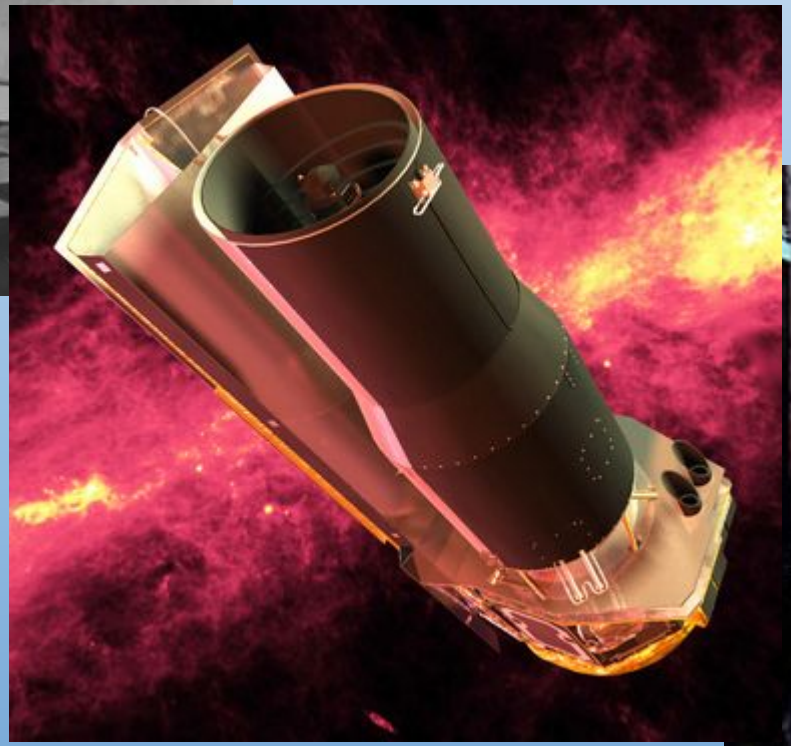
Astronomy



From Galileo to Spitzer and Beyond!

Syllabus

Week 1: Introduction. Beginning Astronomy. Naked eye viewing, finding your way in the (Northern hemisphere) sky, some interesting objects.

Week 2: Telescopes, history, types and use. Visual fields, understanding magnification, what sort of telescope to use for what sort of observation. Some minimal math.

Week 3: Telescope setup – how to get the most from your instruments.

Week 4: Basic physics. What are Stars, planets, asteroids, moons, comets, etc. What do we see in the night sky? What do we NOT see? What is our Galaxy?

Week 5: Local viewing – Moon and planets

Week 6: Stars, gas, dust and Pretty Pictures

Week 7: Looking at Deep-Sky Objects – Nebulae and Galaxies

Week 8: Astrophotography

Stars

Looking at stars is usually pretty boring

But there ARE some exceptions.

Stars

Our own local star, for instance.

Stars

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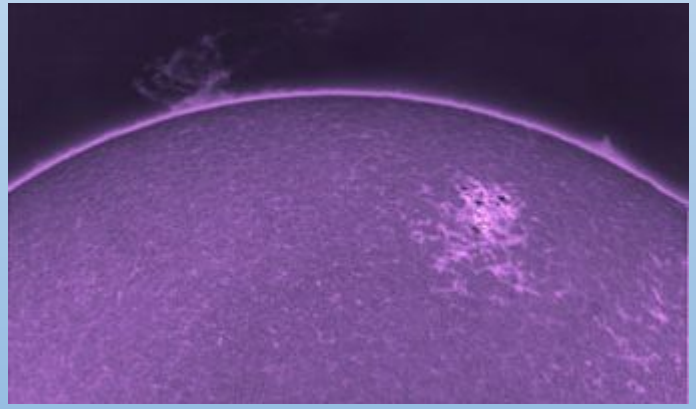
Sun in H-Alpha
Sky & Telescope, Sean Walker



Sun in Calcium-K
Sky & Telescope, Sean Walker

Sun in white light
Sky & Telescope, *Craig Michael Utter*

Stars

It is **impossible** to understate the IMPORTANCE of a proper solar filter on a telescope. DO NOT attempt to observe our local star without one - or you will not observe anything (at least through that one eye) again!

NO!!
Do NOT
use This!

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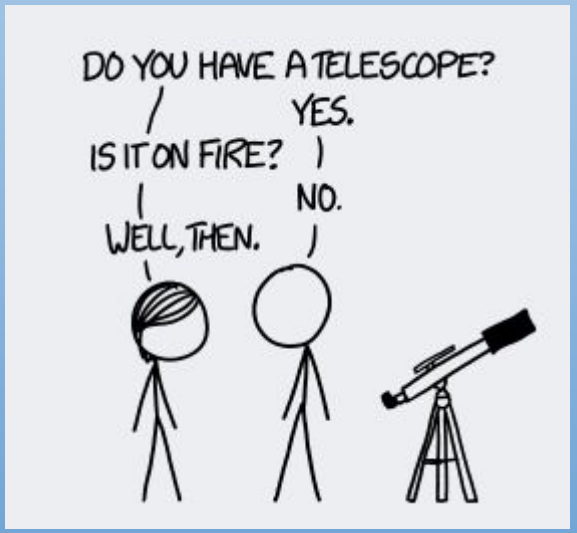

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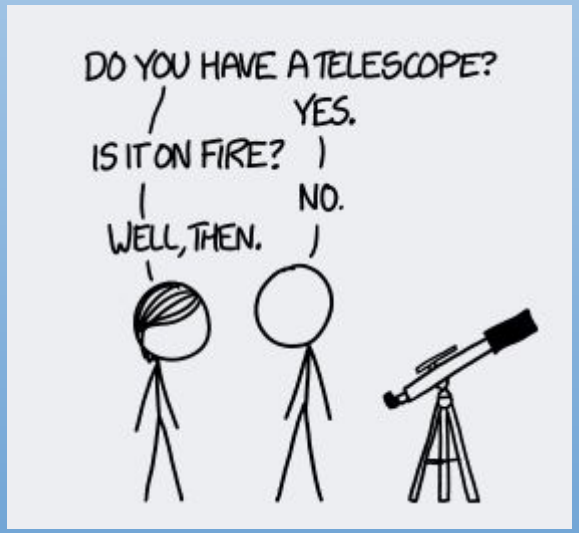

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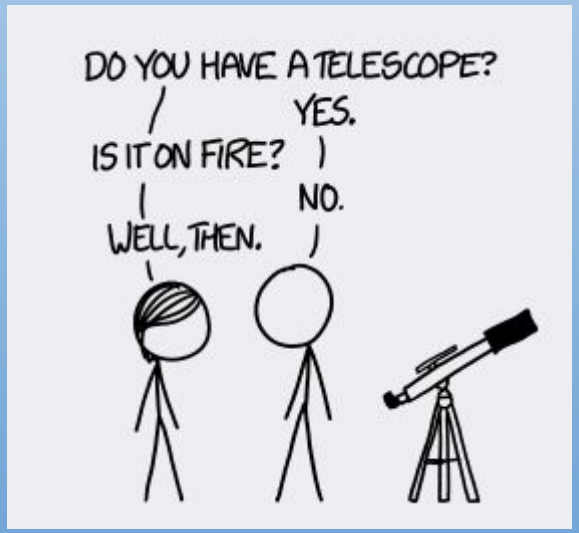

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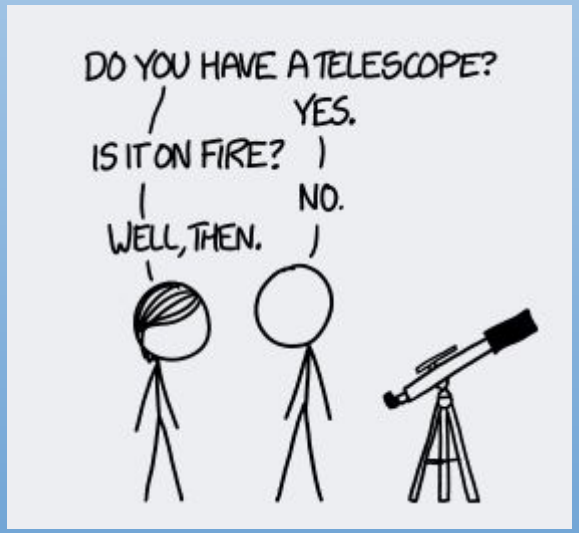

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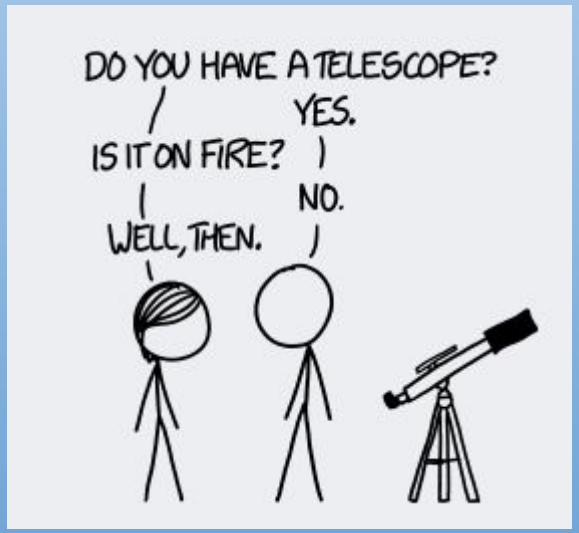

Lets take a closer look at one of those earlier pictures ….

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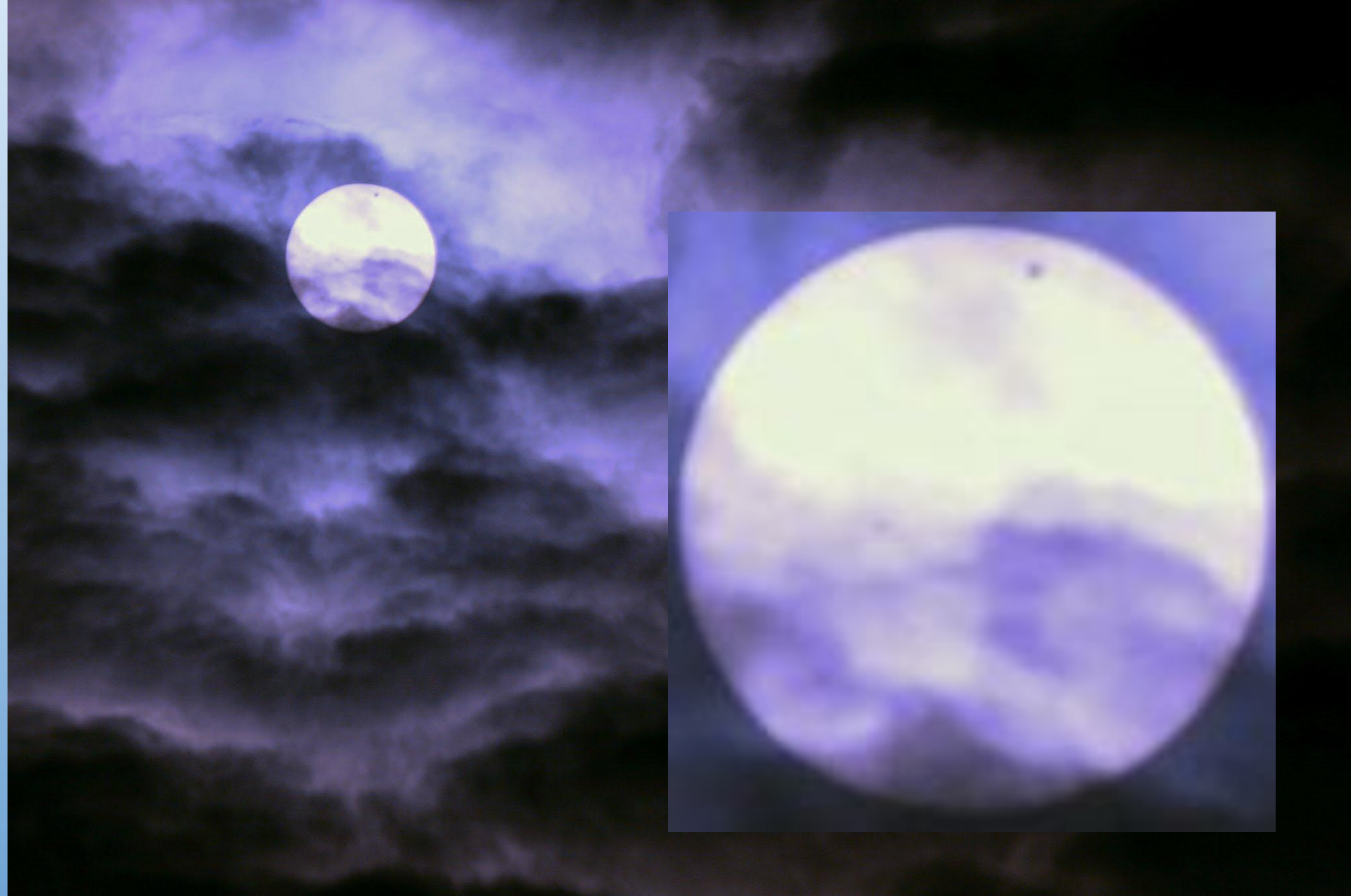
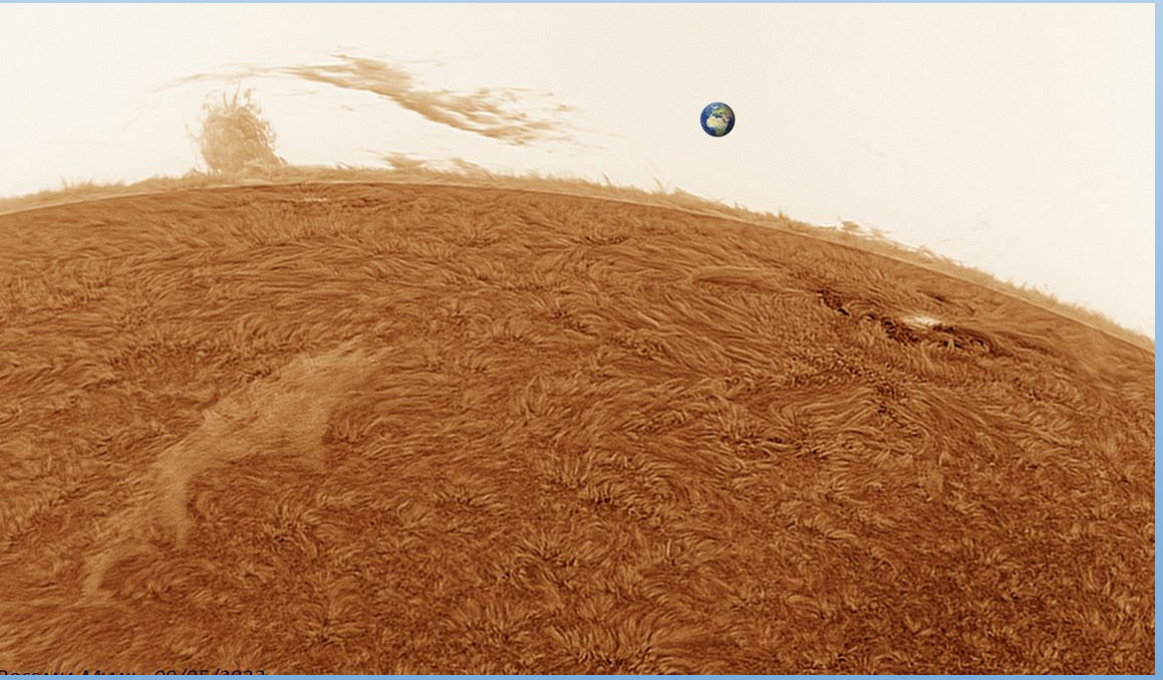
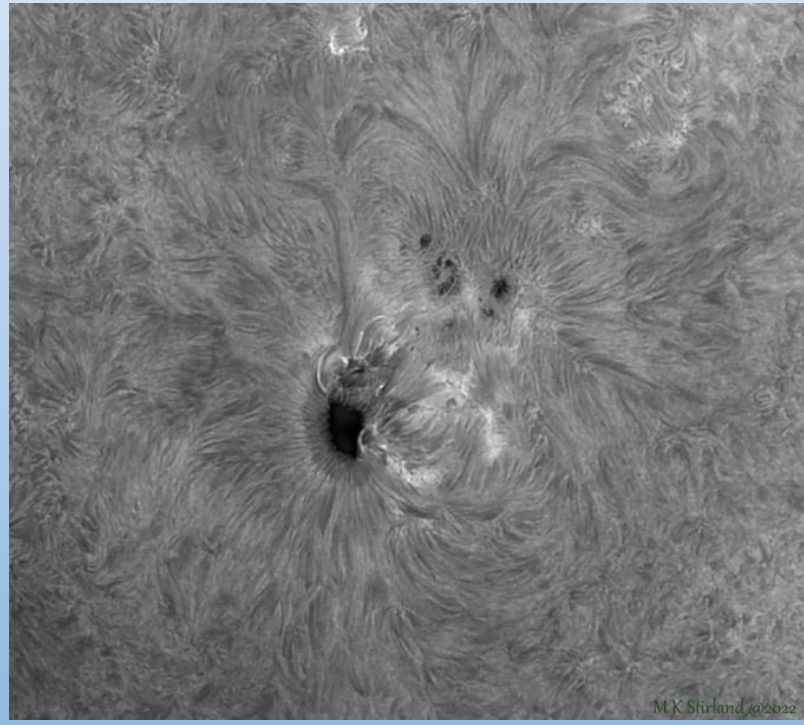


Stars

With the proper equipment, it is possible to get some amazing images of our local star. Images from Facebook group “SolarActivity”



Rossana Miani (Earth inset for scale!)



Martin Stirland

Stars

Lunt Solar 50 mm Ha Solar Telescope with B400 Blocking Filter - $885

Daystar Scout - $995

Coronado PST Personal Solar Telescope

<1.0 Angstrom H-Alpha Refractor - $800

Stars

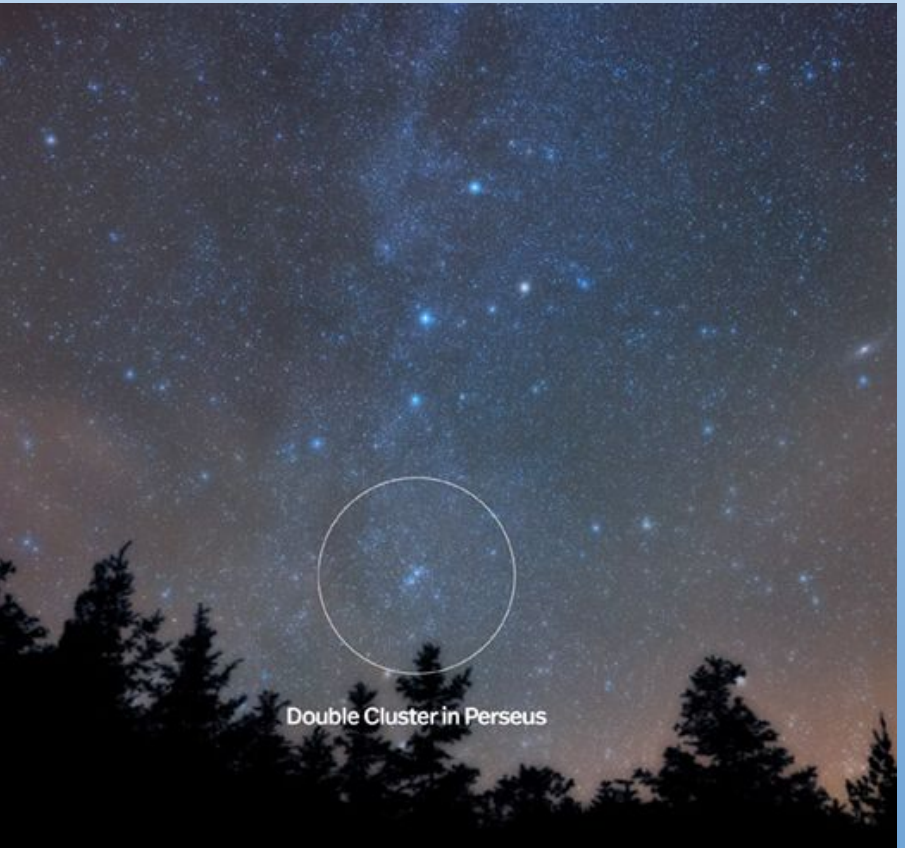
If ya got it, …

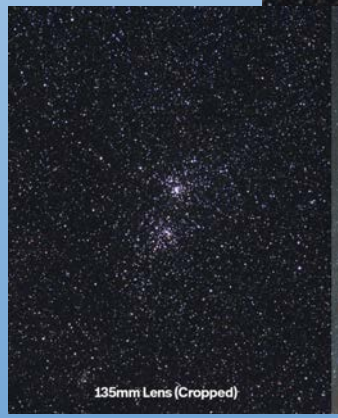
This one is only $99,995 from High Point Scientific.

Star Clusters

NGC 869 & NGC 884
Double Cluster

Images from:
https://astrobackyard.com/double-cluster-in-perseus/





Star Clusters

M45: Pleiades

The Pleiades at 105mm using a DSLR and 24-105 Camera Lens

There's not much time left to catch the Pleiades until about September!

Images from: https://astrobackyard.com/m45-the-pleiades/

Star Clusters

Pleiades

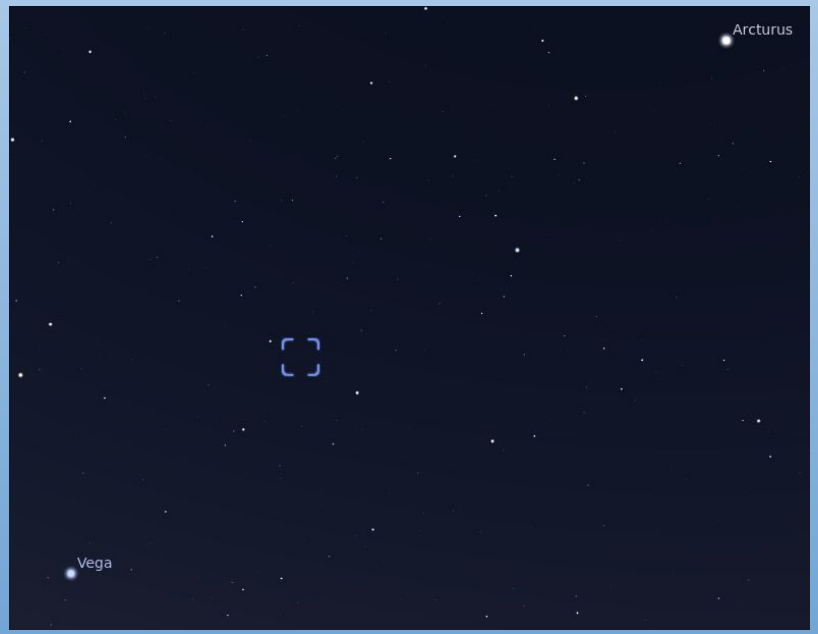
Star Clusters

Subaru and Subaru

Star Clusters

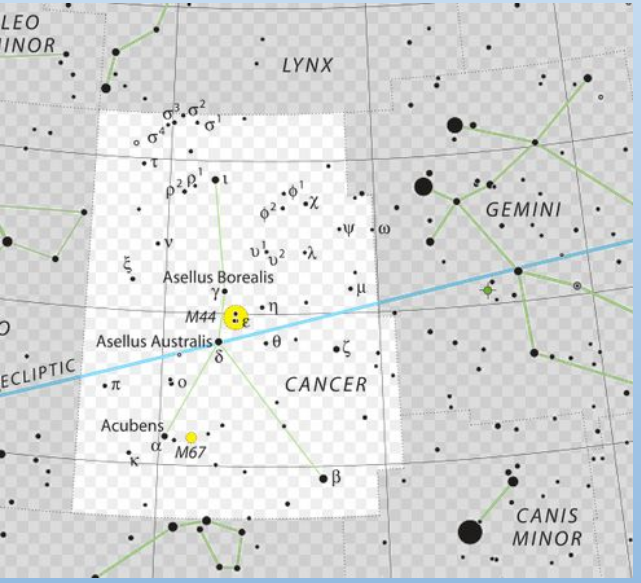
M13 - Great Cluster in Hercules

In the ENE after about 9 pm. find Vega and Arcturus. Between them, find the “Keystone” of Hercules. The cluster will be between the top two stars of the “keystone”



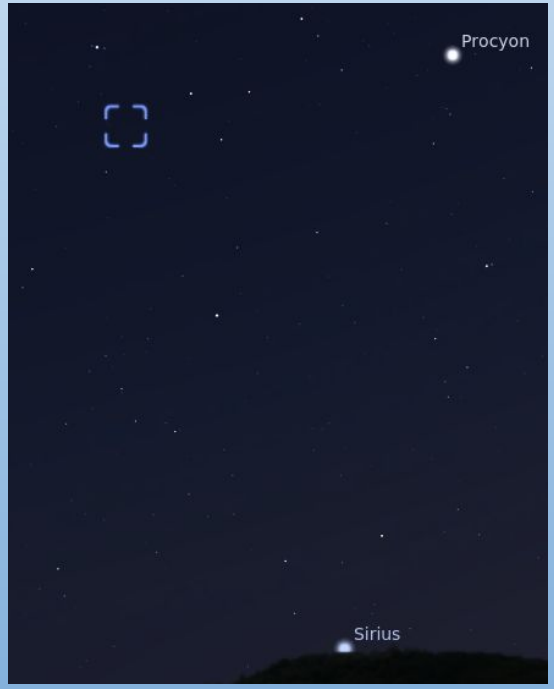
You are looking at stars 12-13 BILLION years old!

Star Clusters



Look in the SW after Sunset - find Sirius (setting) and Procyon. The Beehive is to the left of Procyon It too will drop into the Sun soon and not return to the evening sky until around September.

M44 - Bee Hive



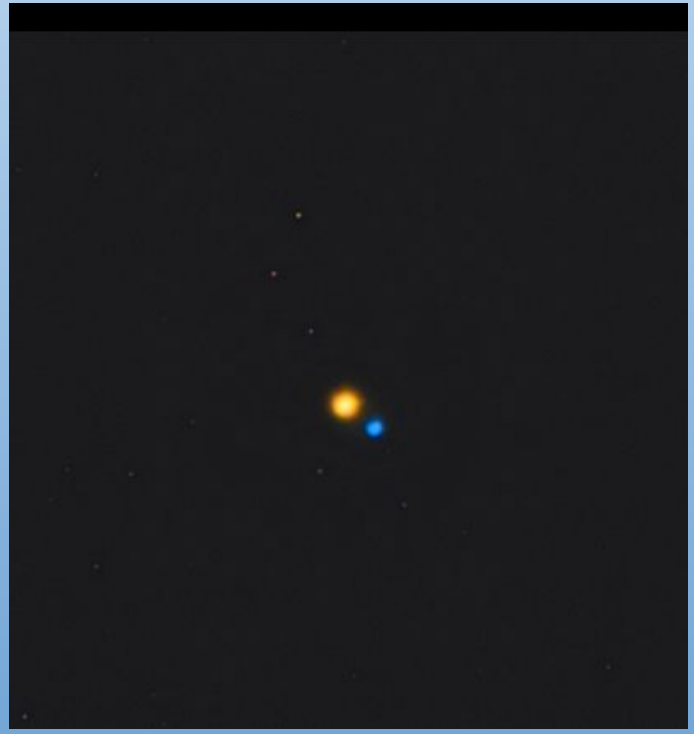
By Stuart Heggie - https://www.jpl.nasa.gov/spaceimages/details.php?id=PIA15801, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=97198874

Stars

Albireo

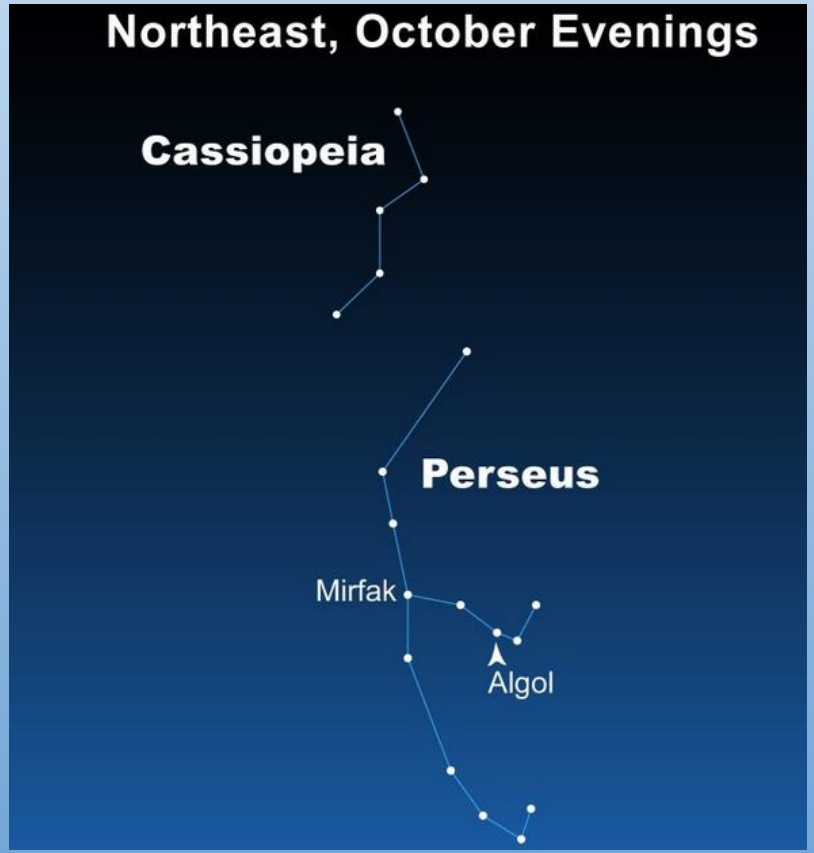
This beautiful visual double is just starting to reappear in the night sky - currently rising about 9:30 pm, best seen after 11.

Albireo is the Eye of Cygnus the Swan. Cygnus appears to be flying along the Milky Way.



Stars

Algol - the Demon’s Head



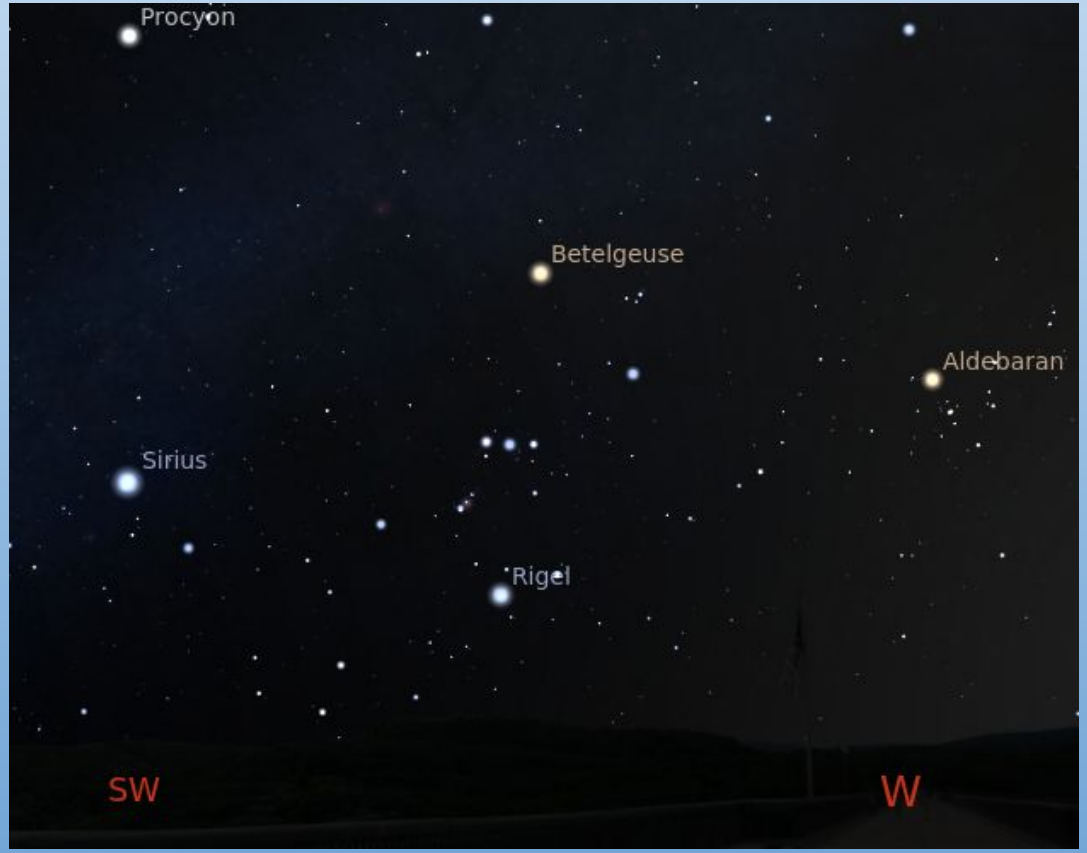
Algol itself isn’t much to look at - but watch it over a period of a couple of days - and you will see it dim, then brighten again! The entire cycle almost 3 days - 68 hours, 49 minutes.

The main problem right now though is it is near the Sun, best seen in the fall and winter.

The star is actually two stars - an “eclipsing binary” where we see the orbital plane nearly at the edge - so one star appears to pass in front of the other, dimming both slightly.

Stars

Sirius - our brightest



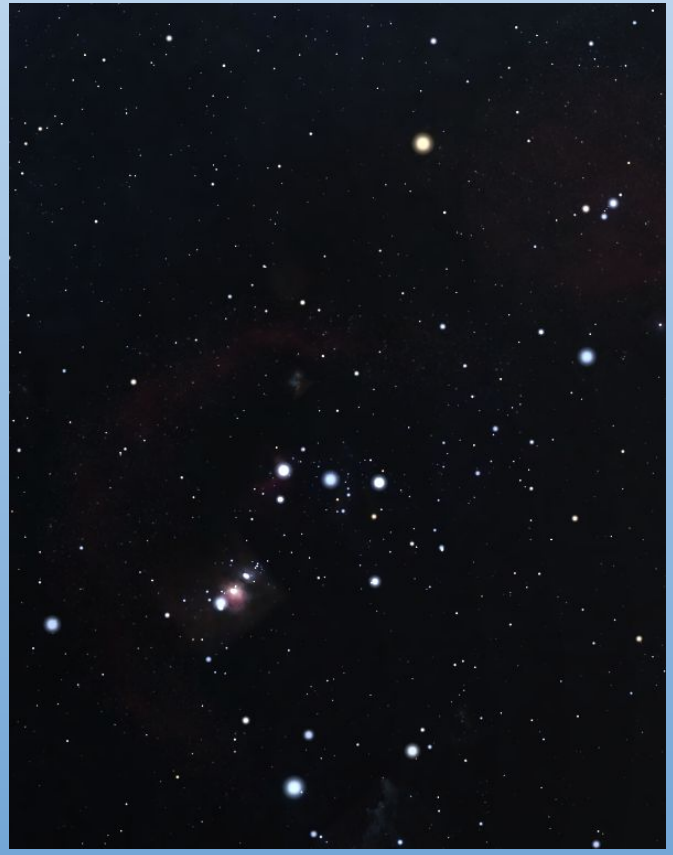
Other than being our brightest star in the night sky - about -1.45 magnitude - Sirius is rather unremarkable. It's a bright dot. It is VERY easy to find - you will probably think it is an aircraft.

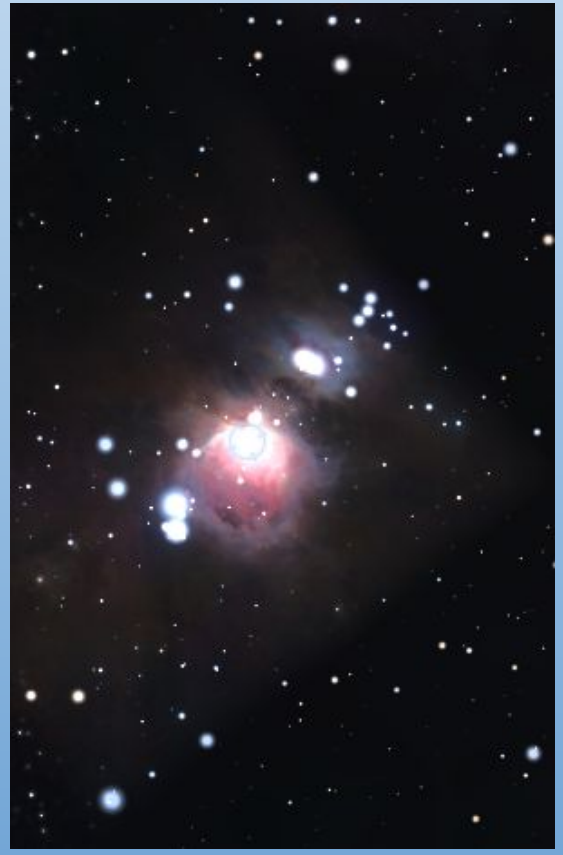
But - particularly now and for the next several weeks when it is up just past sunset, it is low on the horizon in the West - which is important!

Put a telescope on it, prepare for a VERY bright object - and watch it twinkle!

Gas

M42 - Orion Nebula





The Orion Nebula is an easily visible nebula located in the “sword” of Orion

Roughly 1,340 light years distant, it is the closest star-forming region to Earth.

It spans about 1° making it about twice the apparent size of the full Moon (and Sun)

Gas

M8 - Lagoon Nebula

This one may be a little tough in our skies, but has an easy to find location - right above the spout of the “teapot” of Sagittarius and if you have a REALLY dark sky, you MIGHT see the two stars that are part of Sagittarius constellation and flank it.

A telescope or binoculars will give you the best view, but only after midnight at this time of the year.

Toward the fall is much better.

Dust

Something we CAN’T see

While we are talking about Sagittarius…

We can’t see it at this time, but around July, Sagittarius begins to rise to the point where we can see it easily. It gets better as the months progress.

This image is around 10 pm July 10.

Dust

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Circled in this image is the center of our own Galaxy - the Milky way.

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Something we CAN’T see

This is an artistic image of what we believe the Milky Way Galaxy to look like, if we could get outside of it - which we can’t.

Dust

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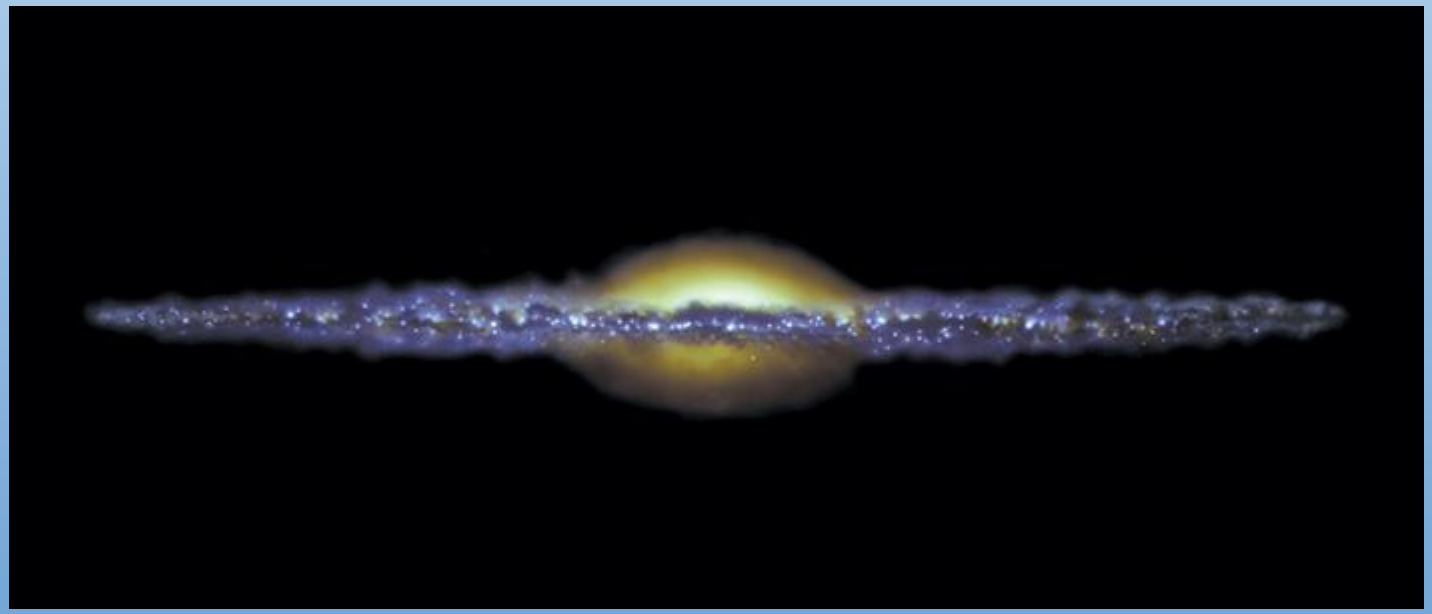
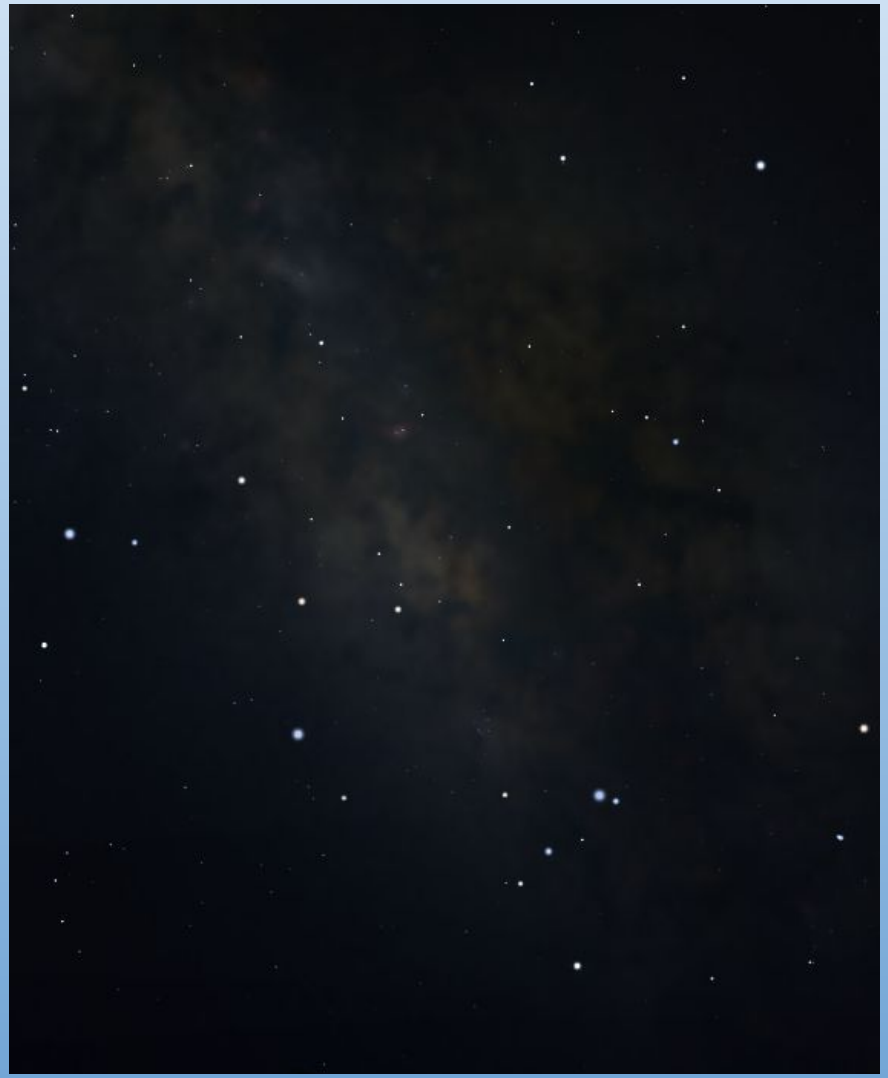


Looked at from the side, it looks like a thin plate with a lump of bright stars in the middle.
All these stars near the center are hidden from us in the optical (visible light) spectrum.



Dust

The Great Rift

Rather hard to see in this image, during the Summer and Fall months when the Milky Way is prominent, you may be able to see it as if it were two separated bands. The separation is actually a vast dust lane that is obscuring the view of stars behind it.

Dust

With the right telescope, we can actually see through the dust! This requires Infrared sensitivity - which is affected far less by the dust.

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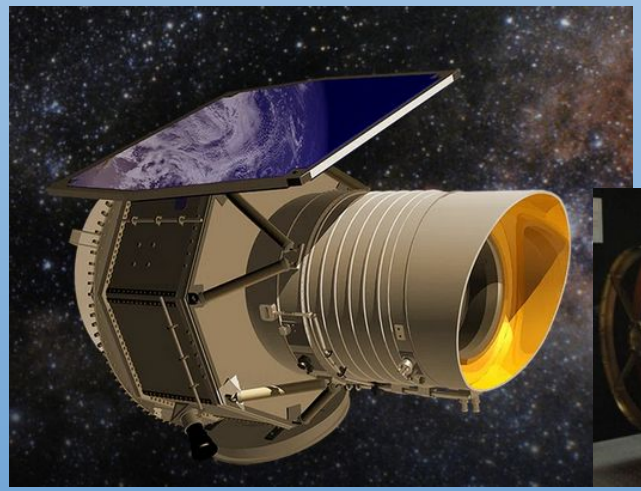
this image is a combination of views from WISE and Spitzer space telescopes, courtesy of NASA



(**Wi**de-field **I**nfrared **S**urvey **E**xplorer)

Dust

Amateur astronomers CAN use InfraRed - but it is tricky, and sometimes perhaps expensive. Any good telescope will work, you will need an IR filter (which removes all the visible spectrum and passes a narrow band of IR light) and - preferably - a camera set to Monochrome (B&W).

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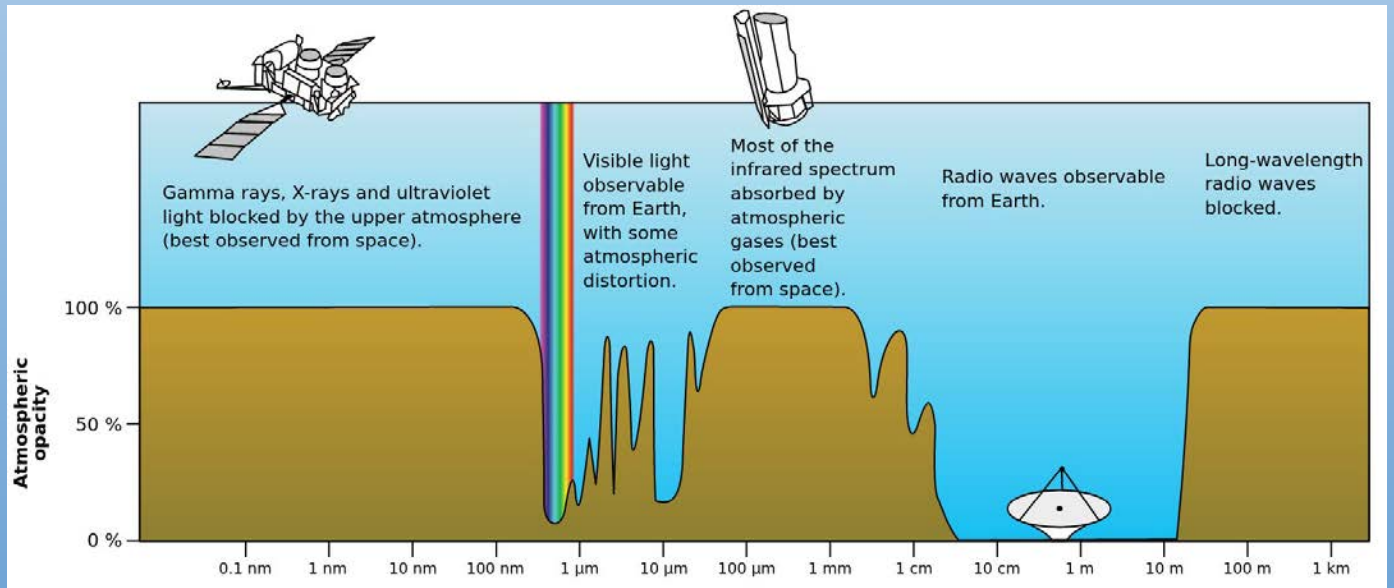
You won't be able to look through a scope set up this way and see anything - because of the filter.



Next Week:

Deep-Sky Objects!