Newsletter May 2021

Next Meeting: **ZOOM Meeting - Monday 24 May 8pm**

Topic: AAS May Meeting - The Gren Flash by Mike Frost

Join Zoom Meeting
https://us02web.zoom.us/j/84706834309?pwd=Z3llVllWNUpuMm5NUzloSHpZc3hkUT09
Meeting ID: 847 0683 4309
Passcode: Solar

Contents

President's Word

I hope you are all doing well and staying relatively COVID free.

It is good to see that things are progressing so well with vaccinations and social distancing/isolation measures, that there is a glimmer of hope on the horizon that the society may be able to return to physical meetings and some form of normality in the new astro season starting in autumn. Time will tell, but be sure that we will keep you informed of any changes to the current virtual Zoom meetings. The Zoom meetings have been a lifeline to the society allowing us to get together during COVID Restrictions and enjoy an evening of astronomy with friends, albeit virtually in our own homes.

If you haven't yet joined our meetings then I urge you to consider them. You don't need to interact if you don't want to, just joining and viewing the meeting is absolutely fine, although if you do want to ask a question or two, you can do that too!

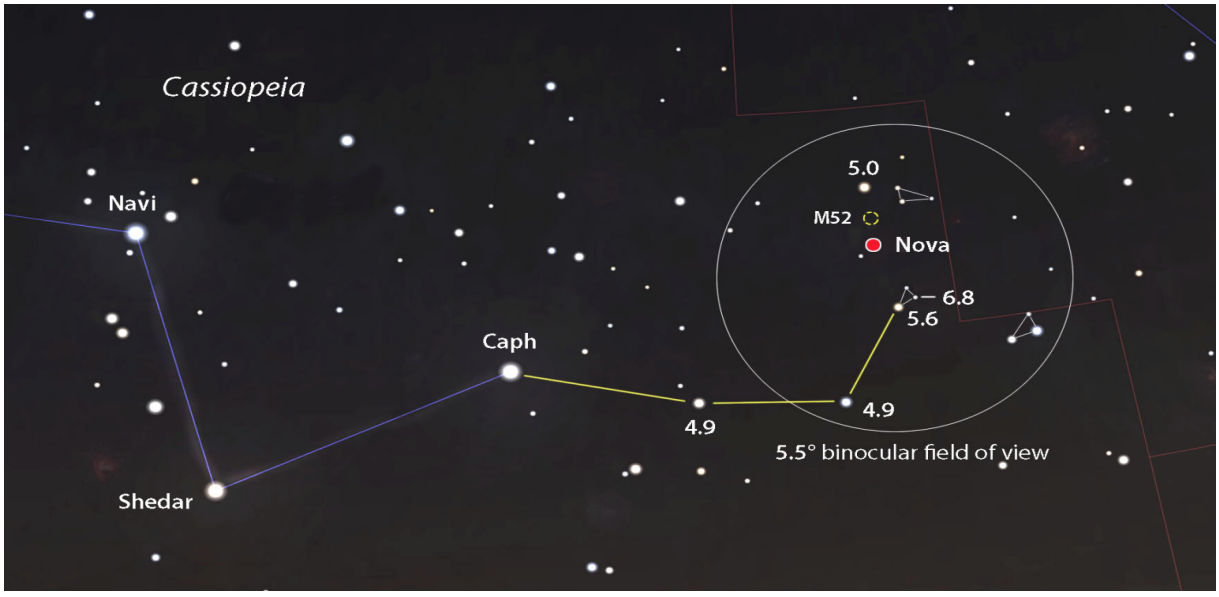
I hope to see you all at our last virtual meeting of this season on Monday 24th May at 7pm.

Nova in Cassiopeia

When novas explode they can brighten from a very dim object to something that can be viewed in a pair of binoculars in just a matter of hours. Some stay at much the same brightness for a while, then fade back into obscurity, others fade then re-brighten one or more times before dimming and going out of view.

Enter Nova Cassiopeiae 2021, formally named V1405 Cassiopeiae. Discovered at magnitude 9.6 by Japanese amateur astronomer Yuji Nakamura on March 18th, it rapidly brightened to around magnitude 7.5-8.0, then remained fairly constant in brightness for the next four weeks at magnitude 8.0. In mid-April the nova began to slowly brighten again, finally ending the month at magnitude 7.5.

The big surprise was on 6th-7th May when V1405 Cassopeiae brightened hugely by almost 2 magnitudes to 5.7 and later it was still climbing albeit not as quickly, and in dark areas it could be seen with the naked eye. Several Novae are discovered every year but bright ones such as this are uncommon and if you managed to either see, or better still, capture the object you are



extremely lucky!

A nova occurs when a small but very dense white dwarf star strips hydrogen gas from its sun-like and much less dense companion. The material spirals its way from the sun star toward the white dwarf's surface where it is compacted and heated by the immense gravity, until the hydrogen eventually fuses and releases energy in an enormous thermonuclear explosion. The blast brigtens the star system by approximately 50,00 – 100,000 times as the energetic material gets ejected into space at speeds of several million miles per hour. You really wouldn't want to be close to this event!

Neutron Stars are much larger than Scientists had Predicted

When a massive star dies, first there is a supernova explosion. Then, what's left over becomes either a black hole or a neutron star. That neutron star is the densest celestial body that astronomers can observe, with a mass about 1.4 times the size of the sun. However, there is still little known about these fascinating objects. A Florida State University researcher has published a piece in *Physical Review Letters* arguing that new measurements related to the neutron skin of a lead nucleus may require scientists to rethink theories regarding the overall size of neutron stars.

To sum up, neutron stars may be larger than previously predicted.

"The dimension of that skin, how it extends further, is something that correlates with the size of the neutron star," said Dr. Jorge Piekarewicz, a Robert O. Lawton Professor of Physics. Piekarewicz and his colleagues have calculated that a new measurement of the thickness of the neutron skin of lead implies a radius between 13.25 and 14.25 kilometers for an average neutron star. Based on earlier experiments on the neutron skin, other theories put the average size of neutron stars at about 10 to 12 kilometers.

Piekarewicz's work complements a study, also published in *Physical Review Letters*, by physicists with the Lead Radius Experiment (PREX) at the Thomas Jefferson National Accelerator Facility. The PREX team conducted experiments that allowed them to measure the thickness of the neutron skin of a lead nucleus at 0.28 femtometers—or 0.28 trillionths of a millimeter.

An atomic nucleus consists of neutrons and protons. If neutrons outnumber the protons in the nucleus, the extra neutrons form a layer around the center of the nucleus. That layer of pure neutrons is called the skin.

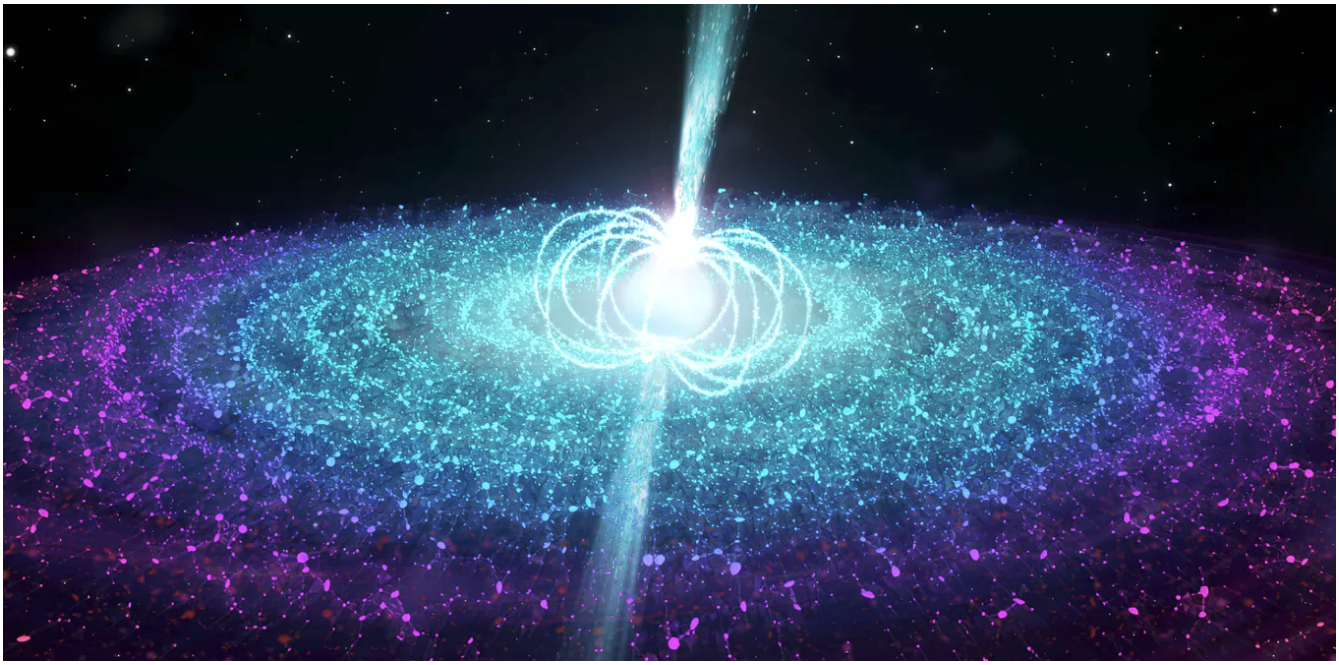
It's the thickness of that skin that has captivated both experimental and theoretical physicists because it may shed light on the overall size and structure of a neutron star. And though the experiment was done on lead, the physics is applicable to neutron stars—objects that are a quintillion (or trillion-million) times larger than the atomic nucleus.

Piekarewicz used the results reported by the PREX team to calculate the new overall measurements of neutron stars.

"There is no experiment that we can carry out in the laboratory that can probe the structure of the neutron star," Piekarewicz said. "A neutron star is such an exotic object that we have not been able to recreate it in the lab. So, anything that can be done in the lab to constrain or inform us about the properties of a neutron star is very helpful."

The new results from the PREX team were larger than previous experiments, which of course affects the overall theory and calculations related to neutron stars. Piekarewicz said there is still more work to be done on the subject and new advances in technology are constantly adding to scientists' understanding of space.

"It's pushing the frontiers of knowledge," he said. "We all want to know where we've come from, what the universe is made of and what's the ultimate fate of the universe."



Wishing you all the best of health and clear skies!

Roger

Committee Nominations

At the last committee meeting it was decided that, due to the ongoing Covid restrictions, the present officers and remaining committee members would stay in post until September at which time an Extra Ordinary General Meeting will be called to elect new Officers and Committee members.

For anyone who might want to volunteer for a committee position, please submit your name and the position you are interested in, to the president as soon as possible.

Email: president@ayrastro.com

Member Articles

Alex's Space

A WORLD GONE WRONG

Venus has been described as one step from Hell, and with rainstorms of sulphuric acid, howling winds, continuous lightning, volcanoes, temperatures high enough to melt steel and atmospheric pressures 100 times more than Earth, then perhaps this is an accurate description.

It is really a tale of two sisters whose early lives were closely linked, and yet fate took them down very different paths. One became pleasant and forgiving while the other came to hide a Hellish nature beneath a cloak of beauty One of these siblings was Earth, over billions of years it has grown into a delicate world of moderate temperatures, mild climate (most of the time!), and most important liquid water friendly to life forms such as ourselves.

The other sibling was who was led down the dark side was Venus, the shroud of impenetrable cloud envelopes the planet and makes Venus appear so brilliant in the night sky. When you see a crescent Venus lying there in its cradle of stars, it is not hard to see why the Romans named her after the Goddess of Love and Beauty, but little did they know…

Finally: this is from a car accident claim form –

"Something came out of nowhere, hit my car and vanished into thin air.."

Alex Baillie

2021

May / June Observing

General

The nights are getting progressive brighter and we are now about to lose astronomical darkness, which is defined when the sun is at least 18 degrees below the horizon. As of the 20th of May it will only be 14 degrees below the horizon at the darkest part of the night, and by the summer solstice it will only be 11 degrees below it. This makes observing deep sky objects difficult, though brighter objects like star clusters can still be seen if one stays up late enough. The planets are not overly affected, nor is lunar or solar observing.

Main Event

There is an annular solar eclipse taking place on the 10th of June, for us, it will start at about 10:05, end at 12:29, with maximum coverage at 11:15 at 31%. The annular part will only be visible from Canada, Greenland and Russia. See Mid-Eclipse Chart p. 11.

Planets

Mercury and Venus: Mercury is now heading back towards the sun while Venus continues to move higher in the sky. The two will be in close conjunction on the 28th of May, 30 arc minutes apart, or about the width of the full moon and easily visible to the unaided eye, binoculars or a small telescope.

Mars: It remains in the evening sky, however, it will get harder to see as it moves further west in the sky.

Jupiter and Saturn: They are now visible earlier in the morning sky and by then end of June they will be rising just after midnight. They are a good target for early birds or extreme night owls.

Uranus and Neptune: For most of this period both planets are lost in the morning glare, however, Neptune may be visible with some effort later in this period (to the left of Jupiter, about the same angular distance Jupiter is from Saturn)

Comets

There are no easily observable comets visible present during this period.

Meteor Showers

There are no significant meteor showers predicted for this period.

ISS

The ISS is visible in the late evening sky most nights until the 29th of May, before disappearing until it returns in July in the morning sky. Consult https://www.heavens-above.com for specific times and locations. If you are interested in ISS lunar or solar transits here is another site where you can obtain predictions: https://transit-finder.com/.

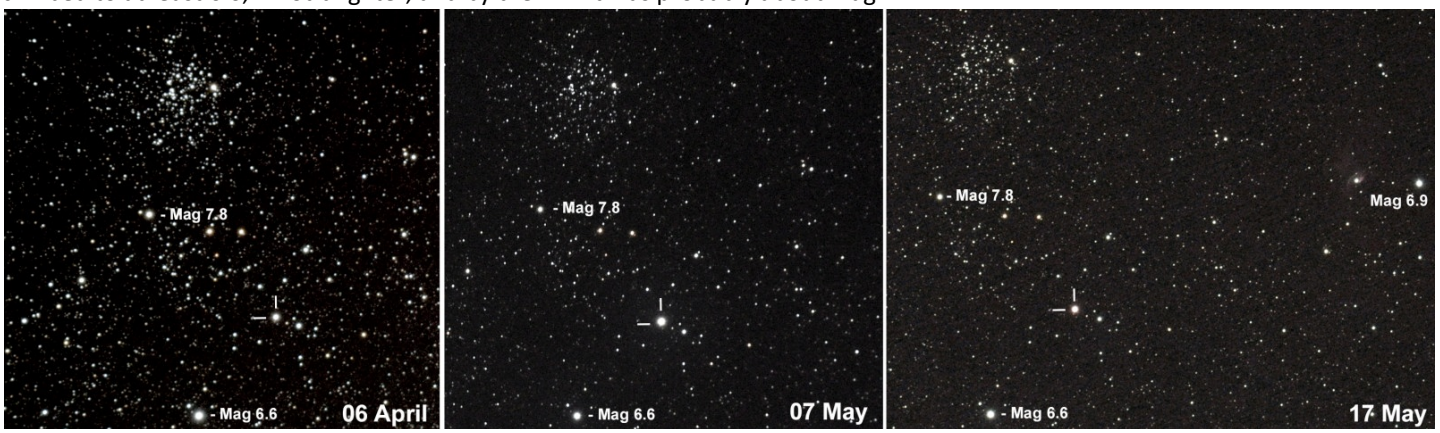
Nova Cas

Worth observing, see President's word and Member Images.

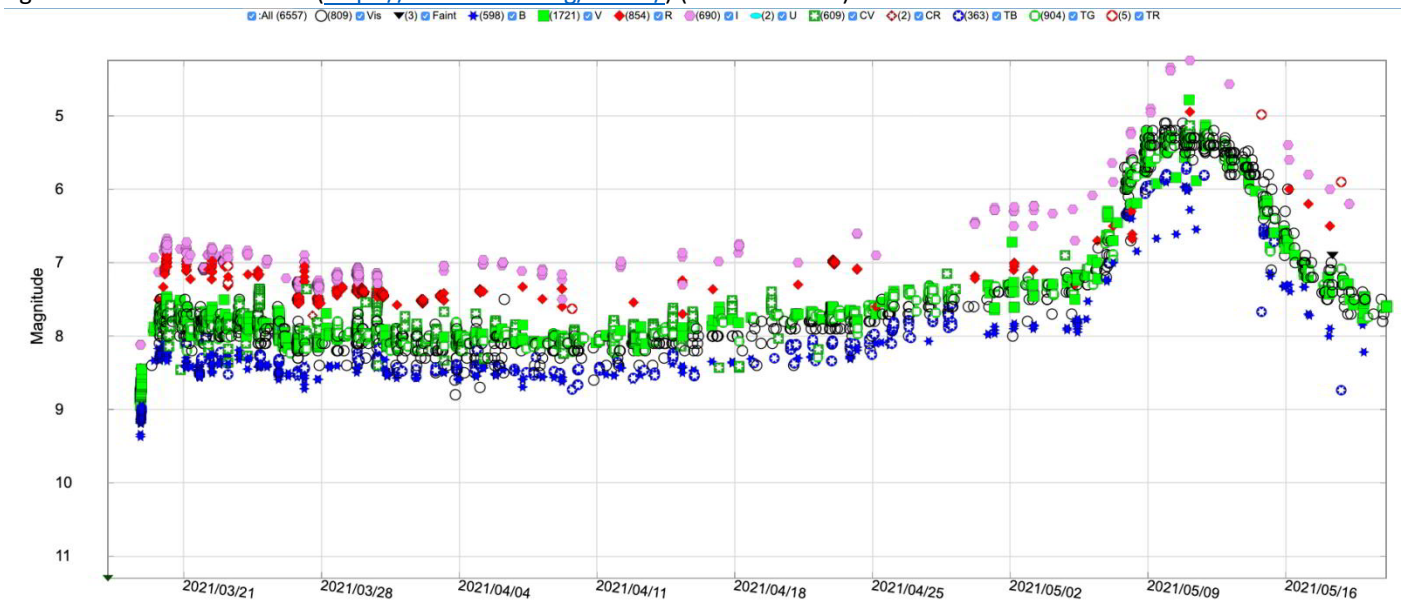
Member Images

Marc Charron

Nova Cassiopeia
Sequence of images showing the nova brightening then dimming, on April 6 it was roughly mag 8, but the 7th of May it had climbed to at least 6.6, if not brighter, and by the 17th it was probably about mag 7.



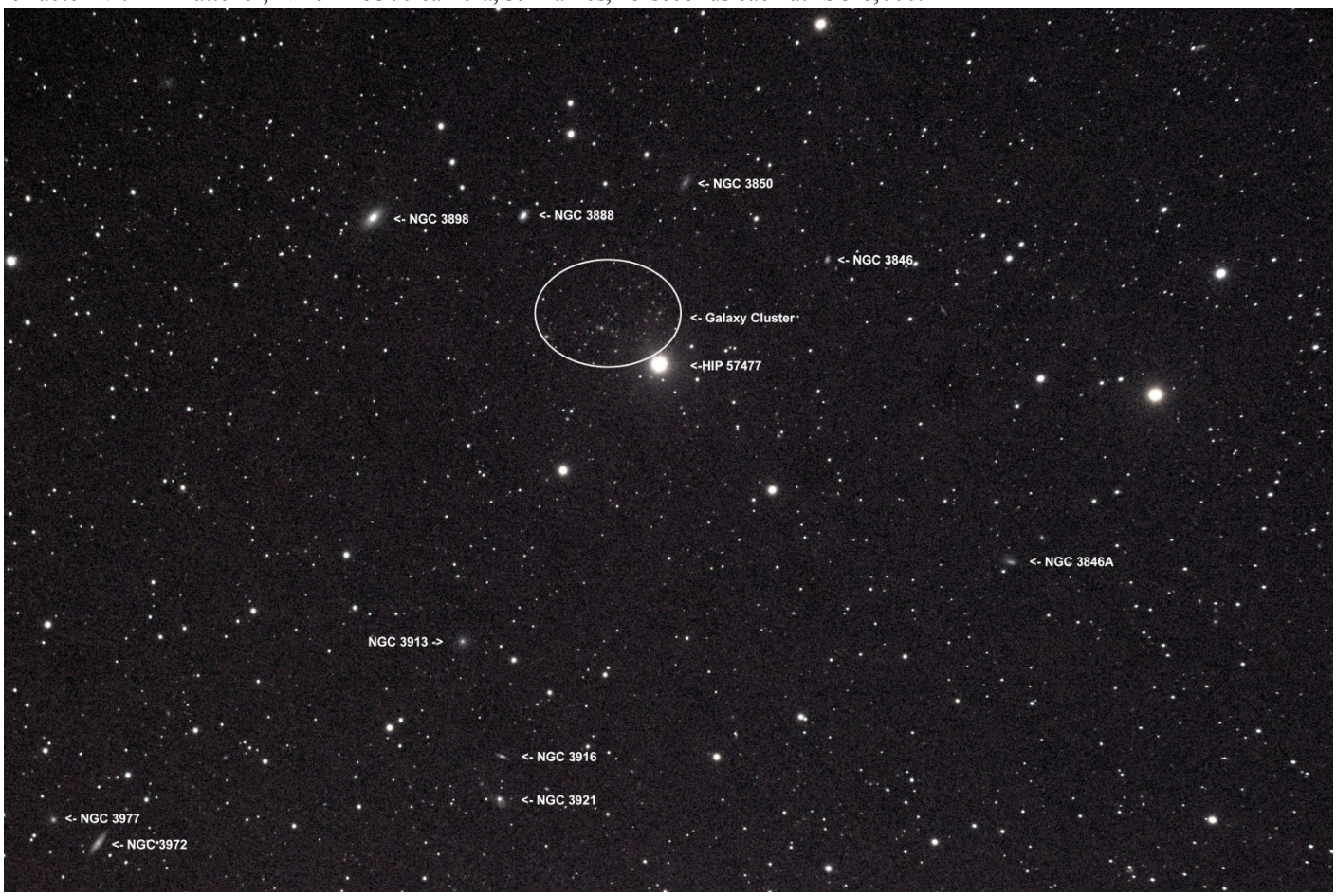
Light curve from the AAVSO (https://www.aavso.org/LCGv2/) (for: V1405 cas)



M51 with TMB 130/1200 and M101 with 70mm f6 (420mm efl)

Distant Galaxy Cluster (looking like dust)

An image of the NGC objects and a galaxy cluster near the star HIP 57477. Most of the NGC objects are within a range of 55 to 150 million light years, i.e. not too far away in galactic terms. These galaxies (mag 12-14) are moving away from us anywhere from 1100 to 2400 km/sec. The galaxy cluster near the star, on the other hand, is much further away at about 700 - 800 million light years (mag 16+ objects), and are travelling at 14,000 to 16,000 km/sec or about 5% the speed of light. Taken with 70mm f6 refractor with 1x flattener, Nikon D5300 camera, 39 frames, 25 seconds each at ISO 8,000.



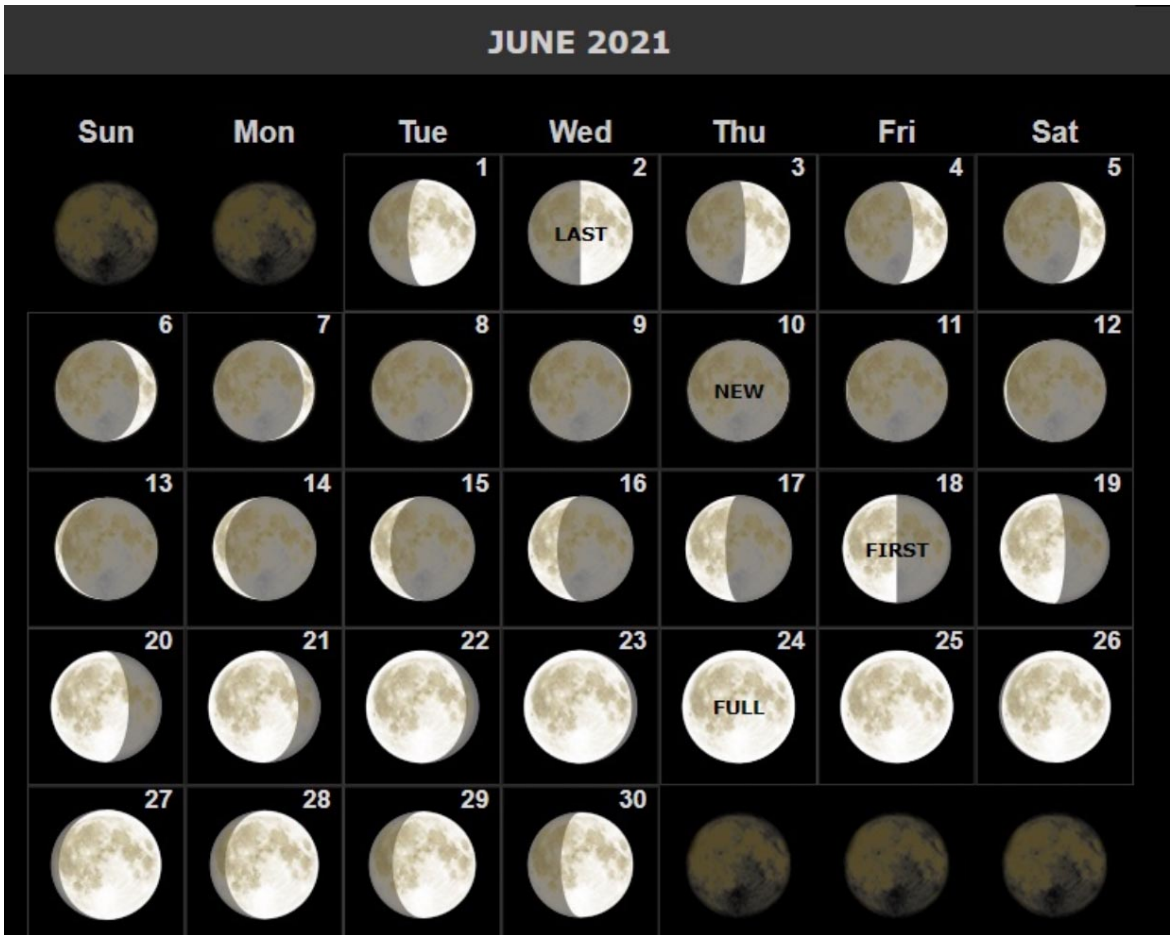
Lunar Crescent on the 14th of May

Nikon d750 70-300mm at 70mm for the bats, and coincidently 70mm(diameter) f6 triplet with 2x barlow, (efl 840mm) and Altair Astro 178C camera for the high resolution image.

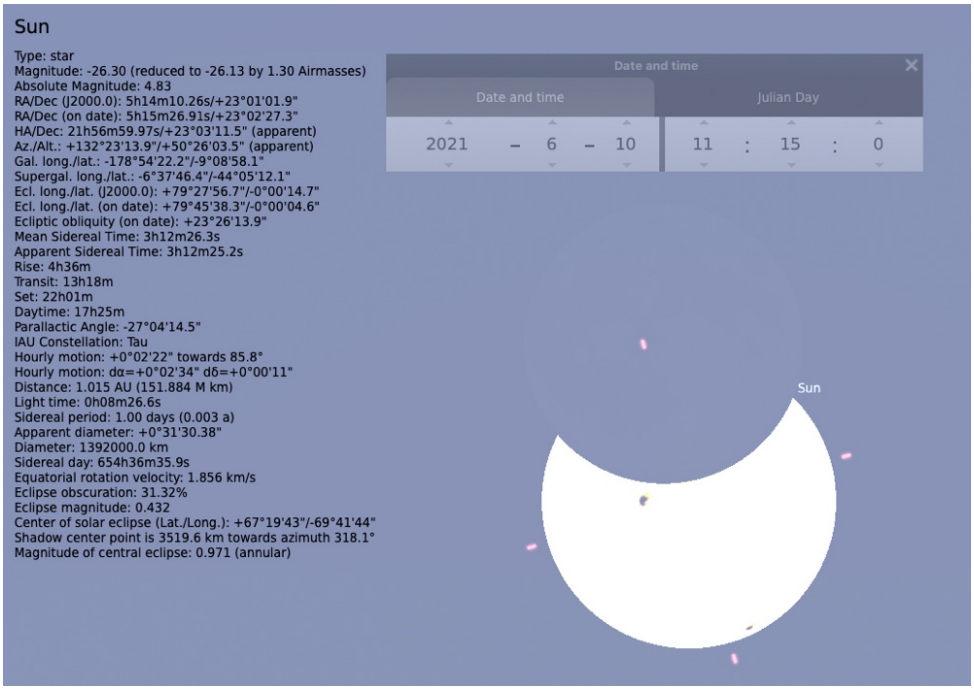
High resolution view of the moon on 18th of May, same telescope set up as the previous image.

Solar Study (70mm f6 triplet with AA Herschel wedge, PST, and 2x barlow)

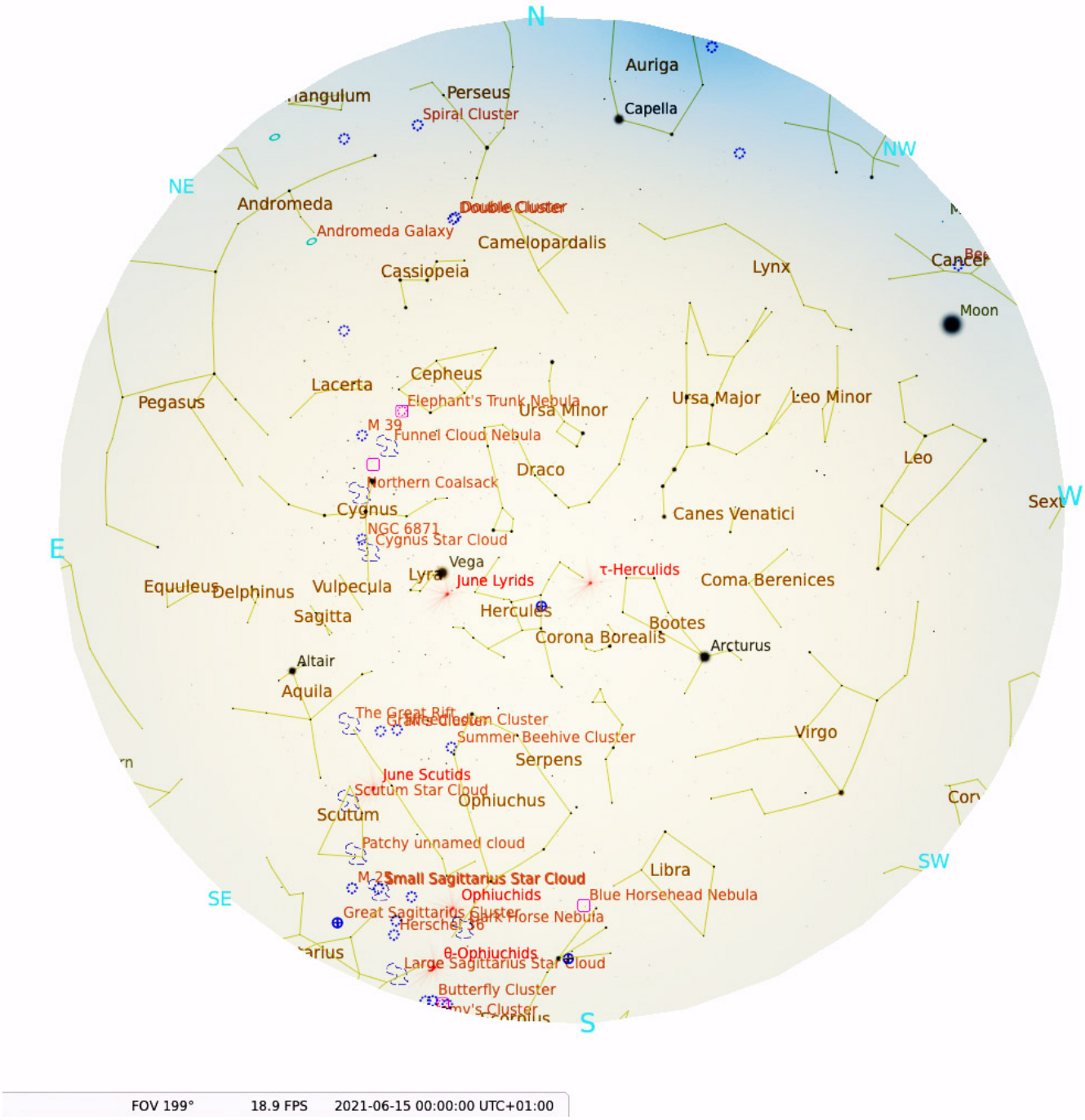
Moon Phases and Mid-Eclipse Chart



Mid solar eclipse viewed from Ayr



May Sky Chart



FOV 199° 18.9 FPS 2021-06-15 00:00:00 UTC+01:00