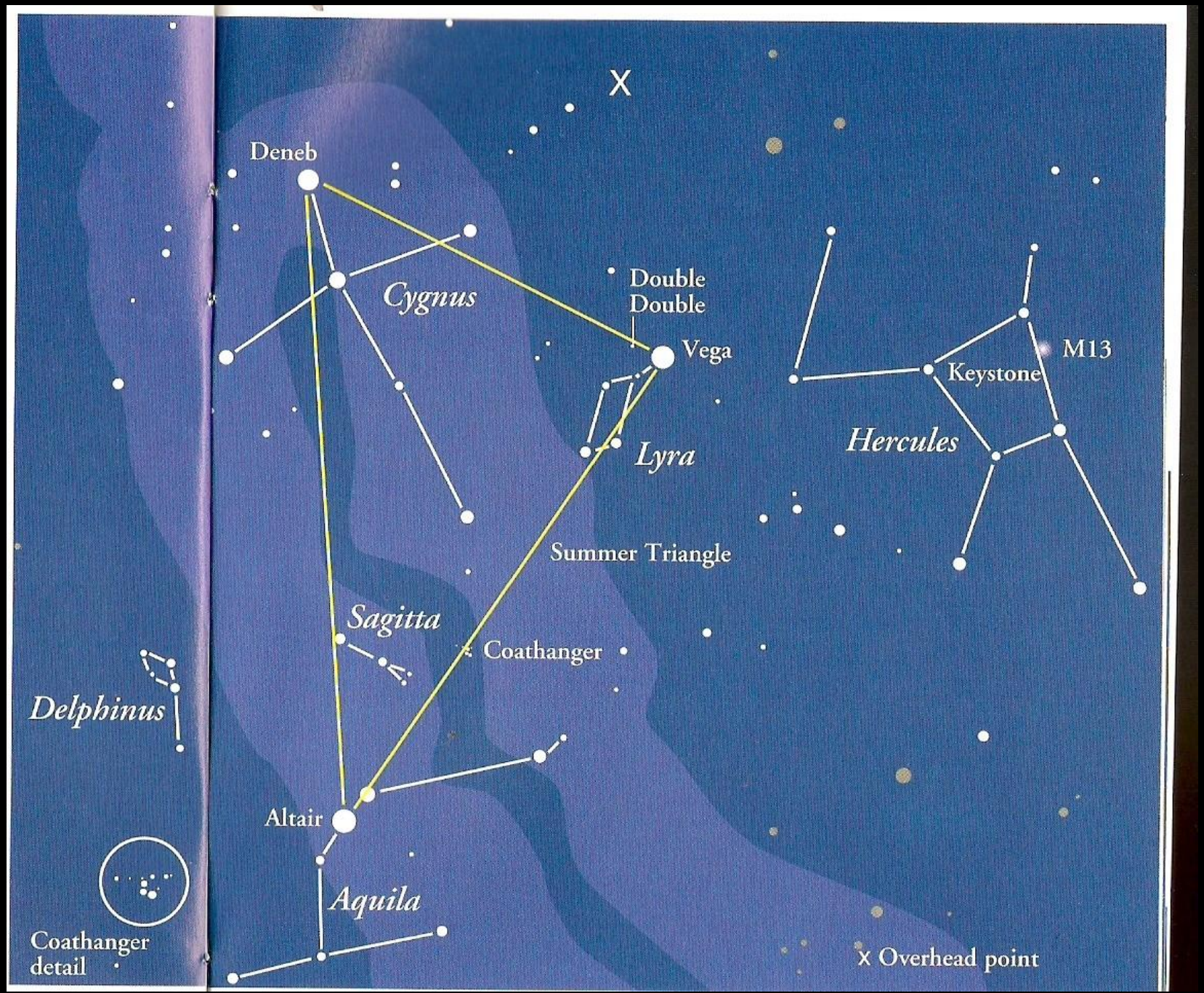


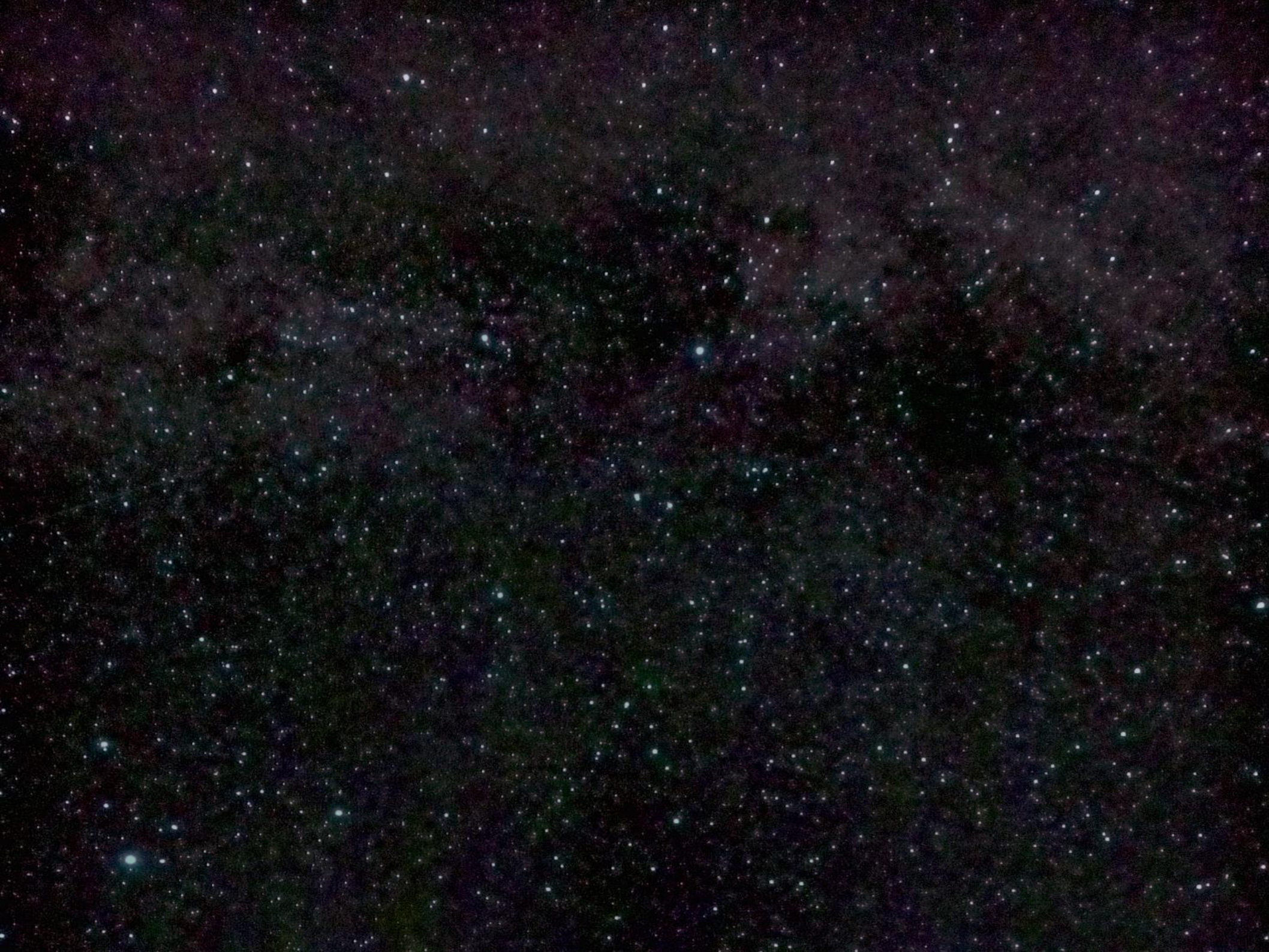


Autumn Sky- Andromeda

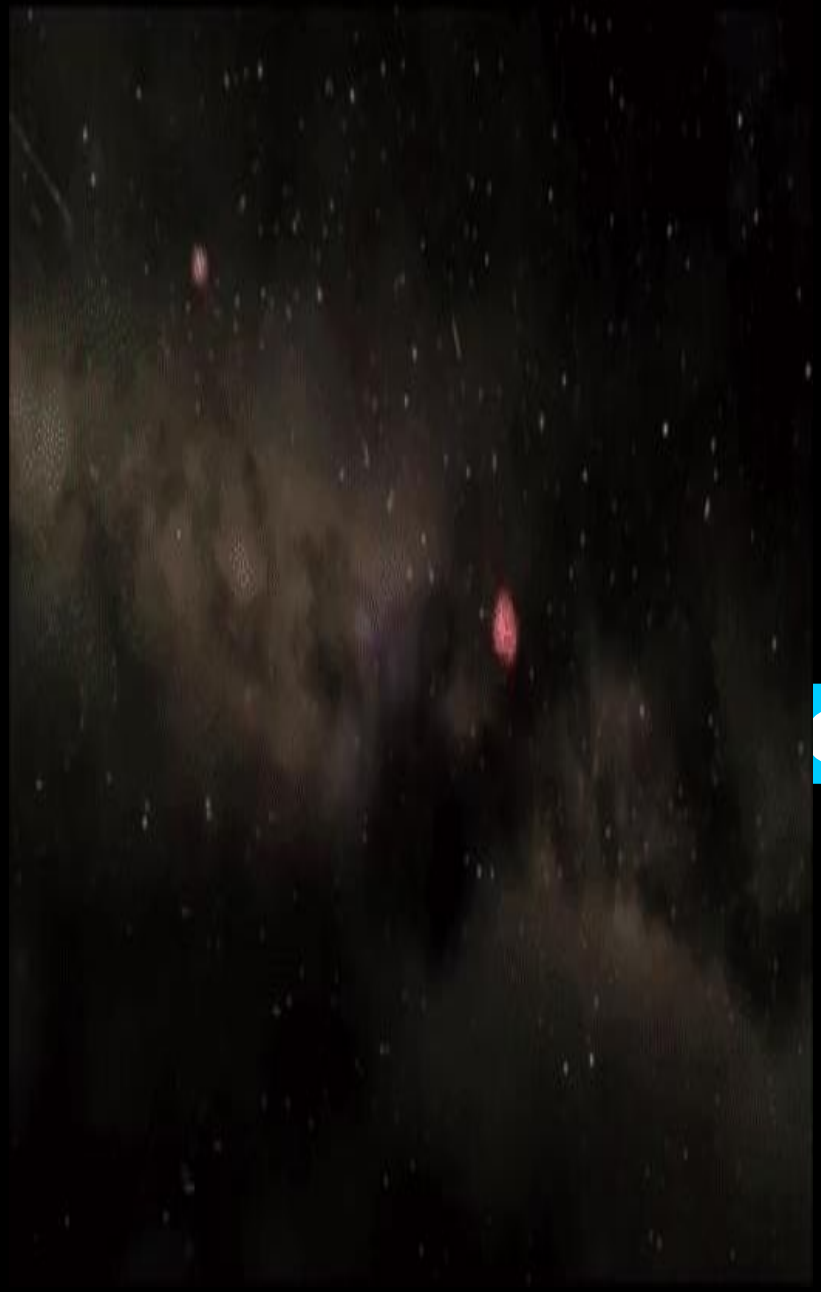


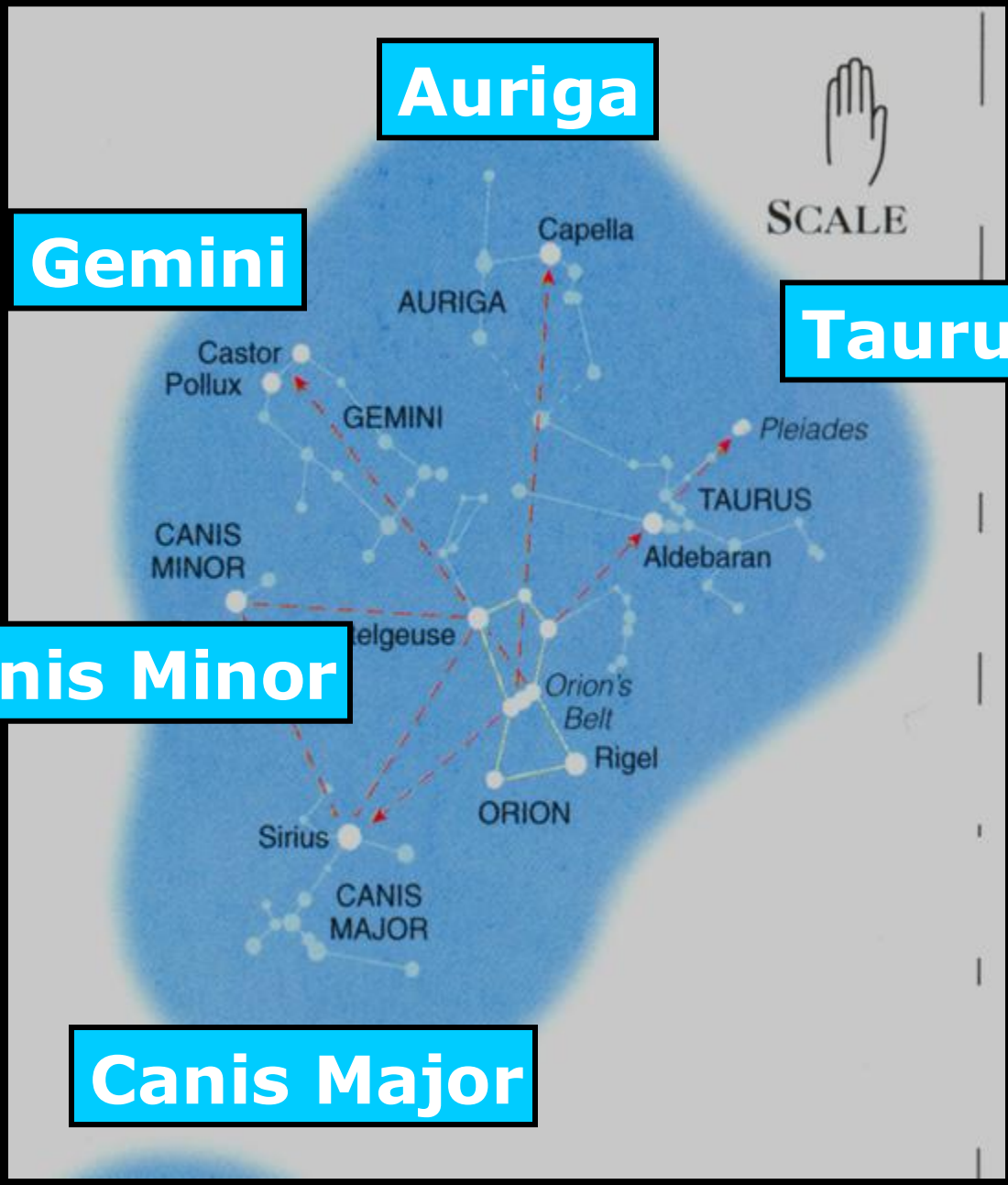
Autumn Sky- Cygnus 'The Swan'





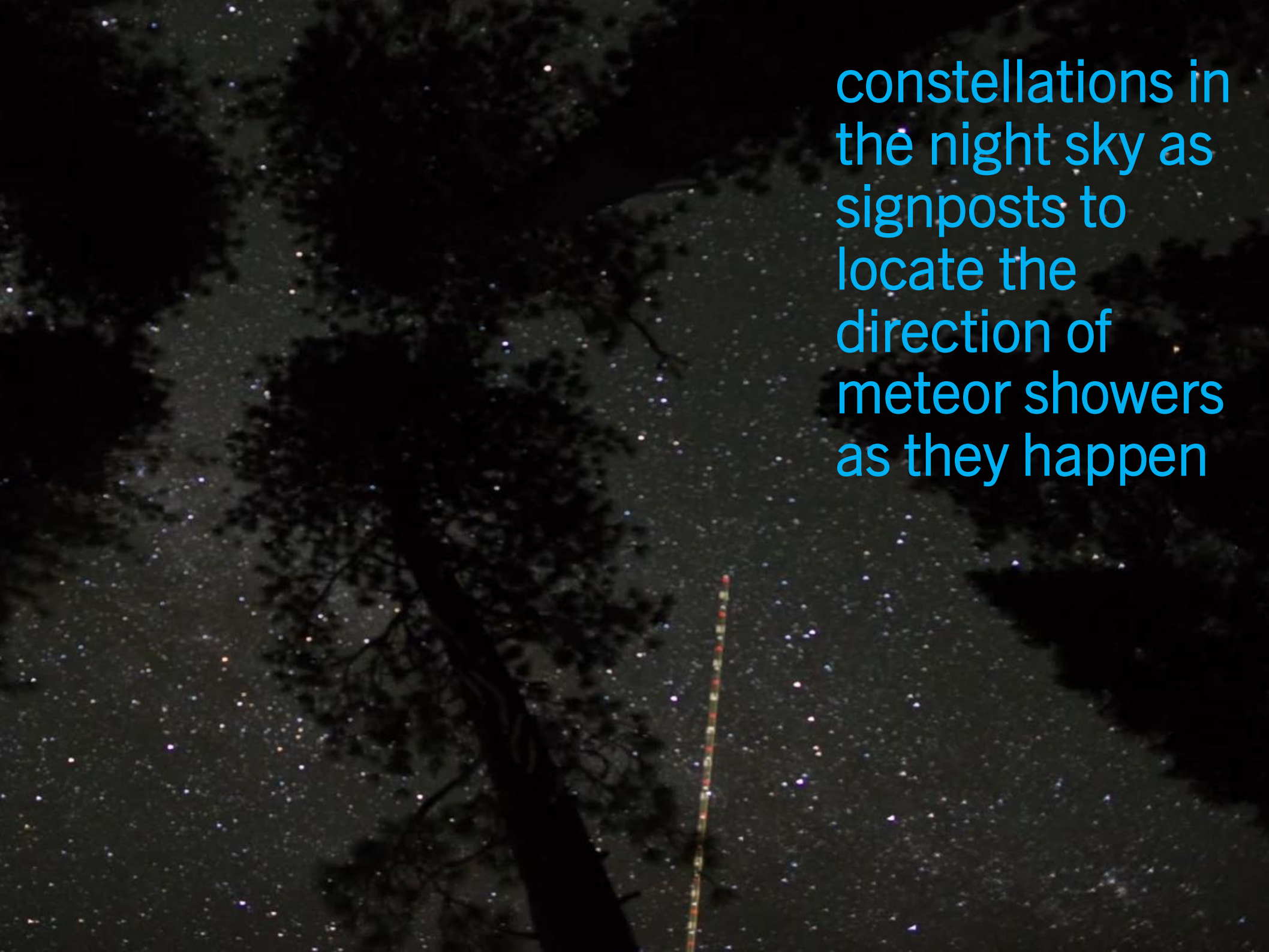
Orion as a perfect stellar signpost











constellations in the night sky as signposts to locate the direction of meteor showers as they happen



Not to be confused with satellites (which are like flies at this stage)

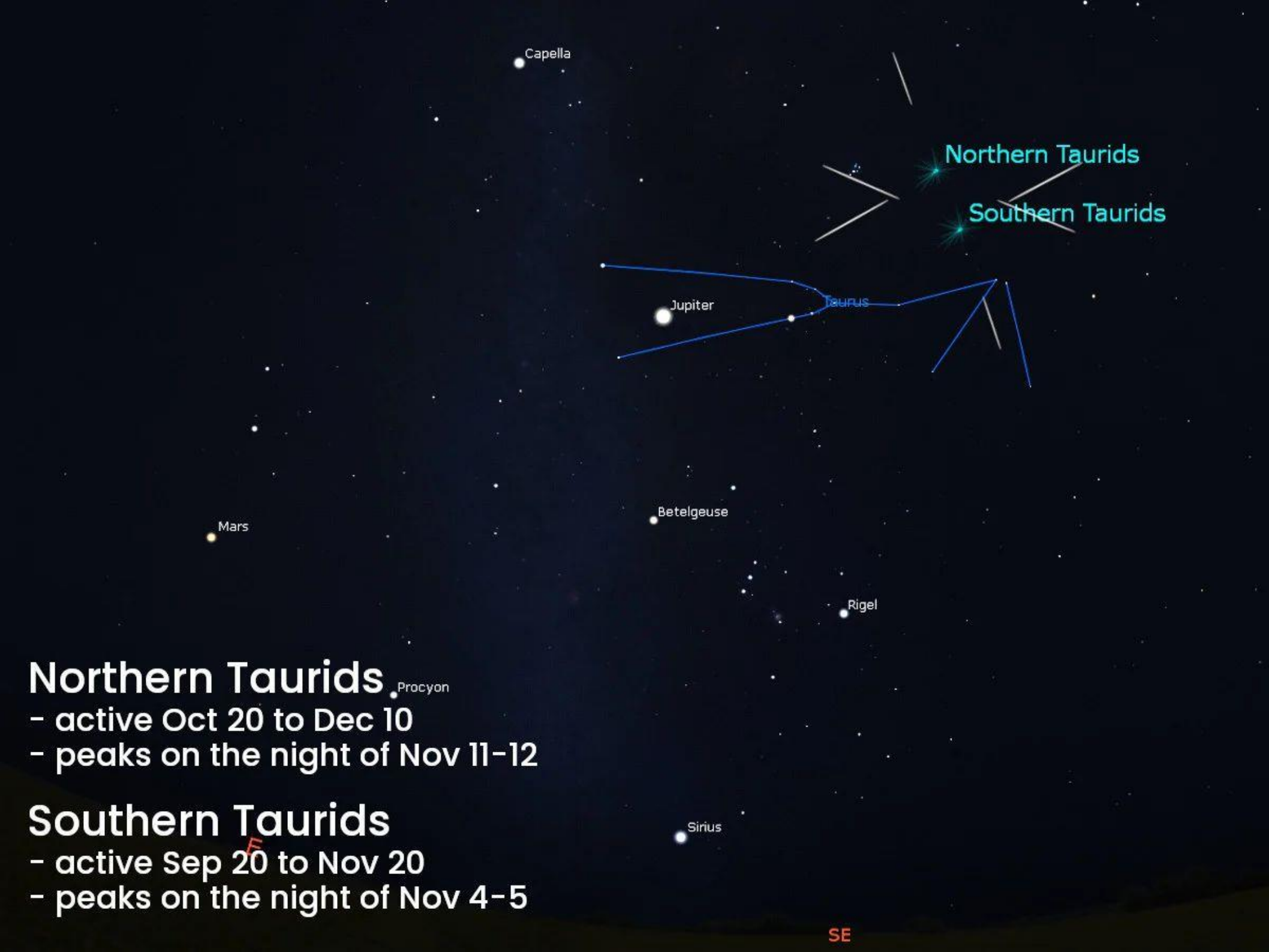






Orionids

- active Oct 2 to Nov 7
- peaks on the night of Oct 21-22



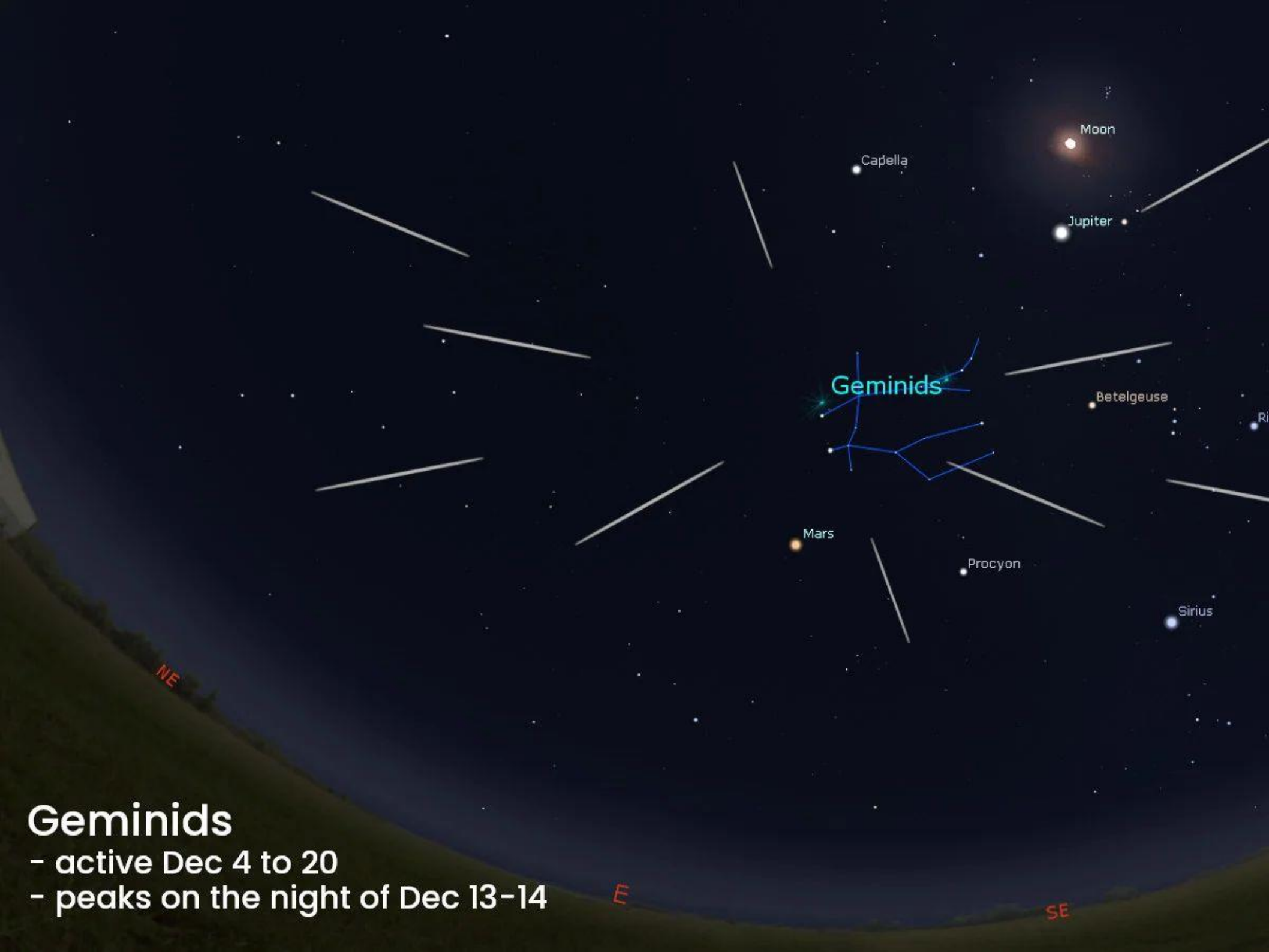
Northern Taurids
- active Oct 20 to Dec 10
- peaks on the night of Nov 11-12

Southern Taurids
- active Sep 20 to Nov 20
- peaks on the night of Nov 4-5



Leonids

- active Nov 6 to 30
- peaks on the night of Nov 17-18

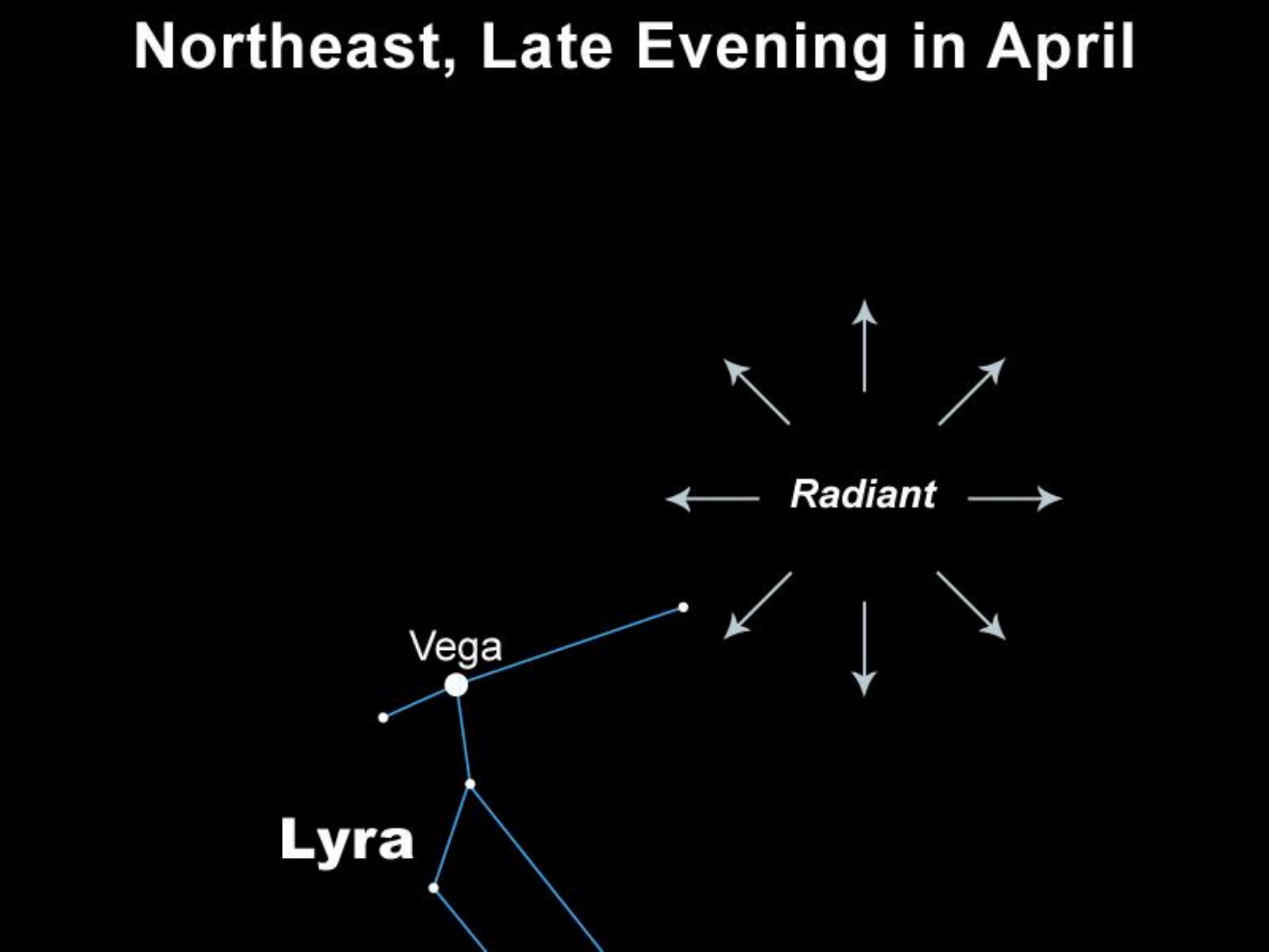


Geminids

- active Dec 4 to 20
- peaks on the night of Dec 13-14

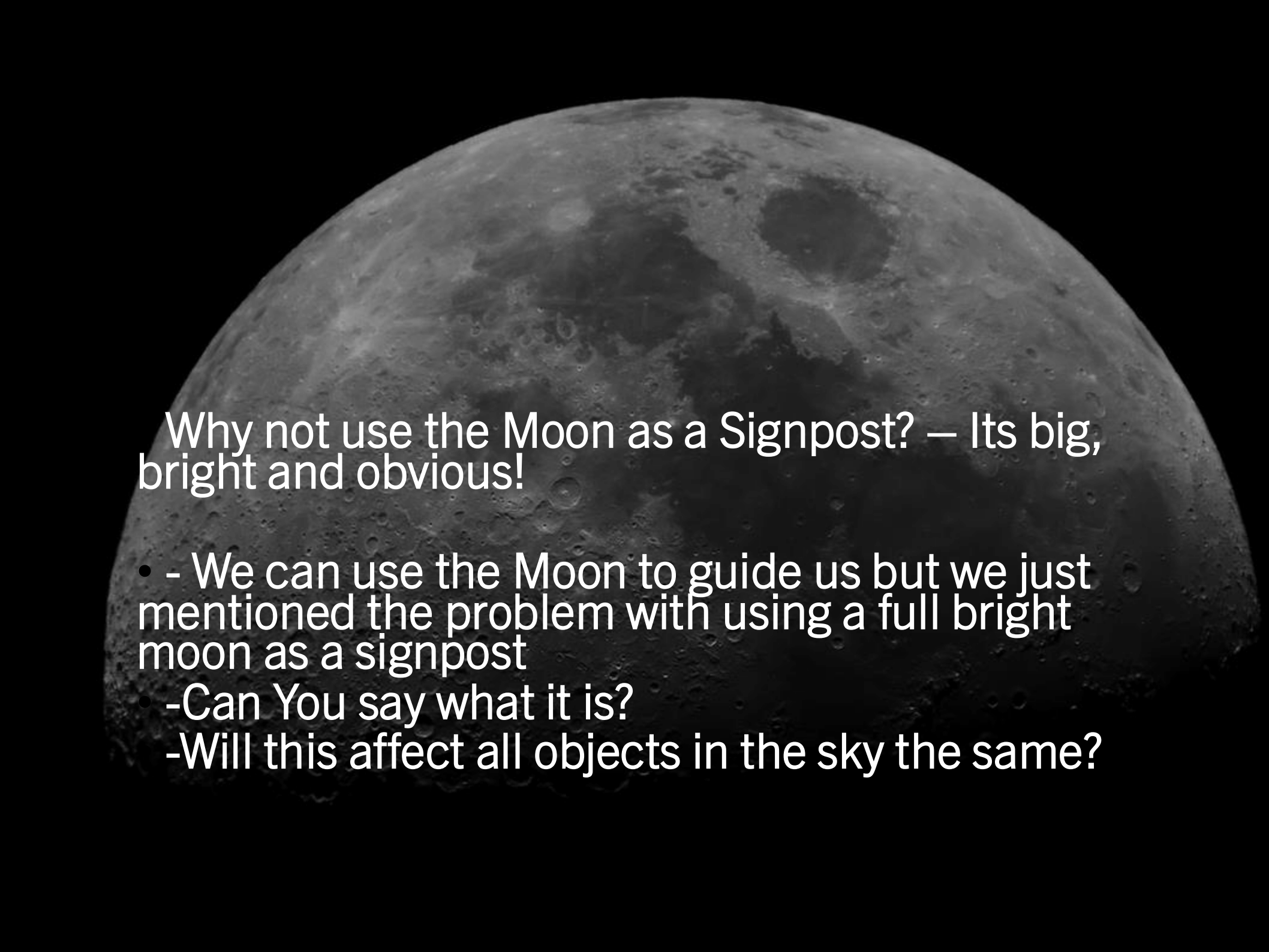

Big Dipper
Little Dipper
Radiant
Boötes
Arcturus
Draco
Quadrantids meteor shower
Looking northeast around 3 a.m. local time on January 3rd

Northeast, Late Evening in April



METEOR SHOWER	PEAK	METEORS/HOUR	CONSTELLATION	MOON ILLUMINATION
Lyrids	April 23	18	 Lyra	 9%
Perseids	August 13	100	 Perseus	 10%
Draconids	October 9	10	 Draco	 25%
Orionids	October 22	20	 Orion	 49%
Leonids	November 18	10	 Leo	 25%
Geminids	December 14	150	 Gemini	 2%





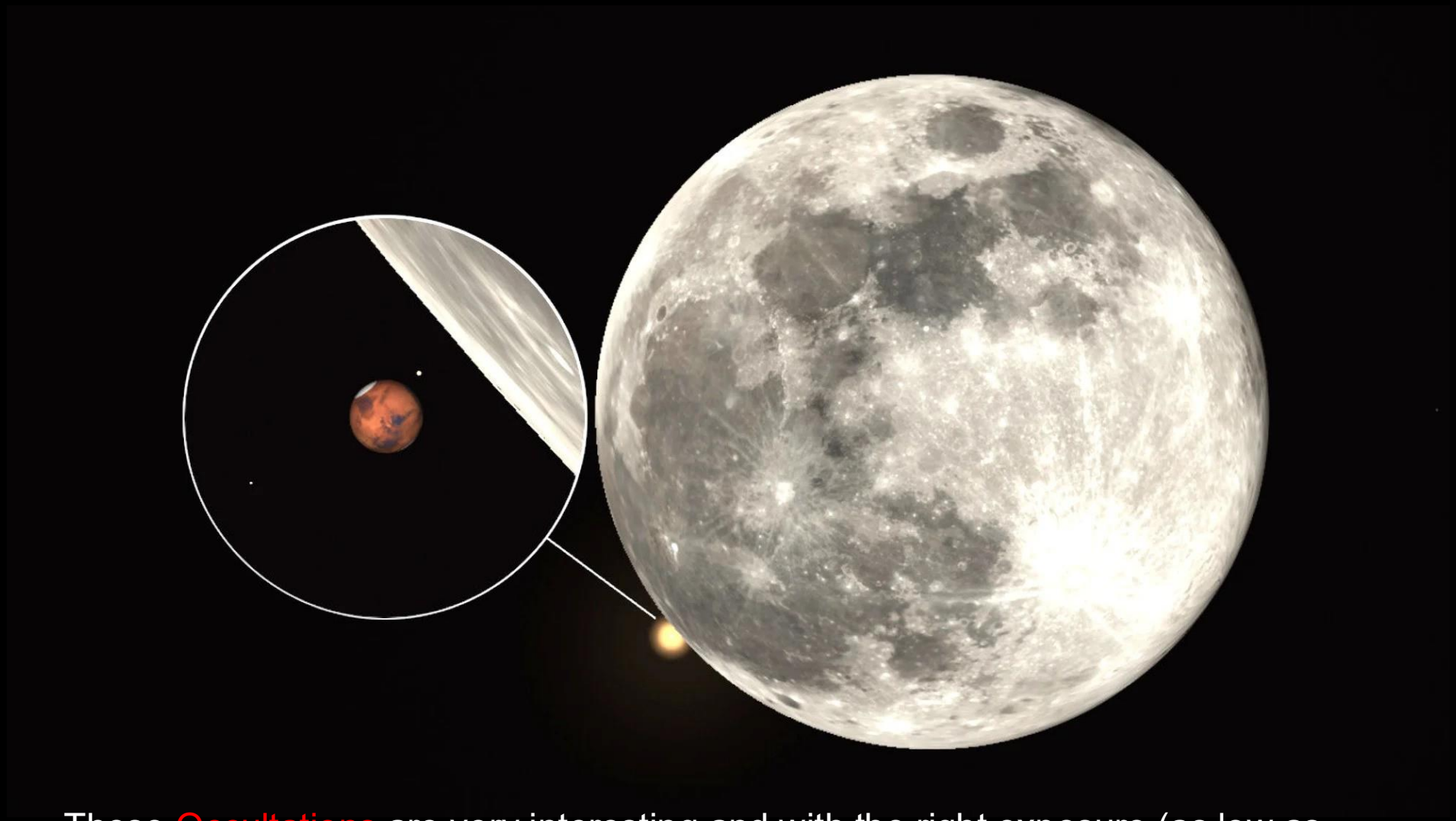
Why not use the Moon as a Signpost? — Its big, bright and obvious!

- - We can use the Moon to guide us but we just mentioned the problem with using a full bright moon as a signpost
- -Can You say what it is?
  -Will this affect all objects in the sky the same?



The Moon however does not interfere with planet viewing (as most planets are fairly bright) and this creates some interesting Effects, especially when there are so many planets in the sky

For example Moon grazed past Mars earlier this year



These Occultations are very interesting and with the right exposure (as low as possible) its possible to focus on the details of the moon and mars in the same image! Even with the naked eye its impressive as the Moon acts as a great signpost for someone who has never "seen" Mars before.

But the moon is not always in the sky so this is why, to find things we want to see, i.e. a planet we use the noticable constellations as signposts

Planets themselves are also really not that "big" in the sky as compared to constellations or some deep sky objects.

They are however "bright" at opposition/elongation times (we will cover this next week)







NEXT WEEK
THE PLANETS! (AND COMETS/ASTEROIDS)
PARTICULAR EMPHASIS ON SATURN MARS AND JUPITER EVENTS- KEEP UP TO DATE
MONTHLY LECTURES,
PLEASE SEND ANY PHOTOS TO MAGAZINE@ASTRONOMY.IE TO GET THEM PUBLISHED! MAKE (POSITIVE) HISTORY!

astronomy ireland

Useful websites

www.astronomy.ie/handouts

www.stellarium.org

Thank You