Volume 5, Number 4
April 2024

Club Website:
http://vlgastroclub.org/
Facebook:
https://www.facebook.com/groups/vlgastroclub/

Club Officers & Directors

President	Mark Graybill
Vice President	Ken Katta
Secretary	Randy Gilbert
Treasurer	Linda Meng

Newsletter Contact
saundby@gmail.com
(please include TVAstro in subject line)

UPCOMING EVENTS

Space Academy, April 1st, 6:30pm

Location Change! Due to maintenance at Truman Recreation Center, this month's Space Academy meeting will be held at Captiva Recreation Center, 658 Pinellas Place (near Morse Blvd.)

Join us as we discuss the Sun and eclipses in a presentation hosted by Toni Graybill.

Space Academy is expected to return to Truman Rec Center in May.

Telescope Workshop, April 1st, 7:30pm

Location Change! Due to maintenance at Truman Recreation Center, this month's Telescope Workshop will be held at Captiva Recreation Center's Picnic Pavilion, 658 Pinellas Place (near Morse Blvd.)

Learn about how to choose and use a telescope, binoculars, or smart scope. Learn about techniques and accessories for your equipment to make astronomical observation easier.

Telescope Workshop is expected to return to Truman Rec Center in May.

Comet Pons-Brooks on 19 March 2024 near Tau Piscium (bright star at lower right.) by member John Prudente Sr with Dwarf II

Exec Directors' Meeting, April 5th, 11am

All members are welcome, join us at Fishhawk Recreation Center, 2318 Buttonwood Run, from 11a to 12p as we plan 2024's events and meetings including CEMEX Earth Day and April's eclipse event.

Solar Eclipse, Homestead Recreation Center, April 8th, 2024, 12pm to 4pm.

Join us to view the Solar Eclipse of 2024 from The Villages! We will have solar glasses (donations accepted), solar scopes, the Solar Walk tour of the solar system, and projections of livestreams of totality from other parts of the country inside the recreation center

Peak eclipse will be at 3:02pm, reaching about 67% coverage of the Sun by the Moon.

We will be set up both inside and outside the Homestead Rec Center, 6227 Meggison Road, south of Highway 44.

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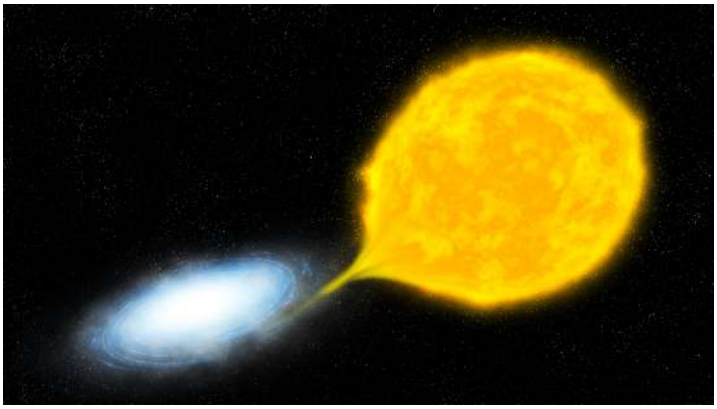
General Meeting, April 16th, 2024: White Dwarves & Cataclysmic Variables by Ken Katta



A tiny dwarf star the size of the Earth coupled with another star in a space as small as the Earth/Moon system can suddenly flare up to thousands of times its normal brightness. In time, it can even explode as all the carbon in the star suddenly fuses, generating more light than an entire galaxy.

Learn how white dwarves and cataclysmic variables have shaped our understanding of stars, and our ability to measure distances in the universe in this in-depth talk by Ken Katta.

April 20th, 5pm:
Fruitland Park Astronomy Group

The Fruitland Park Astronomy Group meets for an evening of observing and talk on the third Saturday of the month every month, conditions allowing. The meeting is at the Cales Soccer Field in Fruitland Park at 300 Shiloh Road (at the corner of Shiloh Road and Dixie Avenue, north of the Fruitland Park water tower.) Village Astronomy Club members and the public are welcome. Gate opens at 5pm, solar observers can catch the sun while it's up, and astro observers can set up in daylight.

Scopes can be set up directly off of tailgates onto pavement, or taken further into the park along paved walks, away from the road to avoid nearby lights. Power is available.

Calendar: https://vlgastroclub.org/calendar/

Recent Events

Astronomy Park Observing, March 15th

On March 15th we opened the Homestead Astronomy Park for club members to do observations under dark sky conditions. With the tricky weather we've had due to this year's strong El Nino weather pattern, notice of the opening was brief so only a few astronomers were able to make it that evening. We had a total of 3 astronomers, one with a SeeStar S50 smart telescope, another with binoculars, and a third with a traditional ETX-90 Maksutov telescope. We had six other attendees as well who enjoyed views through the others' instruments.

The SeeStar accumulated a long duration image of the Orion Nebula, M42. The binoculars were used on the 5 day Moon and many spring sights in the sky including Jupiter and its moons, star clusters, and the Orion Nebula. The ETX gave higher magnification views of those objects as well.

A light haze kept the sky from being perfect, but a slender crescent Moon that set early kept it from ruining views of the sky. Mosquitos were present around dusk, but not terrible--both our evenings in Feb and March this year have not had bad mosquitos. Hopefully that will continue to be a trend.

We are hoping that the weather allows us additional nights this spring to observe at the Astronomy Park before cloudy weather settles in through late spring and summer.

NEWS

SpaceX Starship Third Time's a Charm

SpaceX successfully launched their new Starship launch vehicle into space on March 14th. During the flight, it succeeded in all launch test objectives. The only failures during the flight were related to vehicle recovery.

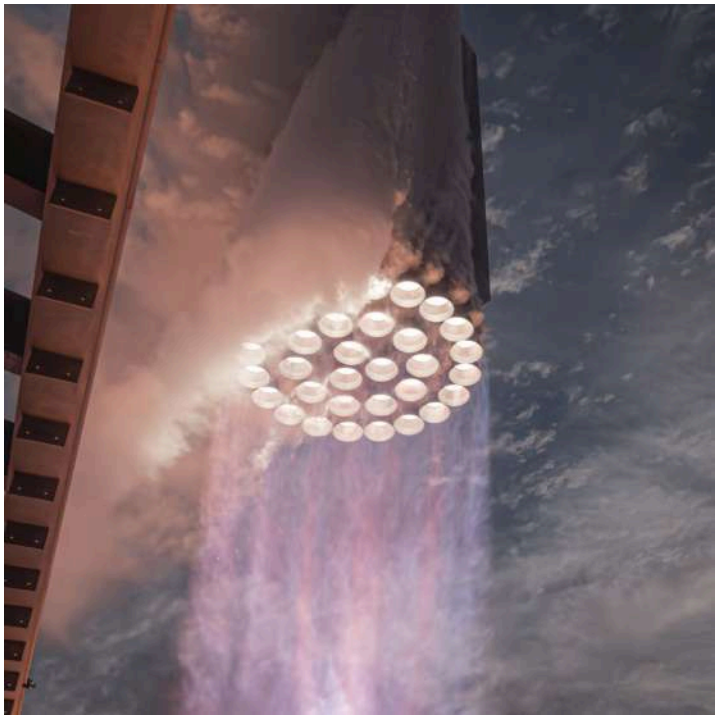
Starship Ascending with 17 Million Pounds of Thrust. SpaceX image.

Starship is the largest launch system ever built, currently with a payload capacity of twice the Saturn V's, planned to increase to three times the Saturn V's capacity in upgraded versions. It is being developed as an astronaut landing system for the Artemis Program's return to the Moon, as a super heavy lift launch vehicle for Earth orbit, and as a deep space and interplanetary exploration vehicle. SpaceX aspires to use it to bring humans to the surface of Mars.

Several versions of the rocket are planned, including the orbital launch version just tested, a tanker version that will refuel the Starship second stage in orbit, a lunar lander version, and potentially a version for rapid flight between points on Earth.

The test on March 14th exceeded the reach of the second test, performed late last year, by placing the Starship second stage vehicle in space at orbital velocity, though on a trajectory that would bring it back to Earth over the Indian Ocean so that if anything went wrong, the vehicle would not remain in orbit as space junk.

This made the Starship the largest object ever placed in space. At 35,000 cubic feet in volume, it is larger than the ISS's pressurized volume. The ISS was assembled over a series of 48 flights of smaller launch vehicles.



33 Raptor Engines Lift Starship Toward Space SpaceX image

While in space, Starship conducted multiple tests of its systems, including opening and closing its large "Pez Dispenser" payload door that will be used to deploy the new Starlink V2 satellites. Starship also tested propellant

transfers between its internal tanks, preparatory to later tests of transferring propellants between different vehicles in space using the tanker version of Starship.

A test of refiring a Raptor rocket engine in space was skipped due to the loss of attitude control on the Starship late in its flight.

Starship in Space--The Largest Object Ever Placed in Space. SpaceX image.

Recovery Tests

Both stages of the Starship vehicle conducted tests toward recovery and reuse of both launch vehicle sections. The first stage, known as “Superheavy”, is expected to be able to return to its launch site in the future where it will be caught by the launch tower arms and set back in its launch stand for reuse.

For this test, the plan was to have Superheavy detach from Starship using “hot staging”, firing the second stage engines while the first stage still has some engines firing, then rotate and conduct a boostback burn by turning more engines back on again to fly back toward the coast. Rather than returning to the launch site, it was slated to return to a point in the Gulf of Mexico offshore from the launch site at a safe distance from land, where it would ditch into the water destructively after slowing itself to a mock landing high above the sea.

During the test, the Superheavy’s recovery test started well. It successfully separated from Starship through hot staging, flipped, then restarted its engines for a boostback burn toward the coast. It was at this point that the Superheavy was destroyed in Flight Test 2, and in Test 3 Superheavy successfully completed the maneuver. Late in its flight back toward the coast, Superheavy began to roll and lose control over its flight. When it started to fire its engines for the landing burn, only one of the 3 planned engines fired successfully. Superheavy’s software attempted to compensate by firing two additional engines outside the center triad of rockets, but shortly afterward it seems that Superheavy either fired its self-destruct charges due to loss of control or it exploded.

Meanwhile, Starship had continued on into space as described above, and performed multiple tests with good results.

After skipping the Raptor restart test, Starship began to enter the outer parts of Earth’s atmosphere at speeds of Mach 20-25. Its orientation was not correct for placing its heat shield toward the direction of its travel, and the flaps on the Starship did not appear to provide control at the high speeds and low atmospheric pressures of the upper atmosphere.

Superheavy Falls Away from Starship After Staging. Launch Contrail and Shadow Visible Below. SpaceX image.

However, due to excellent radio contact maintained with the ship during re-entry, magnificent real time video of the plasma of re-entry was obtained using Starlink satellite links. Plasma built up around the Starship, and viewers had a front row seat as Starship attempted to

correct its orientation while bright orange and pink plasma in the atmosphere built up around it.

Starship Re-Entry Plasma Buildup--SpaceX image

Despite turning tail-first for a while during re-entry, and having one side with no heat sheild tiles turned in the direction of flight for much of the time, Starship showed itself to be amazingly rugged by lasting through the period of peak heating as it entered denser parts of the atmosphere and began to slow.

Shortly afterward, however, the craft broke up and contact was lost.

Test Results

SpaceX has successfully demonstrated that Starship can launch immense payloads to orbit, beyond anything humanity has ever launched before. If used as a fully expendable launch vehicle, Starship would be estimated to cost roughly $200-300M per launch, less than the current Delta IVH launch vehicle despite being far larger and being able to launch ten times as much.

However, SpaceX's plan is for a fully reusable launch system that will recover and reuse both the first and second stages. Currently Falcon 9 reuses only its first stage, reducing its launch cost from about $100M per launch to about $40M per launch. By recovering the second stage of Starship, SpaceX hopes to reduce the launch cost of its behemoth vehicle to even less than that of the Falcon 9.

To achieve this, they will be focusing on modifications to the system and its software in future flights to allow successful recovery. There is also a high probability they will also fly payloads in future test flights to begin to receive some return on the costs of developing Starship.

Future Testing

Starship flight test number 4 could happen within a couple of months. At the time of writing, the next Starship to fly is on a test stand waiting to have its rocket engines tested prior to flight. The next Superheavy first stage is presently in its Mega-Bay hanger having its engines fitted and any changes SpaceX has identified made to it.

Superheavy Flies Back Toward the Gulf of Mexico SpaceX image

Before the next test, the FAA will have to review the accident report from SpaceX on the recovery failures, and approve the work they are performing to update the vehicles, as well as issue a new launch license.

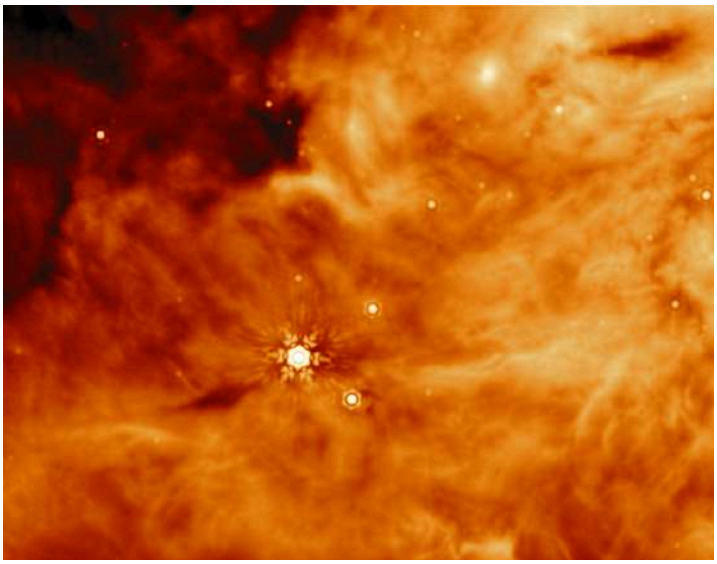
The process for Flight 3 was far less onerous than that for Flight 2, and with the greater success with Flight 3 it is expected that there will be even fewer delays than with Flight 3. Flight 4 may come as early as May or June, if all goes well.

Whether the next flight will carry actual payloads such as Starlink V2 satellites will also be an item to watch. For this flight, Starship carried excess propellant to simulate the mass of a payload.

Then, once the next flight begins, as SpaceX says, it's "Excitement Guaranteed!"

Full video of Starship Flight Test 3:
https://twitter.com/SpaceX/status/1768258691319689232

JWST Discovers Complex Organic Molecules in Star-Forming Clouds



The James Webb Space Telescope (JWST) has discovered a variety of complex molecules already present in clouds of gas and dust where new stars are beginning to form within our galaxy. This shows that these materials are present from the time of formation in our current generation of star formation, and do not require other processes to create them prior to the creation of protostars, stars, or planets.

The finding shows that the chemistry to create the organic molecules can occur on the surface of small grains of dust in the interstellar medium within our galaxy, prepositioning the materials before the system forms, and shortening the time for creating systems with complex chemistry and the potential for the creation of life.

Full story:
[Cheers! NASA's Webb Finds Ethanol, Other Icy Ingredients for Worlds]

IN THE SKY THIS MONTH

The Moon:
Last Quarter, April 1st
New Moon, April 8th
1st Quarter, April 15th
Full Moon, April 23rd
Last Quarter, May 1st

The Sun and Moon will be in eclipse on April 8th. This will be a total eclipse in places west and north of Florida, and will reach about 67% coverage of the Sun by the Moon here in The Villages at 3:02pm. See above for information about our eclpse viewing event on this date.

Mercury fades rapidly in the evening twilight in April following March's excellent appearance. It will be visible near sunset on the 1st and 2nd, but will be increasingly difficult to view in the following days, disappearing into the Sun's glare on the 4th, headed for its solar conjunction on the 11th. It reappears dimly in the predawn sky on the 20th, growing increasingly easier to see on each morning until the end of the month, when it is magnitude 1.1 and visible half an hour before sunrise 3 finger-widths above the horizon.

Mercury online viewing chart:
https://in-the-sky.org//data/object.php?id=P1

Venus is a morning star this month, rising half an hour before the Sun at the start of the month at magnitude -3.9. It moves north and toward the Sun as the month continues until it is again lost in the dawn's glare.

Saturn and Mars engage in a pre-dawn dance this month, with a conjunction of about half a degree on the mornings of the 10th and 11th of April. Initially, Mars rises earlier then Saturn catches up with it and passes it after the 11th. Be prepared to capture views of them after they rise at 5:30am and before the Sun rises on the 10th and 11th. They will be visible at medium level magnification (~100-200x) at the same time.

Venus online finder chart:
https://in-the-sky.org//data/object.php?id=P2

Online observing information for Mars:
https://in-the-sky.org//data/object.php?id=P4

Saturn finder chart:
https://in-the-sky.org//data/object.php?id=P6

Jupiter begins its descent into sunset this month, sitting low in the west in the early evening sky, only 22 degrees above the horizon at magnitude -2.1. It descends lower each day, until it is only about 2 degrees above the horizon at twilight at the end of the month, at a magnitude of -2.0.
https://in-the-sky.org//data/object.php?id=P5

Uranus is near Jupiter this month, reaching its closest on April 20th at 0.5 degrees (the width of the Full Moon.) This is a good time to see this planet without difficulty in finding it, using Jupiter as your guidepost. Uranus starts the month about 3 degrees above Jupiter, is less than 2 degrees by the 10th, is less than a degree by the 16th, half a degree on the 20th, and back out to a degree on the 25th, with Uranus below and right of Jupiter (4 o'clock angle.)

Go out early to see them right at sunset, you will need a clear view to the west to see them low on the horizon.

Uranus finder chart:
https://in-the-sky.org//data/object.php?id=P7

Neptune shines at magnitude 8 and is only 2.2 arcseconds across this month. It rises in the early morning hours between 4 and 5 am. Our thick atmosphere will reduce its apparent magnitude to dimmer than mag 12. This will not be a good time to observer Neptune, though it does have a closeconjunction with Mars (9 arcmin) on the morning of the 29th of this month.

Online finder chart for Neptune:
https://in-the-sky.org//data/object.php?id=P8

More information on sky events this month:
https://in-the-sky.org/

T Coronae Borealis is a recurring nova that explodes every 80 years (come to our general meeting presentation, **White Dwarves and Cataclysmic Variables** to learn more about why!) It is predicted to explode sometime between now and September of this year. Begin watching the northern sky near Hercules to see it brighten from mag 10 (below visible brightness) to a high as mag 2 (easily visible) when the nova occurs!
View Nova Explosion, 'New' Star in Northern Crown – Watch the Skies

M35, The Shoebuckle Cluster in Gemini by John Keller with Seestar S50

Dwarf II Smart Telescope and Accessories Dwarflab image.

Dwarf II Smart Telescope User Report by John Prudente

For me, The Dwarf II has made seeing and photographing the cosmos so easy. I have an astrophotography setup with a ZWO MC Pro 294 camera that I can use on multiple telescopes like my Celestron 8” scope. So, with the scope, computer, mount, table and software setup, that takes me a good hour to assemble and prepare to start taking photos. And a while to bring it all back in after the astrophotography session. I love doing it, but it’s time consuming.

The Moon as imaged by the Dwarf II by John Prudente

The Dwarf II allows me to bring out the scope out and have it shooting pictures in 5 minutes. I really enjoy being able to share my experience though my photos. There have been frequent updates to both the Dwarf II software and the app for phones or tablets. It always seems to be getting better.

I also enjoy the portability of the scope. I can carry the carry bag it comes in on a plane – It’s no bigger that a small camera bag. I’ve traveled with it and had no problems getting it through an airport.

The Rosette Nebula imaged with Dwarf II by John Prudente

The Veil Nebula via Dwarf II by John Prudente

(continued next page)

Horsehead Nebula via Dwarf II
image by John Prudente

Dwarf II Specifications
Aperture Diameter: 24 mm
Focal Length of the Telephoto: 100 mm
Equivelent Focal Length: 675 mm (Tele), 48 mm (Wide)
F-number: 4.2 (Tele), 2.4 (Wide)

Resolution of IMX415 sensor

Model name IMX415
Number of effective pixels 1920(H) × 1080(V)
Resolution 8.4 MP
Image size Diagonal: 6.43mm (type 1/2.8)
Unit cell size 1.45μm (H) × 1.45μm (V)

The Andromeda Galaxy imaged with Dwarf II
by John Prudente

Club Calendar

Yellow marks special events hosted by The Villages Astronomy Club
Blue marks events that are not hosted by The Villages Astronomy Club, but which we recommend.
Green Marks Volunteer Events for other groups.

April 2024
1 Telescope Workshop 8pm/Space Academy 6:30pm Truman Rec Ctr
5 Exec Meeting
8 Solar Eclipse (60% in TV.) 11am setup
Peak:3:02pm (Monday) 12-4pm
16 General Meeting: Ken Katta speaks on White Dwarfs and Cataclysmic Variables
20 (Deferred for eclipse) Astronomy Day, Homestead Rec Center, 11am to 2pm, setup 10am.
20 Fruitland Park Observing
22 CEMEX/Girl Scouts Earth Day, CEMEX Center Hil Minel 530 W Kings Hwy, Center Hill, FL 10am-2pm (public open times)

May 2024
3 Exec Meeting
6 Telescope Workshop 8:30pm/Space Academy 6:30pm
18 Fruitland Park Observing
21 General Meeting: Mike Petersen, “The Life and Death of Stars”

Club Calendar on the web:
https://vlgastroclub.org/calendar/