Covid Situation Getting Better, but Still be Careful

THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno November-December 2022

DART Scores a Bullseye

Nasa's DART(Double Asteroid Redirection Test) spacecraft made a direct hit on the asteroid Dimorphos, a chunk of rock about 530 feet in diameter, which orbits a larger asteroid known as Didymos, both about seven million miles from Earth. Neither presented a threat to Earth and were chosen as targets due to their size and proximity. The purpose of the mission was to test "kenetic energy" devices to see if they could deflect an asteroid into a different trajectory if it was threatening to our home planet. While DART's trajectory was determined by scientists on Earth, for the last thirty minutes it relied solely on its own internal navigation system, acting autonomously to the second of impact. As well, real-time cameras aboard the spacecraft followed it all the way to the surface. A small Italian-made cubesat, as it's called, named LICIACube, followed the craft and recorded the impact with high resolution cameras. A number of telescopes on Earth, as well as the Hubble and James Webb Space Telescopes, also imaged the impact.

Preliminary images taken by LICIACube and other devices show an almost 6,000 mile long trail of debris from the asteroid, soil and rocks kicked up when the spacecraft crashed on to its surface. Scientists were elated by this new opportunity to study yet another aspect of asteroid collisions.

A followup-On October 10, scientists reported that, as a result of the collision, the asteroid's trajectory has, in fact, been altered significantly.

Quote of the month-

"Humason showed me how to play poker, shoot pool, drink whiskey, and smoke cigars. Hubble showed me how to measure galaxies…"

-Alan Sandage, on being mentored by Edwin Hubble and Milton Humason when he was a graduate student at Caltech

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Central Valley Astronomers

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Dear fellow astronomers!

It has been an exciting few months! From a successful Star-b-Cue to the Dark Sky Festival to planetary oppositions to resumption of private star parties, it's been action packed for our members!

Our Star-b-Cue was a great success, even though we cooked in the parking lot! It was actually kind of nice just being able to stay in the same place though. There was lots of good food, great conversation and great people. I'm glad so many made it out! I think we should do more cookouts!

Though I was unable to attend, I heard the Dark Sky Festival outreach event was a great success with many hundreds of visitors. The conditions were great that evening and I look forward to attending next year! Thank you to all our astronomers that were able to attend and make it all work.

With the Saturn and Jupiter oppositions in the bag, we still have Mars to look forward to coming up on December 8th. Jupiter and Saturn are also very well placed for observation at the moment as the sun sets, so make sure you're getting out there and taking a look!

In summary, it has been a great year and I'm looking forward to the next one!

-Ryan A. Ledak

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Number of exoplanets found as of October 2022-5,190*

How many more are out there?

Tens of thousands? Hundreds of thousands?

***Exoplanets confirmed by NASA; there are over 8,000 possible planets which still need to be verified**

Profiles in Astronomy

Luis Cruis 1848-1908

Cruis was born and raised in Diest, Belgium, and studied engineering at the University of Ghent. He then joined the Belgian Army and served from 1868 to 1874. Afterwards, he resigned his commission and moved to Brazil, where he at first worked as a civil engineer. While there, he became interested in astronomy, and eventually was hired to work at the Imperial Observatory in Rio de Janeiro. He would stay there for the rest of his life.

Cruis was primarily interested in planetary work, and conducted major observations on all the known planets, but particularly Mars and Mercury, He made several maps of the surface of Mars and calculated its rotational period to a high degree. He also studied the transit of Mercury in 1878 and the transit of Venus in 1882, and again, made highly accurate calculations of their orbits. As well, he observed and studied many of the stars in the Southern Skies. He is best known, however, for discovering the Great Comet of 1882. He was also the director of the Brazilian National Observatory from 1881 to his death in 1908. In a departure from his astronomical work, he led the surveying team that mapped out the location of the eventual national capital at Brasilia in the interior of the country.

Cruis won many honors for his work; among others, he was given the gold medal from the French Academy of Sciences. A crater on Mars is named for him, the Cruis Islands off the Antarctic Peninsula are named for him, and Brazil's scientific base in the Antarctic is also named in his honor. He was made a citizen of Brazil by emperor Dom Pedro and is honored everywhere in the country as one of Brazil's leading scientists.

New Theory on Why Uranus is Tilted

For many years, scientists have assumed that the tilt of Uranus, almost 90 degrees relative to the rest of the solar system, was caused by a giant object crashing into it early in is history, However, in a paper from a group of scientists at the University of Maryland, the new explanation is that a now-vanished moon fell into a gravitational lock with the planet, resulting in the moon's destruction and the planet ending up perpendicular to the rest of the solar system. The destruction created an extensive ring system, similar to Saturn's, whose gravitational and resonance properties caused the planet to tilt. The Maryland researchers believe that Uranus's current rings, which are thin and wispy, are a remnant of this system and will disappear altogether sometime in the future (many scientists believe that Saturn's ring system, which they now think was also formed by a moon that broke apart, will eventually disappear as well). So far, this is just a theory developed through modeling, but in the early 2030s, the Chinese Space Agency plans to send a dual spacecraft mission, known as Tianwan-4, first to Jupiter and then to Uranus, similar to Voyager's "Grand Tour" of the 1980s. It may give more detailed looks at Uranus and its mysteries.

What's New in Space

SLS Delayed Again, This time to Mid-November

NASA and Boeing just can't seem to get its SLS off the ground. Twice in the last two months the giant moon rocket has been delayed due to problems with the fuel systems. Then, as those were fixed and a third launch date was set for October 3, along came Hurricane Ian. The SLS was taken back to the Vehicle Assembly Building to protect it from the storm, and NASA decided to put off the next launch attempt until at least November 10. This would be not only to prepare it for the attempted launch, but also to check for any other glitches that might pop up. Once the craft is launch, uncrewed, the Orion-MPCV spacecraft will travel to the moon, orbit it for at least thirty-five days, then return to Earth, the main purpose being to evaluate the entire system. How this will affect the second SLS launch, which will carry four crewmembers on a circumlunar mission lasting eight days, is unknown. It was originally scheduled to be launched in the fall of 2023, but that may be delayed as well. (On October 11, NASA announced that the next SLS launch attempt will be on November 14, 2022).

In the meantime, Boeing is also wringing its hands over the Starliner commercial crew spacecraft, which is, like the SLS, over five years behind schedule. The second uncrewed test mission earlier this year was mostly successful, but NASA now says that the crewed test flight will probably not take place until March 2023 and the first operational flight will most likely not be launched until the fall of 2023. NASA has already pretty much decided that Space-X is the winner in the commercial spacecraft competition, having booked Crew Dragon flights up to 2029, but would like a backup in the event that something goes wrong with Crew Dragon.

First and Second Crews Under New Agreement Arrive at ISS

Despite political tensions between the two nations due to the Ukraine situation, in July, NASA and Roscosmos signed an agreement to share seats on each other's spacecraft for the foreseeable future. One result of that took place in September and October. On September 21, Soyuz MS22 was launched carrying American astronaut Frank Rubio along with his crewmates Sergei Prokopyev and Demetri Peletin. Another cosmonaut, Anna Kikina, was originally scheduled to be the third MS22 crewmember, but she switched places with Rubio, and, on October 5, was launched aboard Crew Dragon C-5, along with two other rookies, Nicole Mann and Josh Cassady, and veteran Japanese astronaut Kiochi Wakata. The crew swap is intended to make sure that at least one American and one Russian are aboard ISS at all times(which was part of the original ISS agreement). More importantly, both NASA and Roscosmos, despite their countries' political disagreements, are determined to continue the ISS partnership. After the launch of Dragon C-5, Sergei Krikalev, a veteran cosmonaut and now the director of Roscosmos's manned space program, stated that he wants US-Russian cooperation in space to go forward as long as possible.

Polaris Dawn Mission Delayed until Spring 2023
Also, Polaris, Space-X, and NASA in Talks to Service Hubble Space Telescope

NASA and Space-X announced on Wednesday, October 19 that Jerod Isaacman's Polaris Dawn private commercial space mission, originally scheduled to be launched in November or December of this year, has been delayed until at least March 2023. This is to give more training time for the crew, and also to accommodate other Space-X launches. Polaris Dawn, in which Isaacman will again be the commander along with three crewmates, will achieve the highest orbit since the Apollo moon missions, traveling as far as 500 miles above the Earth's atmosphere to study the effect of the Van Allen Radiation Belts on the human body. The mission will also see the first private spacewalk. Polaris Dawn will be the first of four Polaris missions over the next three years. The second mission will also use the Crew Dragon spacecraft, but the third, now projected for mid to late 2024, may use Space-X's Starship and carry as many as twelve crewmembers.

The second Polaris mission, which may come in late 2023 or early 2024, may go to the Hubble Space Telescope. For the past year, NASA and Space-X have been studying ways in which the Crew Dragon spacecraft can be used to service and upgrade Hubble. Now, Isaacman, NASA, and Space-X are in planning sessions to possibly carry out that goal, the first Hubble servicing mission since 2009, in order to extend the space telescope's lifetime into the 2030s. While it has been overshadowed by the James Webb Space Telescope in recent months, Hubble is still operational, conducting scientific research every day.

Speaking of Starship, Dennis Tito Buys Seats on the Second Lunar Flight

On October 11, Space-X announced that billionaire Dennis Tito, the first space "tourist," has purchased seats for himself and his wife on the second Starship mission, now scheduled for a circumlunar flight in 2024. Space-X emphasized that they purchased only two seats, meaning that ten more are yet to be sold. Tito made headlines in 2001 by paying for a seat aboard Soyuz TM31 and spent a week aboard the International Space Station as a private commercial passenger. Now 82 years old, Tito says he has passed all NASA and Space-X medical and mental fitness tests and is ready for a flight around the Moon. His wife Akiko, 57, has also cleared physical and mental exams.

(Bad) Science Jokes

Did you hear about the organic chemist and the graphene scientist who met while researching geology? It's a perfect example of carbon dating.

Why are aliens green when they get to Earth? Atmospheric turbulence.

Both from thecosmiccompanion,com

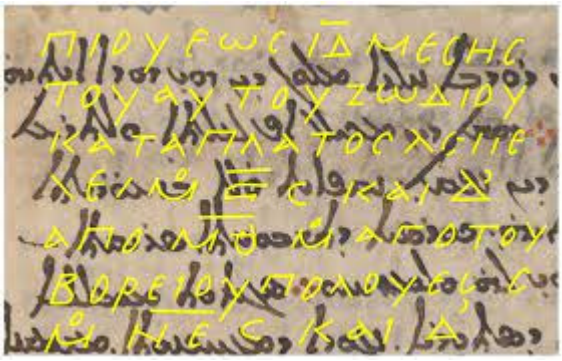
Another Spaceflight Pioneer Slips into the Cosmos: James McDivitt 1929-2022

On October 18, NASA announced that 1960s astronaut James "Jim" McDivitt died at his home in Tucson, Arizona, on October 13 at age 93. The cause of death was not given, but is believed to have been from natural causes.

McDivitt was born in Chicago and raised in Kalamazoo, Michigan. He attended public schools and the local junior college there, then joined the Air Force in 1951 and learned to fly. He ended up flying 140 missions during the Korean War, and afterwards, under an Air Force education program, attended the University of Michigan, earning a degree in aeronautical engineering. It was at Michigan that he met and befriended Ed White, who would also be chosen as a Group Two astronaut. He then attended test pilots' school, and became involved in the X-15 program, although he never actually flew the rocket plane himself. In 1962, he applied for the second group of NASA astronauts and was selected later that year, along with eight other test pilots. His first space flight came in 1965 as the commander of Gemini 4, with his crewmate Ed White making America's first spacewalk. In 1966, he was named as backup commander of the first Apollo flight and in line to command the first or second moon landing mission, but due to a series of crew and mission changes in the wake of the Apollo 1 fire, ended up the commander of Apollo 9, which flew the first flight of the lunar module in Earth orbit in February 1969. Afterwards, he lobbied to be commander of a later moon landing flight, either Apollo 16 or 17, but was turned down and eventually resigned from NASA and the Air Force in 1972 and went into private industry.

With McDivitt's passing, only three of the nine Group Two astronauts are still alive: Frank Borman, James Lovell, and Thomas Stafford, all in their 90s.

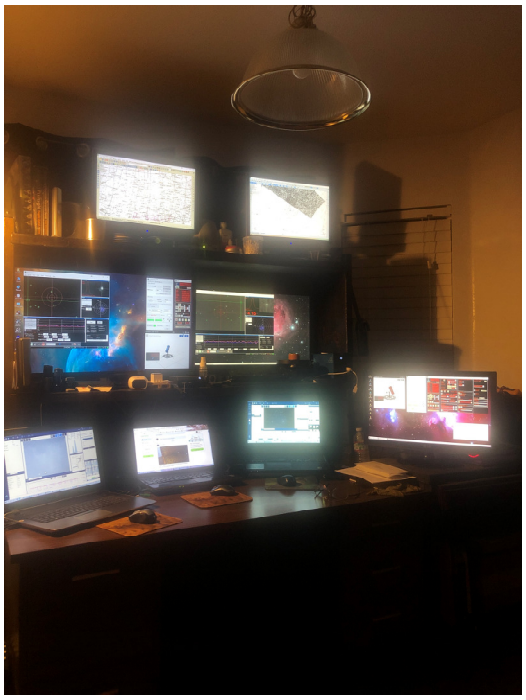
Discovery of the Oldest Known Star Map-Catalogue Announced



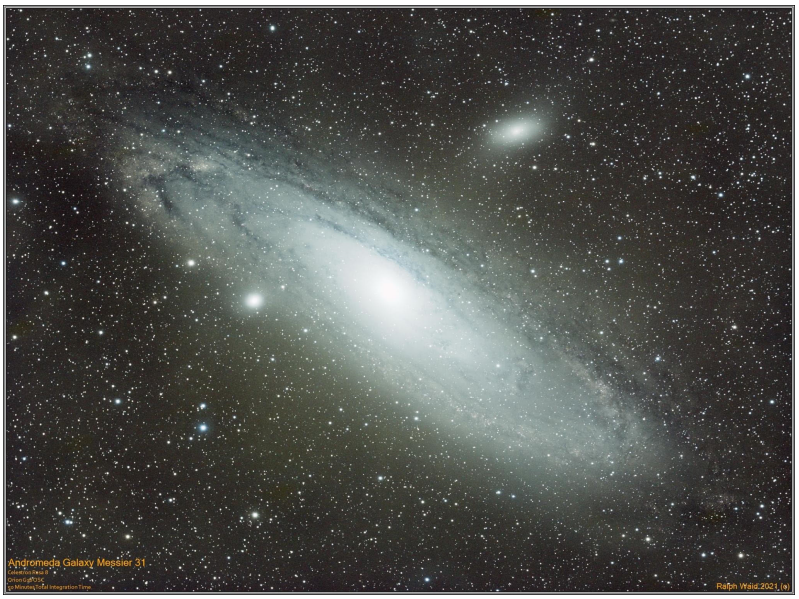
On October 18, an article in the science magazine *Journal for the History of Astronomy* announced that a portion of an ancient star map by the Greek scientist Hipparchus had been found underneath a Medieval manuscript. The map has been dated to between 162 BC and 127 BC, making it one of the oldest known stellar texts ever found.

In 1997, researchers found a manuscript in St. Catherine's Monastery in the Sinai Desert in Egypt, along with an obscure reference to a star map. The manuscript was of a Christian text believed to have been written around 1100AD, but many scholars suspected that it was a palimpsest, a process in which the ink from an earlier writing is scraped off in order to allow the parchment to be used again, something that was commonly done up to the time of the mass production of paper in the 1500s. Using multispectral scanning to look beneath the text, scientists were able to determine what the original writing concerned. They were stunned to find it referred to stellar positions and descriptions of stars, and eventually traced it to the long-lost stellar catalogue of Hipparchus, which is mentioned in many ancient documents. The found text is only a fragment of the entire catalogue, but it gives experts a good idea of what it consisted of. Some now also believe that, based on this discovery, Ptolemy of Alexandria used Hipparchus's star catalogue to develop his own catalogue, which early astronomers used all the way up to the Renaissance. The manuscript is currently owned by the Museum of the Bible, which also financed the research that found the stellar text.

CVA Member Ralph Waid's Images and "Toys"



Ralph's control room



Great Image of M31

Astronomy Short-

When Vera Rubin studied for her doctorate at George Washington University, her thesis advisor was George Gamow. At their first meeting, Gamow and Rubin had to meet in the lobby of the physics building because women were not allowed upstairs in the professors' offices. She ended up doing her thesis on the properties of galaxy clustering, which she continued to study after receiving her degree in 1954 and eventually led to her discovering dark matter some twenty years later.

Space Trivia-

The Mercury astronauts were allowed to give their spacecraft personal names. Gus Grissom capsule named his capsule "Liberty Bell" for his suborbital flight in 1961, but it sank shortly after the ocean splashdown and was not recovered until 1999. Grissom commanded the first Gemini mission, GT-3, with John Young, in 1965, and named it the "Molly Brown"* after the heroine in the Titanic tragedy in 1912, who was labeled as "Unsinkable." However, NASA felt that the names were being taken too far, and after GT-3, did not allow any personalized spacecraft monikers until the Apollo moon landings of the late 1960s.

***The name Molly Brown is a misnomer. Mrs. Brown, born Margaret Tobin(1867-1932), the wife of a Denver mining engineer who subsequently became extremely wealthy through a gold strike, never used the name Molly during her lifetime. She always went by, and her family and friends always called her, Margaret or Maggie. After the Titanic, when a reporter asked how she survived, she supposedly replied, "I'm unsinkable," although that quote is now believed to be apocryphal. At her death, though, she was eulogized as the "Unsinkable Molly Brown." Where the name Molly came from, no one knows.**

The real Mrs. Brown was a far more compelling figure than the books and movies about her suggest. Born in Hannibal, Missouri, the daughter of poor Irish immigrants, she had only a few years of formal education, but as an adult, studied the Classics until she could recite them from memory and achieved fluency in five languages. For many years, she worked as a travel writer and reporter. In the wake of the Titanic disaster, she was honored by several governments for her role in taking over leadership of a lifeboat and trying to save other passengers, and became an international celebrity. Afterwards, she ran for the U.S. Senate from Colorado, led World War I medical and health efforts, and in her later years gave away millions to various causes, especially workers' and women's rights.

SOFIA is Grounded for Good

On the night of September 30, 2022, NASA's SOFIA (Stratospheric Observatory for Infrared Astronomy) airborne observatory, a joint project between NASA and the German Space Agency, made its last observations. With the 2023 fiscal year looming, the space agency decided that it was just too expensive to justify. The SOFIA observatory, a Boeing 747 with a 2.5 m infrared telescope in its bay, flew three to four nights a week for twelve years at 45,000 feet, above much of the water vapor that inhibits infrared observing, made many discoveries concerning galaxies, the planets, nebulas, and the stars. But it cost $85 million a year, money that NASA felt can be more efficiently used in other astrophysics programs. NASA says that projects originally intended for SOFIA will now be conducted with the Hubble Space Telescope or with the newly operational James Webb Telescope. NASA emphasized that, even though SOFIA will fly no more, the data collected so far will take at least three more years to evaluate and analyze.

Star Stories

Altais

Altais, also known as Delta Draconias, is in the constellation Draco, the Dragon. It is classified as a G9 giant star 3.3 times the size of our sun, with an apparent magnitude of 3.0, making it easily viewed from Earth with the unaided eye. Its absolute magnitude is .62, and the latest satellite measurements show it to be 97 light years from Earth. It is estimated to be about 800 million years old. Altias is one of the closest stars to Polaris, the North Star, situated only 1.5 degrees of true north. It is not known to have any companion stars.

Being a class G star, Altais is of interest to scientists, which, despite its size, shares many characteristics with our sun. They believe that it has exhausted its hydrogen and may be going into its final stages of evolution. Since its mass is close to that of the sun, 2.3 times, it will most likely end its life as a white dwarf.

The name Altais comes from, like so many other stars, Arabic. *Al Tais* means "The Goat," and was originally applied to three stars in the constellation: Delta Draconis as Al Tais, Pi Draconis as Tais I, and Rho Draconis as Tais II. The Chinese called Altais *Tian Chu,* meaning "Celestial Kitchen," which was originally an asterism referring to several stars in the Draco constellation.

Haleakala Observatory

When people think of astronomy in Hawaii, they generally refer to Mauna Kea and the many large telescopes there. But Hawaii has another major observatory, this one on the island of Maui, on top of Haleakala. Although usually overshadowed by Mauna Kea, it nevertheless plays an important role in astronomical research. The Air Force runs one part of the observatory; the civilian side is managed by the University of Hawaii.

The Haleakala Observatory was originally established in 1961 as a military base; the Air Force decided it was a good place to keep track of satellites in the new era of the Space Age. So, for several years, it was off limits to civilian use. However, the military eventually allowed civilian scientific facilities to be built on the mountaintop. At 10, 000 feet, it proved to be ideal as an observing site and a viable alternative to Mauna Kea. Today there are six civilian telescopes on the mountain, the most prominent being the newly built Daniel Inouye Solar Telescope, named after the late U.S. senator from Hawaii. Other telescopes include the Pan-STARRS 1.8m telescope, the Faulkes 2m telescope, the Mees Solar Observatory, and the Zodiacal Light .5m telescope. The Air Force still has a presence on Haleakala, and while some of its facilities are known to the public, others are classified(in the late 1980s, I heard an interesting story. When the first space shuttle mission, Columbia STS-1, was launched in April 1981, there were concerns that some of the protective heat tiles ripped off during the launch and the crew might be in danger when returning to Earth. But a day later, NASA said reentry would not be a problem; however, the space agency never explained how it knew that. Years later, word leaked out that, as the shuttle passed over Hawaii, high powered telescopic cameras at the Air Force's Haleakala facility imaged its underside and determined there were no missing heat tiles, allowing for a safe reentry).

CVA's Annual Star-B-Que

After a two year layoff due to the Covid virus, CVA held its traditional star-b-que at Eastman Lake on October 22. Because the club was unable to get the group picnic area, people met in the boat launch parking lot and set up tables and grills there. It actually worked out well, and CVA is considering making the lot the star-b-que location form now on. Almost 30 people showed up, including spouses and children. Ryan Ledek served as chief chef, cooking hamburgers and hotdogs, as well as stuffed jalaperno peppers. Members brought everything from chips to salads to dips and multiple deserts. Afterwards, everyone commenced to an evening of starwatching, although the wind picked up shortly after dark, and became strong enough to curtail most viewing by 9pm.