



The Sky This Month

Joel Swallow





The Sky This Month

- Time for Astronomy!
- The Moon
- The Planets
- Meteor Showers
- Some targets for observing...





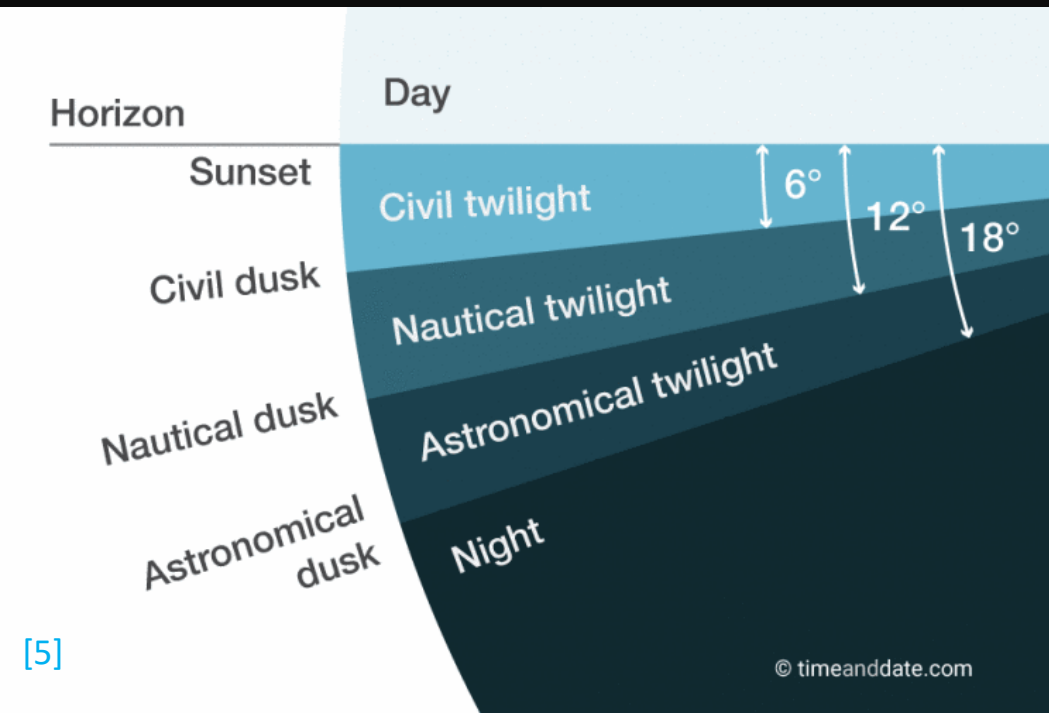
Time for Astronomy!

	19 th October	26 th October	2 nd November	9 th November	16 th November
Sunrise	7:41	7:53	7:06	7:19	7:32
Sunset	18:03	17:49	16:35	16:23	16:13
Astronomical Twilight Ends	19:57	19:43	18:32	18:21	18:13



Time for Astronomy!

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- **Civil Twilight:** can probably still see, no stars visible.
- **Nautical Twilight:** artificial lights needed.
- **Astronomical twilight:** astronomical objects begin to be visible.



The Moon This Month

- Full Moon: October 16th
- New Moon: October 30th
- Full Moon: November 14th

October Full Moon— Hunter's Moon / Blood Moon



November — Beaver Moon / Frost Moon



[1]



October 19
Waning Gibbous
Illumination: 84%

[3]

[2]



The Planets this Month

- **Mercury** – slowly being lost in the glare of the sun!
- **Venus** – Low in the south-western sky just after sunset.
- **Mars** – Evening object, low on the horizon in constellation Sagittarius.
- **Jupiter** – Rising in early morning, need to be up very early.
- **Saturn** – In Ophiuchus close to Antares (and Venus – Conjunction 29th Oct), low in south-western sky.
- **Uranus** – At opposition on 15th October so still nice and high in the sky through most of the night, rising in NE and setting in SW. Binocular object, mag. +5.7. Conjunction with moon on 12th Nov.
- **Neptune** – currently undergoing retrograde motion in the constellation Aquarius, high in the sky for most of the night but dim, mag. +7.8.



The Planets this Month

Summary:

Not a good month to observe planets!



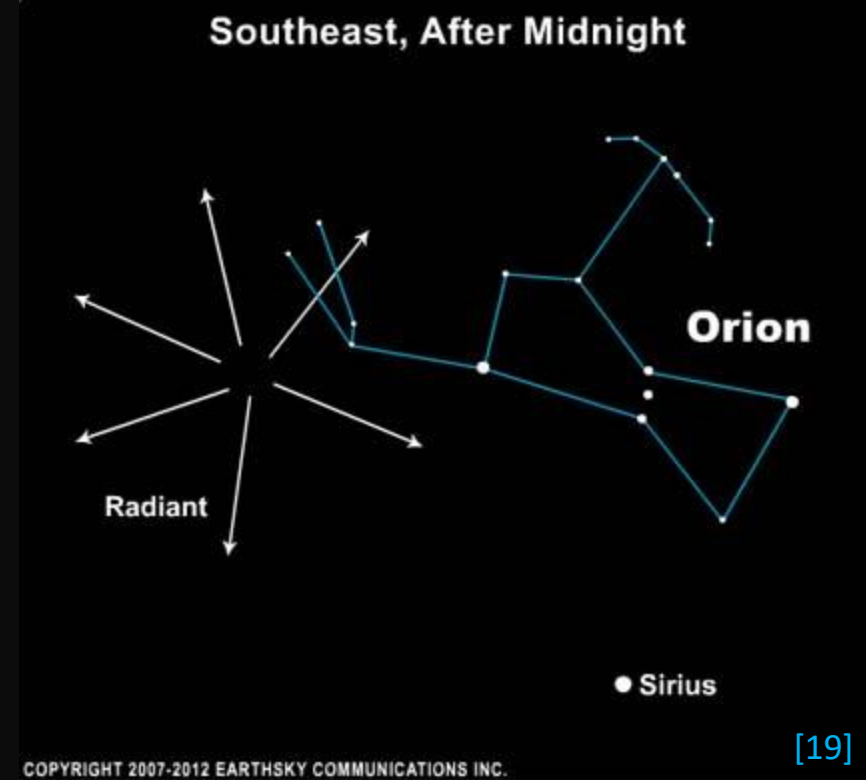
Meteor Showers

©Matthew Dietrich



Orionid Meteor Shower

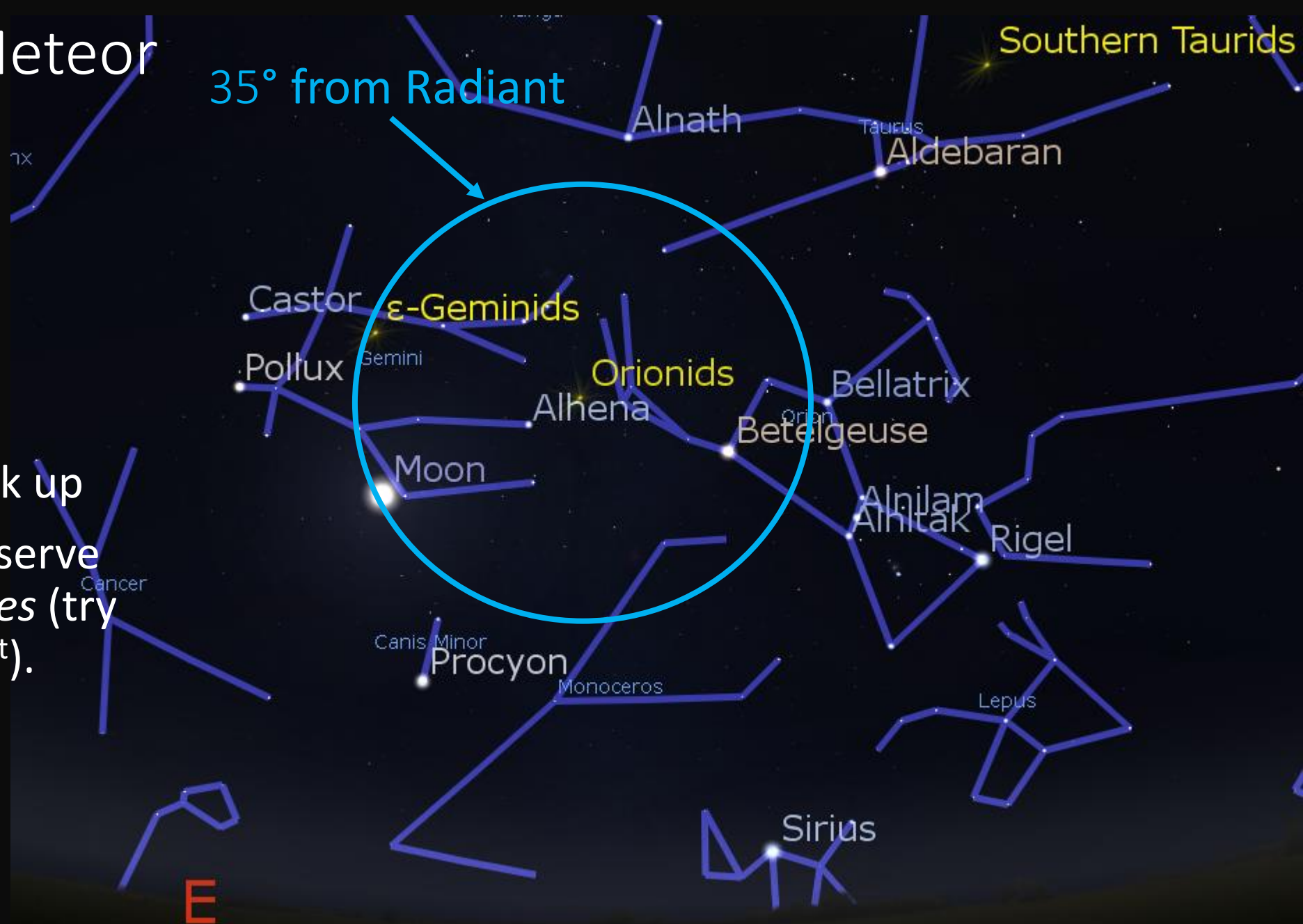
- Peaks in the early morning of **October 21st**.
- **10 – 20** meteors per hour in dark skies.
- **Radiant** does not rise above the horizon until about **10:30** but you will be able to see meteors before!
- Look **30 – 40 °** from the radiant for the best chance of spotting the meteors!
- Orionid meteors are bits of debris left behind by **Halley's Comet** crashing into the Earth's Atmosphere!
- But...a bright **waning gibbous moon** might make it tricky to spot any meteors!





Orionid Meteor Shower

- Wrap up warm!
- Take a chair and look up
- Probably best to observe *before the moon rises* (try before 11pm on 21st).

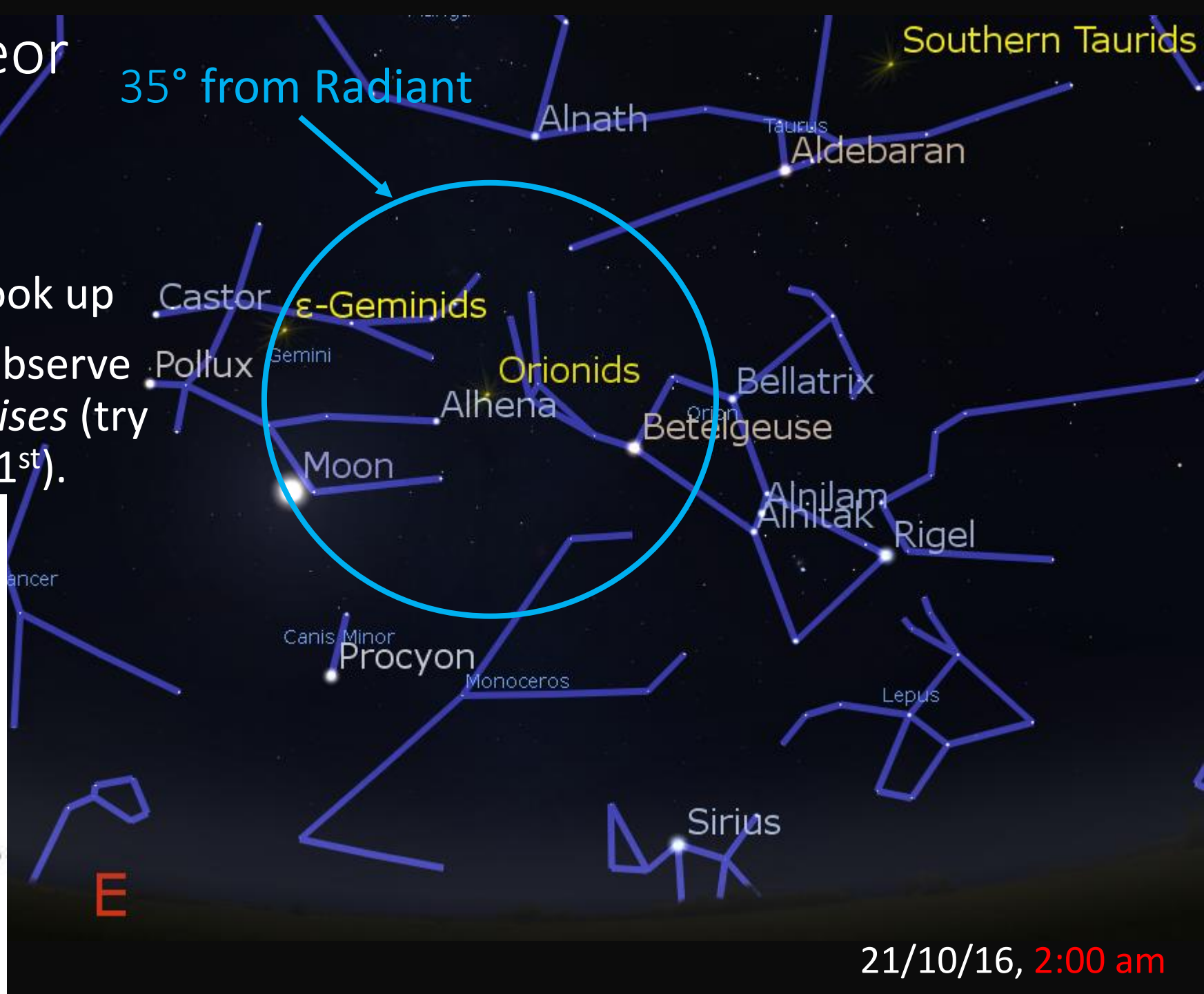
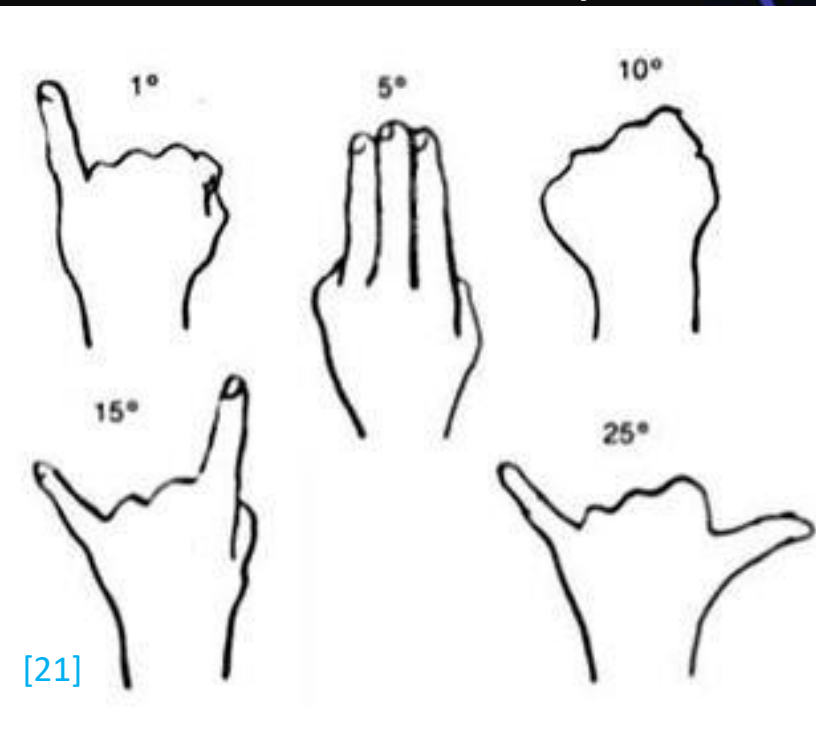


21/10/16, 2:00 am



Orionid Meteor Shower

- Wrap up warm!
- Take a chair and look up
- Probably best to observe *before the moon rises* (try before 11pm on 21st).

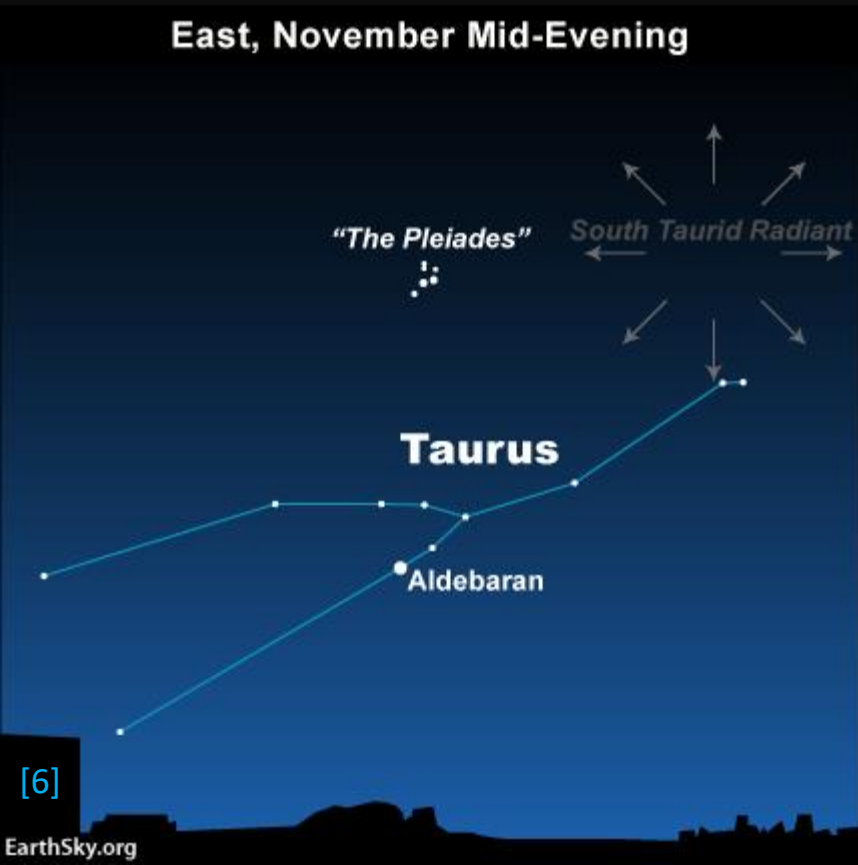


21/10/16, 2:00 am



Taurid Meteor Shower, 4th of November

- The radiant is in **Taurus**, close to the *Pleiades*.
- Best place to look is **30-40°** from the radiant.
- The maximum rate of meteors expected to be visible from a dark location is around **10 per hour**.
- Moon is only 6 days old at the peak of the shower so will not interfere with your view.

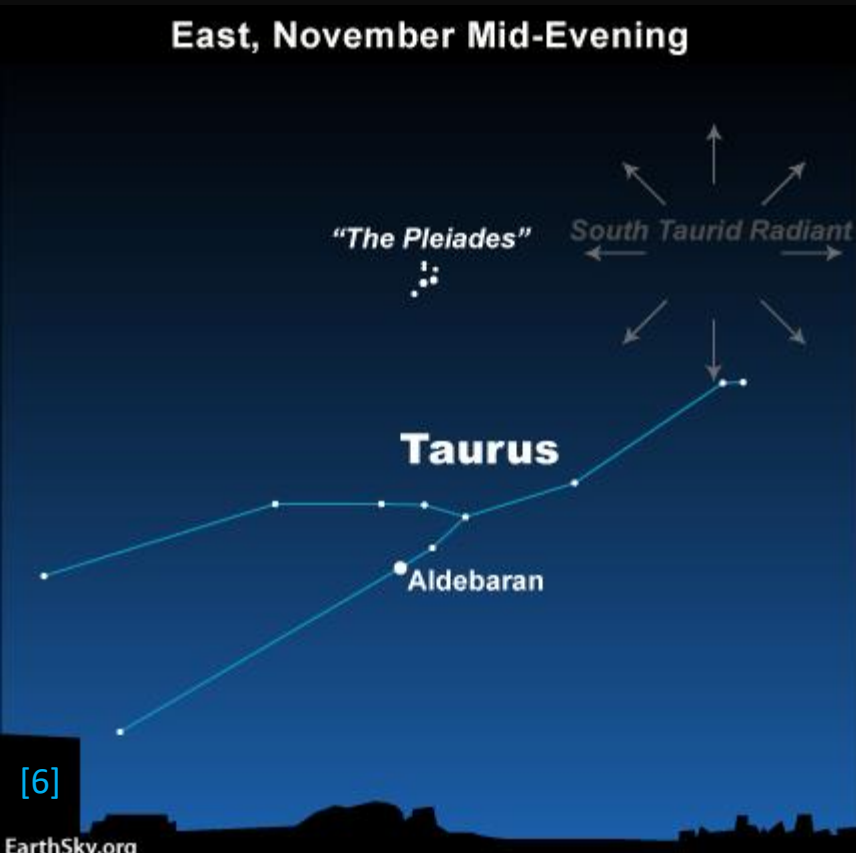




Taurid Meteor Shower(s), 4th & 11th of November

- There are two Taurids, the North and South Taurids!
- Peak of the North Taurids is on 11th Nov. which clashes with a **waxing gibbous moon** (3 days from full).

East, November Mid-Evening



- Debris from **Comet Encke**, thought to have been ejected 1500 and 4700 years ago.

East, November Mid-Evening





Watch out for the ISS!

- Keep an eye out with mobile apps such as “ISS Detector Satellite Tracker” , NASA app, “Where is ISS?”, “ISS Rapid Locator” etc...



[17]



[18]

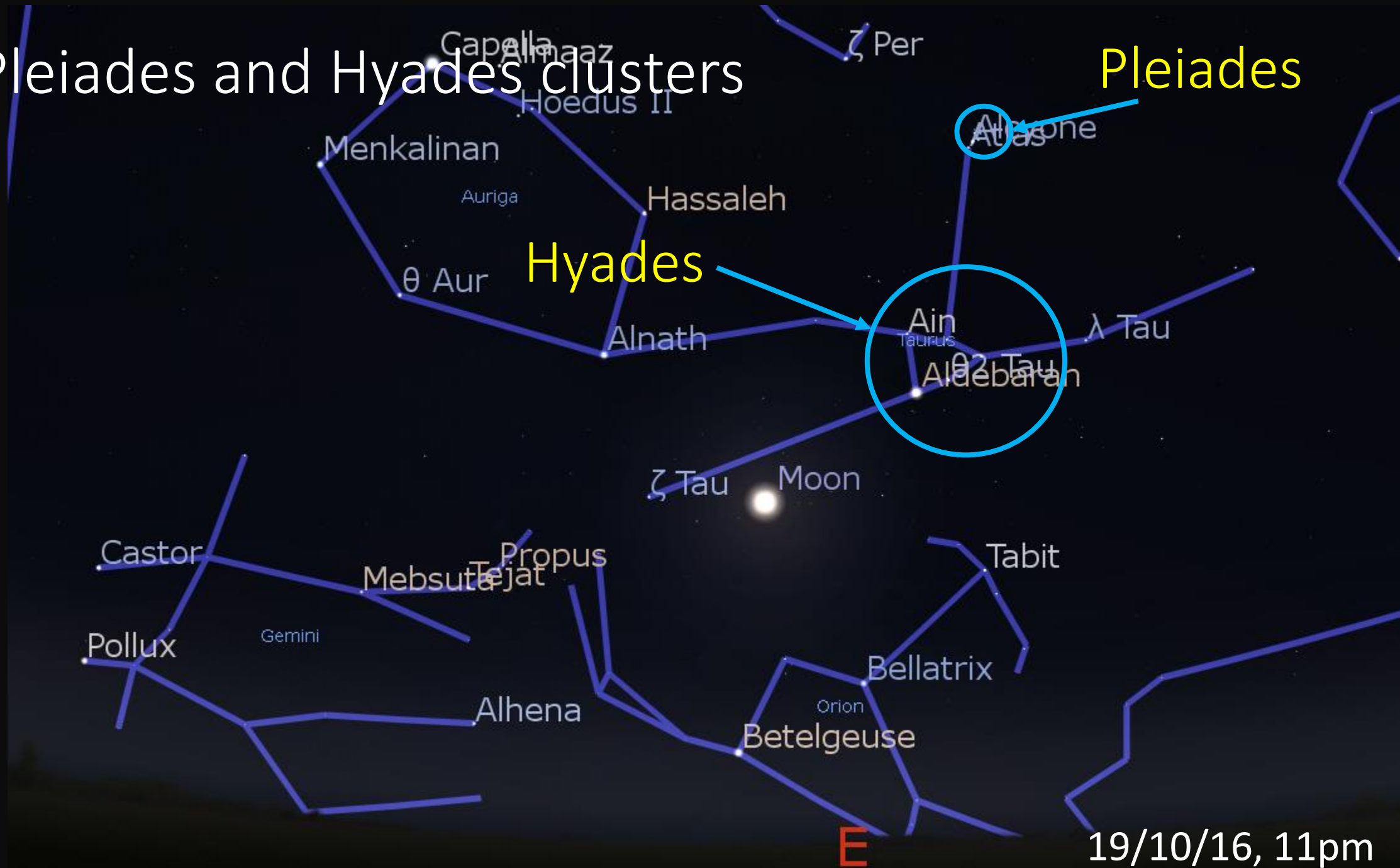


Some Targets for Observing This Month

- The Hyades and Pleiades Clusters – Naked eye, Binoculars, telescope
- The Summer Triangle – Naked Eye
- The Ring Nebula – Telescope



Pleiades and Hyades clusters

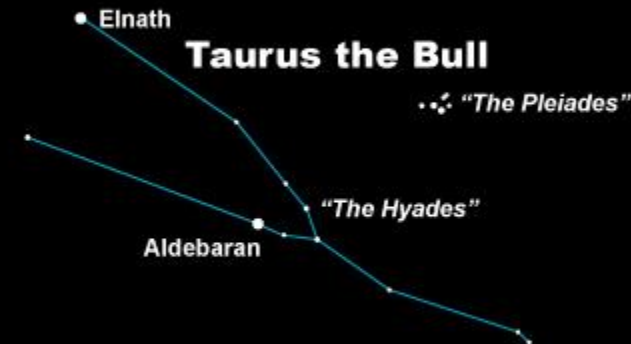




Pleiades and Hyades clusters

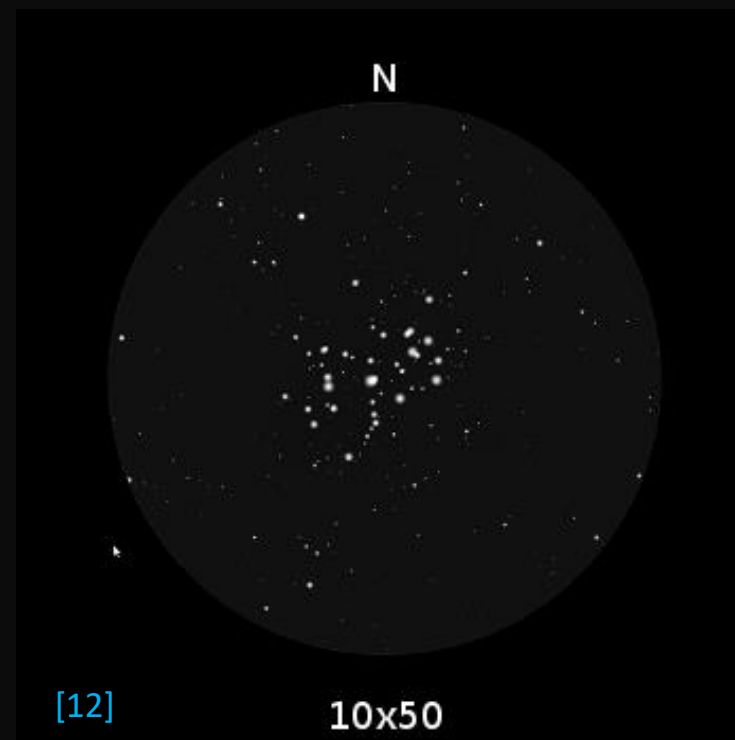
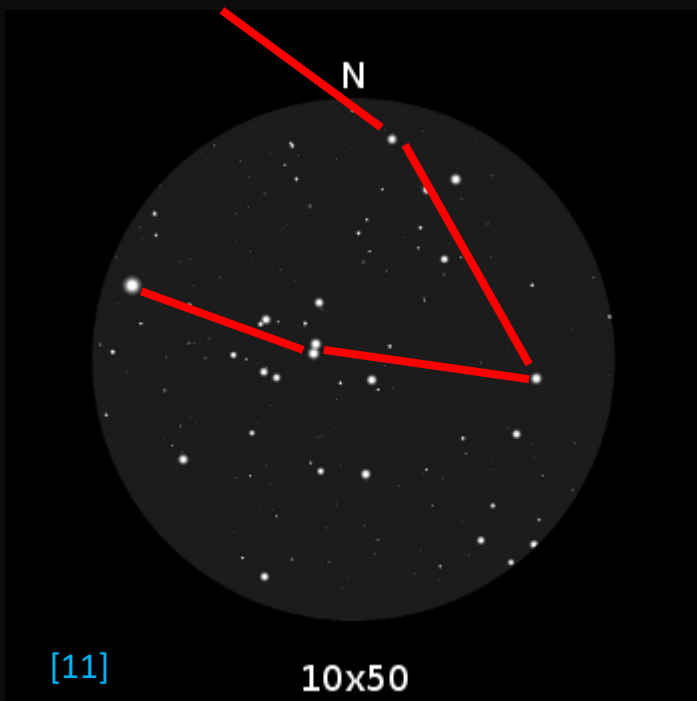
- Easy to spot with the naked eye, but look even better through binoculars.

South, Winter Evenings



[8]

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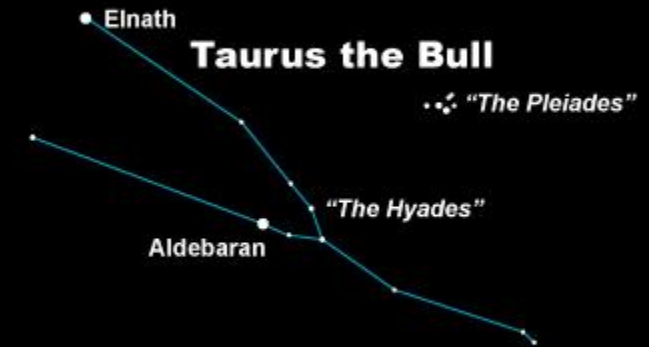


Pleiades and Hyades clusters

- Or with a really nice set-up and a wide field of view...

South, Winter Evenings

[8]



[9]

© Marco Lorenzi

[10]



Looking West...

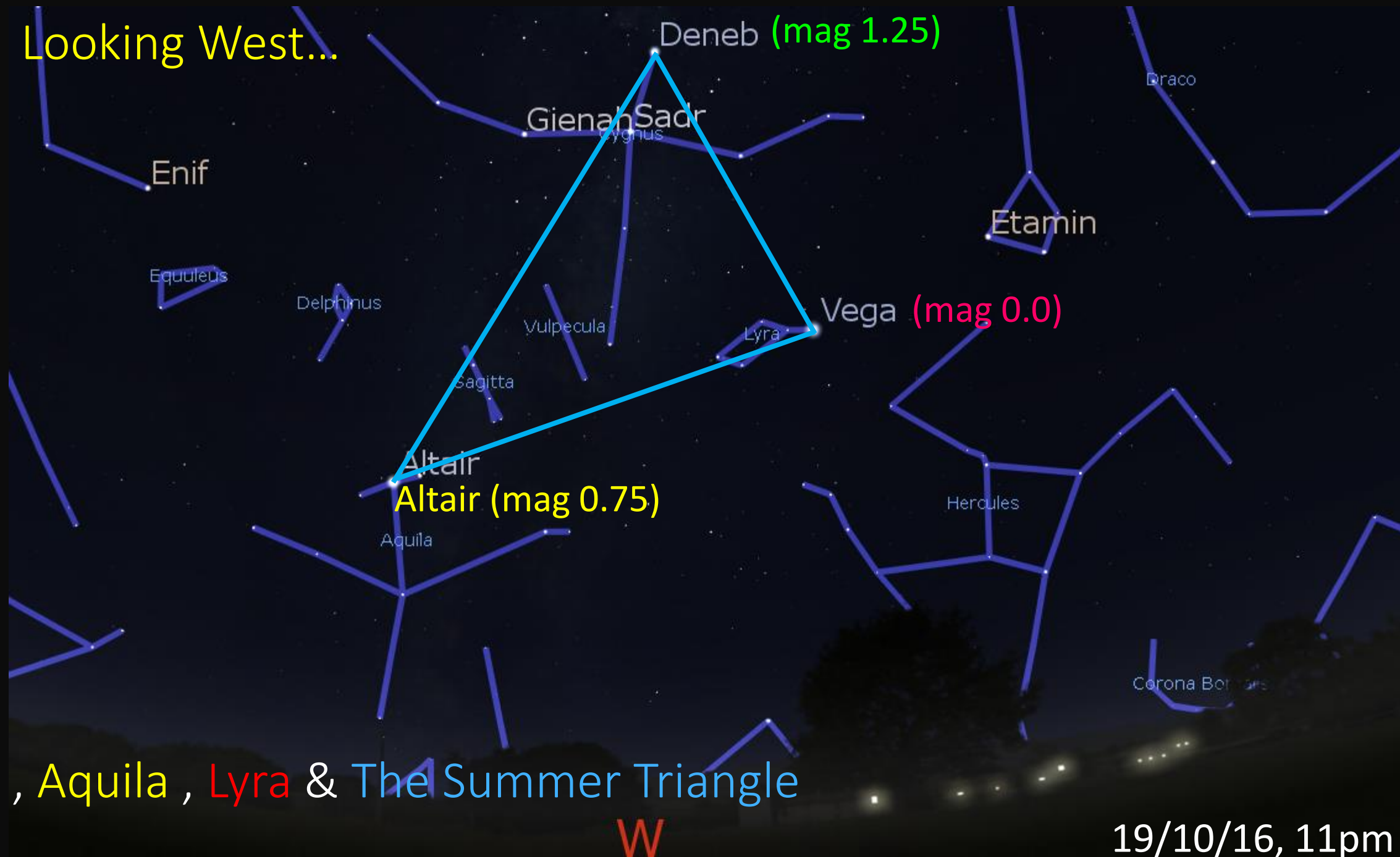


Cygnus , Aquila , Lyra & The Summer Triangle
W

19/10/16, 11pm



Looking West...



Cygnus , Aquila , Lyra & The Summer Triangle
W

19/10/16, 11pm



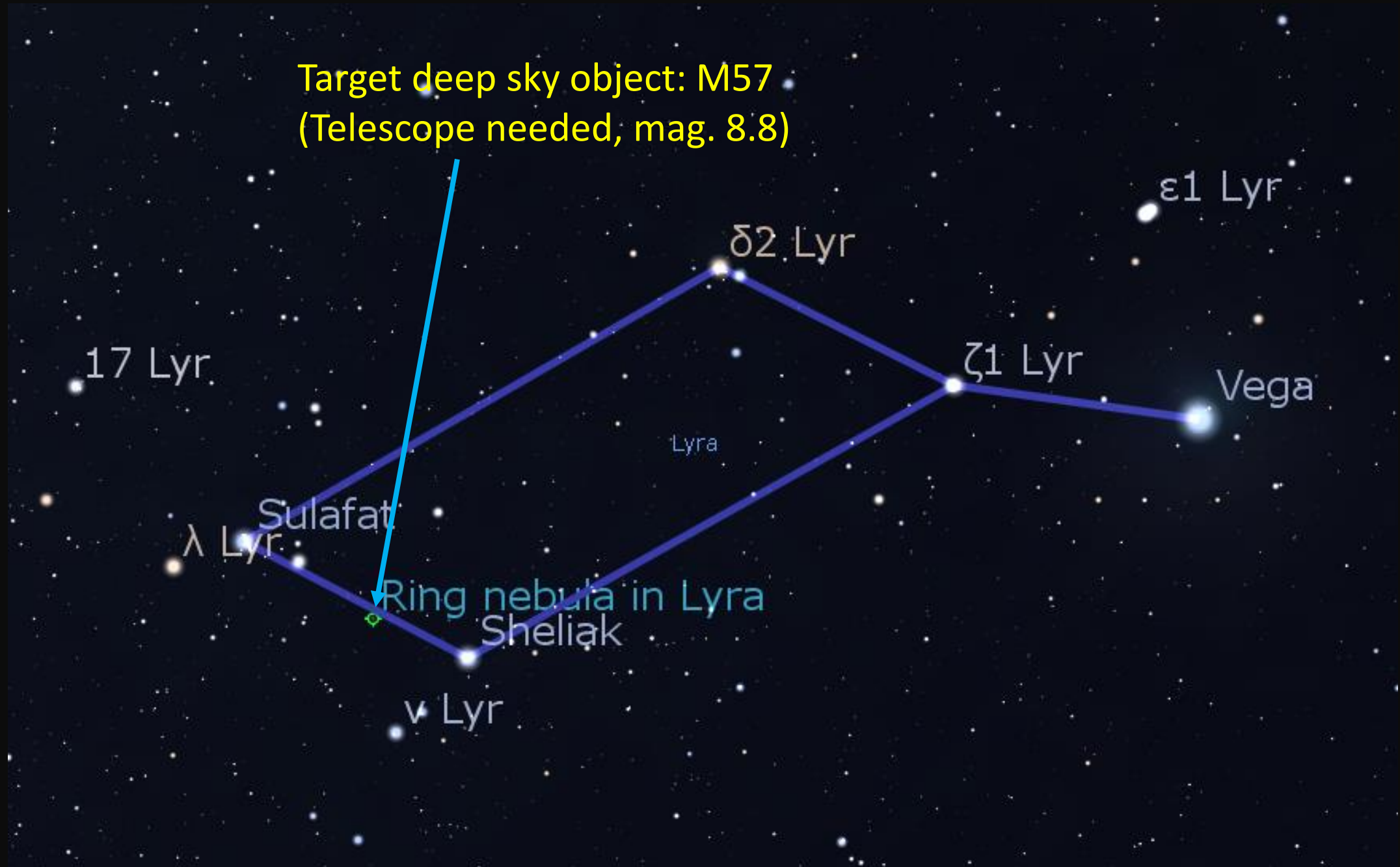
Cygnus , Aquila , Lyra & The Summer Triangle

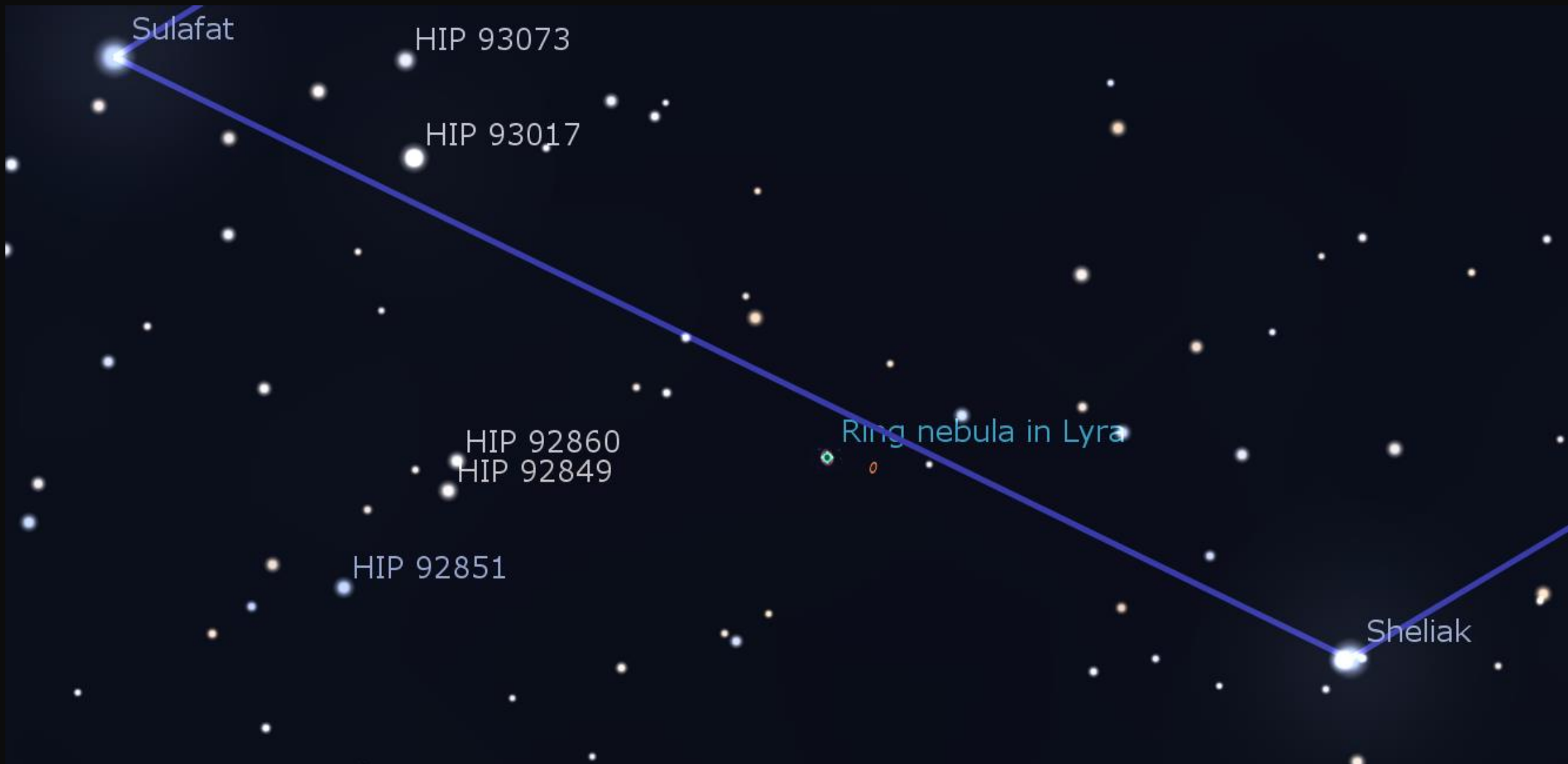
W

19/10/16, 10pm



Target deep sky object: M57
(Telescope needed, mag. 8.8)





Cygnus , Aquila , Lyra & The Summer Triangle

19/10/16, 10pm

The Ring Nebula



- The Ring Nebula is a **planetary nebula** located 2000 ly away and is approx. 1 ly across.
- It was formed when a star at the centre ejected its outer layers into space via **stellar winds**.
- In 1970 B. Paczynski established that the central stars (mag 14.7 for Ring!) are cores of **AGB stars**.
- The gas is ionized by the central star and it glows in different colours due to the presence of different elements.
- The gas expands over time (rate of 20-50 km/s) and the **planetary nebula** appears to expand and fade.



The Ring Nebula

Canon 550D,
10 inch reflector,
8 second
exposure,
6400 iso



Ring Nebula, Credit: Nathan Adams



The Ring Nebula

Canon 550D,
10 inch reflector,
8 second
exposure,
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Hubble Space
Telescope



[15]

Ring Nebula, Credit: Nathan Adams



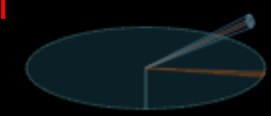
The Sky This Month

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Looking: east (27° above horizon)



Epsilon Tauri
mag. 3.50

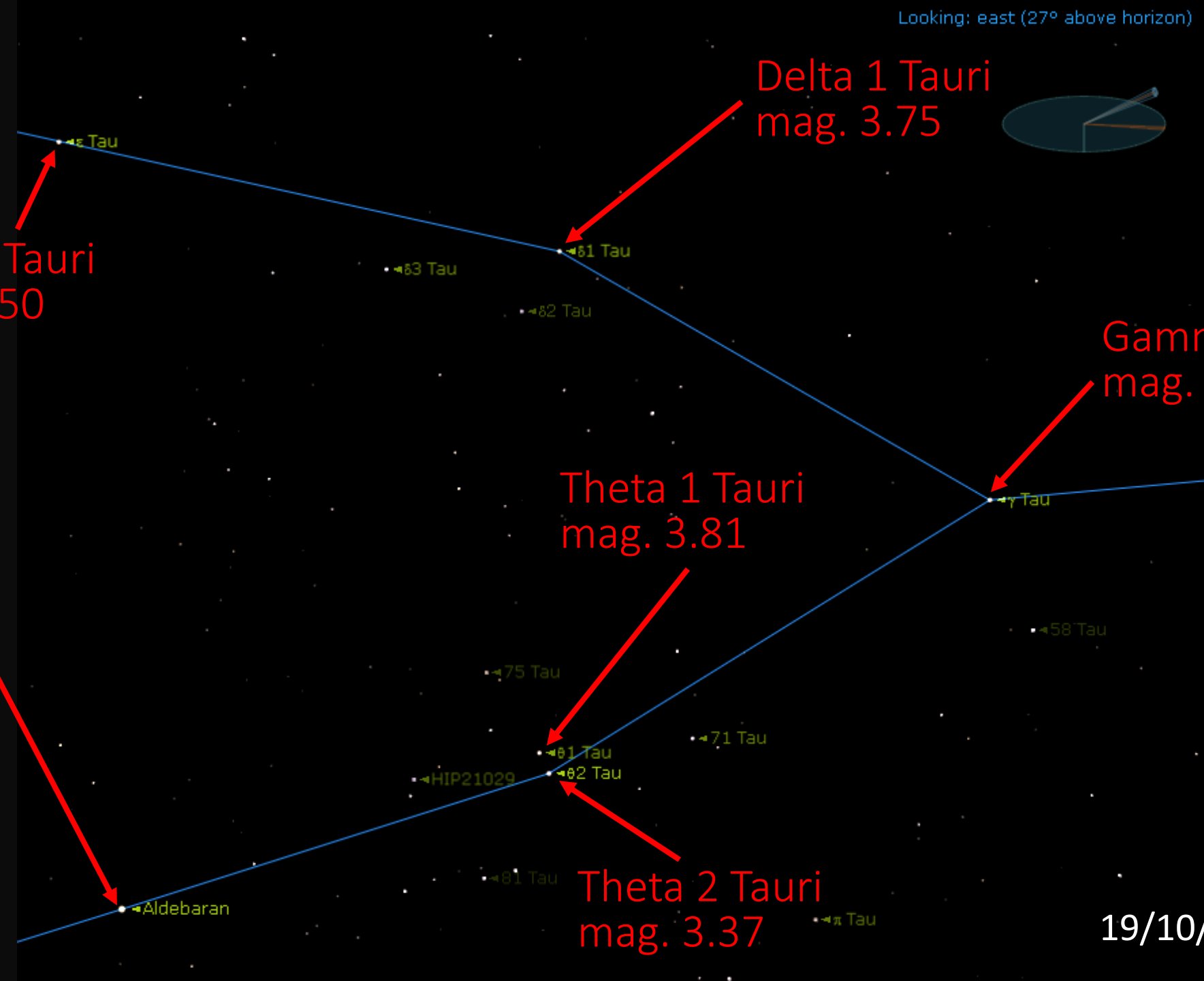
Delta 1 Tauri
mag. 3.75

Gamma Tauri
mag. 3.62

Aldebaran
mag. 0.84

Theta 1 Tauri
mag. 3.81

Theta 2 Tauri
mag. 3.37



19/10/16, 11:15pm





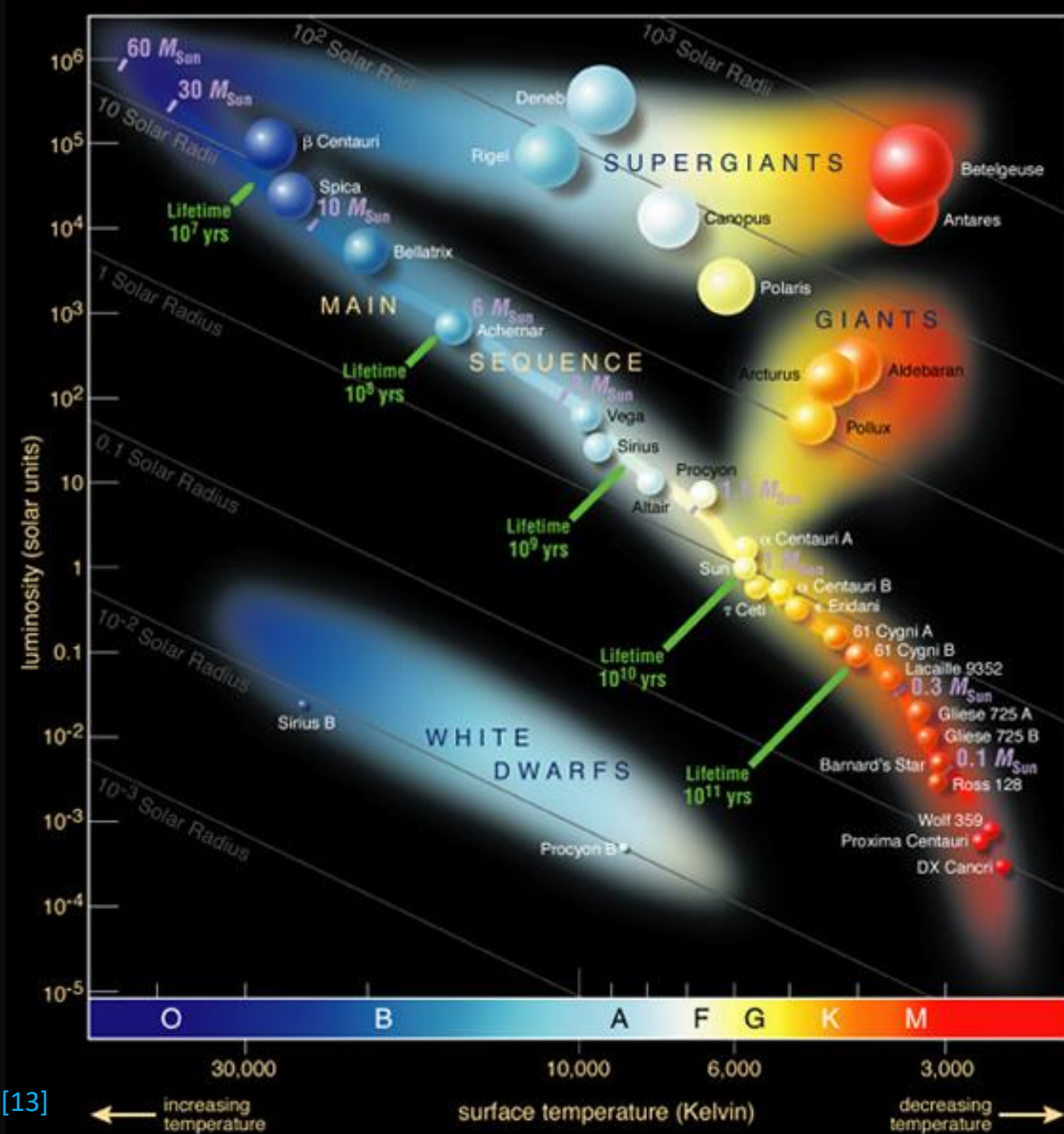
The Pleiades and Hyades – the evolution of a star cluster

- The **Pleiades** and **Hyades** are examples of clusters of stars at different ages.
- Stars form from the collapse of a big cloud of gas and dust when it exceeds some critical mass (the **Jeans mass** $\sim 1000M_{\odot}$) and maybe it gets a kick from a nearby supernova.
- As the cloud collapses it fragments and forms many small stars.
- Over time the system is disrupted by interactions with other nearby stars or by differential rotation in the plane of a galaxy.
- **Pleiades** is 75-100 million years old while **Hyades** is 500 million years old – it has spread out much more and has used up all the gas and dust to form stars.
- **Hyades** stars are more evolved (with the main sequence turn-off point at $\sim 2.3M_{\odot}$).



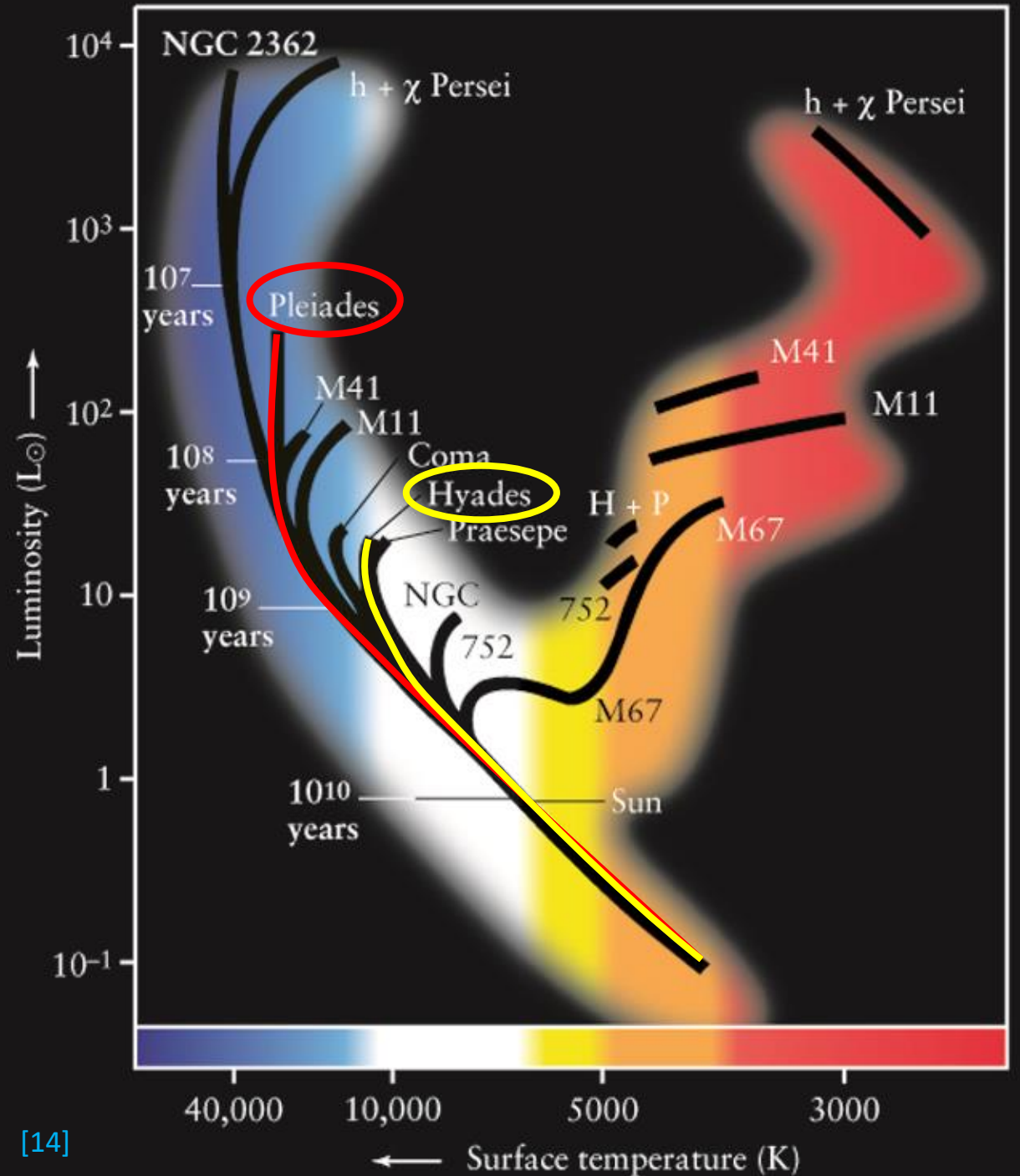
HR Diagram

- Big stars live fast and die young!
- Small stars are economical and live for ages.
- Stars spend most of their life on the **main sequence**, with their energy source being fusion of **hydrogen** into **helium**.



HR Diagram for Open Clusters

- Big stars live fast and die young!
- Small stars are economical and live for ages.
- When the **hydrogen** fuel is exhausted the star evolves off the main sequence becoming a **Giant**.
- If we plot all the stars in a cluster on a HR diagram we find that there is a certain **turnoff point** where the stars leave the **main sequence**.
- From the **turnoff point** of an **open cluster** we can determine its age.





The Planets this Month (26/10/16)

It's not a planet!

	Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Right ascension	14 ^h 4 ^m 19.6 ^s	16 ^h 33 ^m 16.6 ^s	19 ^h 28 ^m 41.4 ^s	12 ^h 38 ^m 54.1 ^s	16 ^h 50 ^m 37.8 ^s	1 ^h 22 ^m 30.7 ^s	22 ^h 45 ^m 14.7 ^s	19 ^h 5 ^m 14.1 ^s
Declination	-11° 57' 15"	-23° 26' 55"	-23° 55' 9"	-2° 58' 32"	-21° 5' 51"	7° 59' 54"	-8° 51' 5"	-21° 26' 23"
Range (AU)	1.426	1.224	1.219	6.349	10.782	18.973	29.362	33.504
Brightness	-0.9	-3.8	0.4	-1.5	1.4	5.7	7.9	14.2
Constellation	Virgo	Ophiuchus	Sagittarius	Virgo	Ophiuchus	Pisces	Aquarius	Sagittarius
Meridian transit	12:32	15:01	17:56	11:07	15:18	23:48	21:11	17:32
Rises	07:04	10:08	13:05	05:15	10:18	17:28	15:36	12:33
Sets	18:00	19:54	22:47	16:58	20:17	06:12	02:50	22:30
Altitude	33.0°	0.0°	-34.8°	50.9°	-1.8°	-41.8°	-62.1°	-28.9°
Azimuth	136.8°	118.6°	97.5°	156.5°	114.3°	325.1°	30.3°	97.7°
Inferior Conjunction	2016-Sep-12 2016-Dec-28	2015-Aug-15 2017-Mar-25	-	-	-	-	-	-
Opposition	-	-	2016-May-22 2018-Jul-26	2016-Mar-08 2017-Apr-07	2016-Jun-02 2017-Jun-15	2016-Oct-15 2017-Oct-19	2016-Sep-02 2017-Sep-04	2016-Jul-07 2017-Jul-09
Superior Conjunction	2016-Jul-06 2016-Oct-27	2016-Jun-06 2018-Jan-08	2015-Jun-14 2017-Jul-26	2016-Sep-26 2017-Oct-26	2015-Nov-29 2016-Dec-10	2016-Apr-09 2017-Apr-13	2016-Feb-28 2017-Mar-01	2016-Jan-05 2017-Jan-06
Max. eastern elongation	2016-Aug-16 2016-Dec-10	2015-Jun-06 2017-Jan-12	-	-	-	-	-	-
Max. western elongation	2016-Sep-28 2017-Jan-19	2015-Oct-26 2017-Jun-03	-	-	-	-	-	-
Perihelion	2016-Sep-28 2016-Dec-25	2016-Jul-10 2017-Feb-20	2014-Dec-12 2016-Oct-29	2011-Mar-17 2023-Jan-20	2003-Jul-26 2032-Nov-28	1966-May-21 2050-Aug-16	1876-Aug-26 2042-Sep-03	1989-Sep-05 2237-Sep-15
Aphelion	2016-Aug-15 2016-Nov-11	2016-Mar-20 2016-Oct-31	2015-Nov-20 2017-Oct-07	2005-Apr-14 2017-Feb-16	1988-Sep-11 2018-Apr-17	2009-Feb-26 2092-Nov-22	1959-Jul-16 2125-Dec-01	1866-Jun-04 2114-Feb-18



The Planets this Month (9/11/16)

It's not a planet!

	Mercury	Venus	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Right ascension	15 ^h 32 ^m 3.2 ^s	17 ^h 47 ^m 1.7 ^s	20 ^h 11 ^m 56.2 ^s	12 ^h 49 ^m 22.7 ^s	16 ^h 56 ^m 52.4 ^s	1 ^h 20 ^m 31.3 ^s	22 ^h 44 ^m 44.0 ^s	19 ^h 6 ^m 20.3 ^s
Declination	-20° 3' 16"	-25° 26' 48"	-21° 49' 1"	-4° 3' 37"	-21° 17' 36"	7° 48' 17"	-8° 53' 54"	-21° 26' 25"
Range (AU)	1.427	1.135	1.305	6.237	10.911	19.053	29.576	33.729
Brightness	-0.4	-3.9	0.5	-1.6	1.4	5.7	7.9	14.2
Constellation	Libra	Sagittarius	Capricornus	Virgo	Ophiuchus	Pisces	Aquarius	Sagittarius
Meridian transit	12:04	14:20	16:44	09:22	13:29	21:51	19:16	15:38
Rises	07:00	09:33	11:46	03:33	08:30	15:31	13:41	10:39
Sets	17:09	19:06	21:42	15:11	18:28	04:15	00:55	20:36
Altitude	29.6°	6.1°	-19.1°	50.7°	17.1°	-48.4°	-43.6°	-5.9°
Azimuth	148.4°	126.1°	104.0°	198.5°	131.4°	5.7°	67.9°	111.9°
Inferior Conjunction	2016-Sep-12 2016-Dec-28	2015-Aug-15 2017-Mar-25	-	-	-	-	-	-
Opposition	-	-	2016-May-22 2018-Jul-26	2016-Mar-08 2017-Apr-07	2016-Jun-02 2017-Jun-15	2016-Oct-15 2017-Oct-19	2016-Sep-02 2017-Sep-04	2016-Jul-07 2017-Jul-09
Superior Conjunction	2016-Oct-27 2017-Mar-06	2016-Jun-06 2018-Jan-08	2015-Jun-14 2017-Jul-26	2016-Sep-26 2017-Oct-26	2015-Nov-29 2016-Dec-10	2016-Apr-09 2017-Apr-13	2016-Feb-28 2017-Mar-01	2016-Jan-05 2017-Jan-06
Max. eastern elongation	2016-Aug-16 2016-Dec-10	2015-Jun-06 2017-Jan-12	-	-	-	-	-	-
Max. western elongation	2016-Sep-28 2017-Jan-19	2015-Oct-26 2017-Jun-03	-	-	-	-	-	-
Perihelion	2016-Sep-28 2016-Dec-25	2016-Jul-10 2017-Feb-20	2016-Oct-29 2018-Sep-16	2011-Mar-17 2023-Jan-20	2003-Jul-26 2032-Nov-28	1966-May-21 2050-Aug-16	1876-Aug-26 2042-Sep-03	1989-Sep-05 2237-Sep-15
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Photo Credit

1. <http://www.moongiant.com/phase/10/19/2016>
2. <http://vee-kay.deviantart.com/art/Hunter-s-Moon-Blood-Moon-432650543>
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