

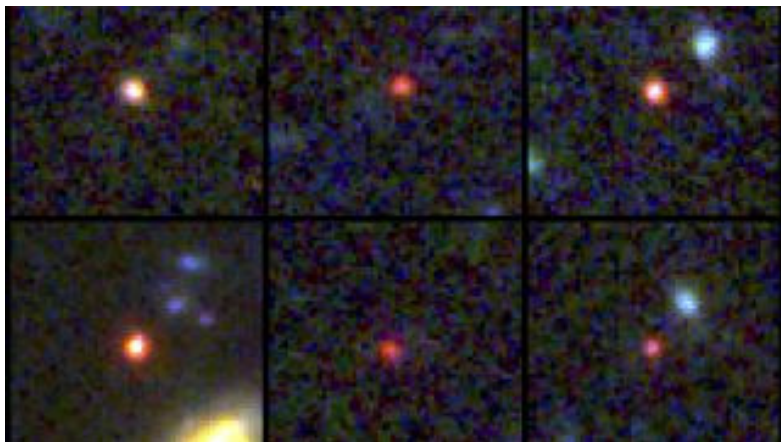
The CVA meeting in April will be Saturday, April 1-7pm at FSU (the date of April 3 on the 2023 calendar is a mistake)



THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno

March-April 2023



JWST is Already Rewriting the History of the Universe

The most recent James Webb Space Telescope images released by NASA and ESA have cosmologists in a state of shock. The Webb Space Telescope detected several galaxies that are estimated to have existed only about 500 million years after the birth of the universe. Yet, they are already fully formed and far larger than what is normally expected for objects that old. Many scientists are saying that, if these images hold up, major revisions in the early history of the universe will probably be necessary. How did these galaxies form so quickly? Why do they appear to be so mature? What were the processes and conditions in the early universe that caused them to be the way they are? And why are there so many of them? These questions and probably many more are going to keep cosmologists busy for the next several years, if not longer.

Image: NASA/ESA/ CSA/JWST

Astronomy Quote of the Month-

“I should have looked more carefully...”

English astronomer James Challis, who observed Neptune at least twice in early 1846, but failed to recognize it as a planet. It was correctly identified later that year by Johann Galle.

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NGC 3982

Central Valley Astronomers

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Astronomical Events in March and April-

March 2-Conjunction of Mercury and Saturn; Conjunction of Venus and Jupiter

March 19-Conjunction of the Moon and Saturn

March 20-Spring Equinox

March 21-Best night to see all 109 Messier objects

March 22-Conjunction of the Moon and Jupiter

March 24-Lunar occultation of Venus

March 28-Conjunction of the Moon and Mars

April 1-Beginning of Global Astronomy Month

April 11-Mercury at highest altitude in evening sky

April 20-Total solar eclipse in East Indies and Australia

April 22-23-Lyrid Meteor Shower

April 23-24-Earthshine Nights-unlit part of the moon is visible, also known as DaVinci Glow



Note from the editor-one of our members wants to know it we can start a "Chat Room" for CVA members, concerning star-watches and other events. He says he has seen it with other astronomy clubs and it works well. Maybe something to talk about at the next meeting.

Number of exoplanets found as of February 2023-

5,227

How many more are out there?

Tens of thousands? Hundreds of thousands?



The President's Message-

The Central Valley Astronomers (CVAs) play a key role in informal education during star parties and outreach events. By providing to the public free access to high quality astronomical equipment in a convenient family-friendly environment in various locations, CVA provides a great service to local communities and beyond, fostering interests in STEM to a young generation. The dedicated members of CVA share their experience and knowledge with other members and with the public; all the members must be properly acknowledged for their impact on the community. After COVID, it is time for the club to get back in shape, to have busy star parties, events with schools, and reconnect with old members. In addition, a key priority will be developing strategies to attract and retain young astronomers. While the cost of the equipment has substantially increased since COVID, it remains a great time to start in the hobby as a visual observer or as an astrophotographer thanks to all the various configurations of telescopes that are available in the market, many of them being geared towards new users. As nowadays, everything should be shared on social media - or it didn't happen - astrophotography with all-in-one solutions may bring more people into the hobby.

Despite all the rain we are getting, the drought is not over. Drought is a growing threat to farms, food, and people. California needs the rain even though it provides bad weather for us, amateur astronomers. Yet, the rain that we are currently getting may prevent fires later during the year. If amateur astronomers can bring the rain by buying more new equipment, then they should buy more equipment and get reimbursed by the state. The weather plays a critical role in astronomy and clear skies are necessary for doing our hobby in good conditions. We should be thankful for our location in the Central Valley of California as we are close to the mountains with excellent sites that are just one hour away from Fresno. Our observing sites are fragile, and light pollution is a substantial threat for our hobby. A paper of Fabio Falchi and Salvador Bará, recently published in Science (January 2023), shows that the sky brightness resulting from artificial light is increasing exponentially in the world with an alarming average of 10% each year. In other words, it is doubling in less than 8 years. This substantial increase is much higher than estimates of the evolution of artificial light emissions (about 2% yearly) using radiance measurements.

2023 will be another year with many interesting observations possible for amateur astronomers. The year started with the Comet C/2022 E3 that was close to Earth in early February. At the beginning of March, it will be possible to observe Venus-Jupiter conjunction. A conjunction occurs when a planet appears close to a moon, another planet, or a star. While conjunctions occur relatively often and they do not have any scientific relevance, they are nice to observe and consider as targets for astrophotography. One of the main events of this year will be the annular solar eclipse happening on Saturday, Oct. 14, 2023, which will cross the very top of California. Finally, two star parties are planned in March (March 18 and March 25), allowing us to increase our chances of performing the Messier marathon, if the weather permits.

Clear skies always-

Hubert Cecotti

Profiles in Astronomy

Frank Drake 1930-2022

Frank Drake, internationally known as the foremost advocate in the search for extra-terrestrial life, died on September 2, 2022 at the age of 92.

Drake was born and raised in Chicago, and attended Cornell University on an ROTC scholarship, earning a degree in physics. After active military duty, he did graduate work in astronomy at Harvard, where his doctoral advisor was Cecilia Payne-Gaposchkin. Afterwards, he worked for the National Radio Astronomy Observatory, studying radio emissions from the planets and also the Milky Way Galaxy. While at NRAO, in 1961, he developed the now-famous Drake Equation, which calculated the possible number of intelligent civilizations in the galaxy. In 1964, he returned to Cornell as a professor; at the same time he was director of the Arecibo Radio Observatory. In 1984, Drake moved to the University of California-Santa Cruz, where he became Dean of the College of Natural Sciences, and where he also founded the SETI Institute. He officially retired in 1996, but continued research as a professor emeritus up to the time of his death in 2022.



Throughout the later part of the 20th century, Drake led the search for intelligent life elsewhere in the universe. His Drake Equation stimulated talk on the conditions for intelligent life in the universe; he helped Carl Sagan design the now famous humanity plaque for the Pioneer spacecraft that went to Jupiter and Saturn and eventually left the solar system, and also the "Golden Record" of Earth sounds and songs carried on the Voyager spacecraft. In 1960, Drake began Project Ozma, the first attempt to detect intelligent life elsewhere in the universe. Carl Sagan, then a graduate student, became one of his assistants, and the two men formed a life-long friendship. Project SETI, the Search for Extra-terrestrial Intelligence, is currently the longest-lasting program in the search for intelligent life.

Drake was a past president of the Astronomical Society of the Pacific, and a member of the National Academy of Sciences and the American Academy of Arts and Sciences. An asteroid, 4772 FrankDrake, is named for him. His daughter Nadia Drake is today a well-known science journalist and advocate for SETI.

CVA Events in March and April

February 4-CVA monthly meeting at Fresno State. Fred Ringwald will be the presenter, talking about the L (Langrangian) Points

March 18 and 25-Star Parties at Eastman Lake(because the new moon falls in the middle of the week)

April 1-CVA monthly meeting at Fresno State. Club president Hubert Cocetti will talk about the galaxy cluster in Virgo

April 1- Beginning of Global Astronomy Month

April 11-Mercury at highest altitude in the evening sky

April 15 and 22-CVA star parties at Eastman Lake(same as in March)

What's New In Space

Two Spaceflight Pioneers Pass from the Scene

Walter Cunningham 1932-2023

Walter Cunningham, one of the Group 3 astronauts and the last surviving member of the Apollo 7 crew, died at his home in Houston, Texas, on January 3, 2023 at the age of 90. According to NASA, he died from complications resulting from an accidental fall.

Cunningham was born in Iowa but raised in Los Angeles. He attended Santa Monica Junior College after high school, then joined the Marine Corps in 1951, where he trained as a pilot and flew fighter missions at the end of the Korean War. Afterwards, he stayed in the Marine Corps Reserves, but returned to school, earning a bachelor's degree, and then a doctorate, in physics while working for the Rand corporation. In 1963, he was chosen, along with thirteen other candidates, to the third group of NASA astronauts. Among his classmates were Michael Collins and Edwin Aldrin, who would eventually fly on Apollo 11. In 1965, he was assigned to the Apollo 1 backup crew, along with Walter Schirra and Donn Eisele. After the tragic fire which took the lives of Gus Grissom, Ed White, and Roger Chaffee, they became the prime crew. In the first crewed flight of Apollo, now named Apollo 7, Schirra, Cunningham, and Eisele were launched on October 11, 1968, for a ten day mission to test the Apollo spacecraft system in Earth orbit. It was a success, and afterwards Cunningham was assigned to the Skylab program, where he stayed until he left NASA in 1971 to go into private business. He eventually wrote a best-selling memoir, *The All-American Boys*, about his years as an astronaut.



Valeri Polyakov 1942-2022

Dr. Valeri Polyakov died on September 7, 2022, at the age of 80. He holds the record for most consecutive days in space, 437, from January 1994 to March 1995, aboard the Mir space station. Polyakov was born in 1942; his birth name was Valeri Korshunov, but he took his stepfather's name when he was fifteen. He earned medical degrees at the Moscow Medical Institute, became a medical researcher, and was chosen as a cosmonaut in 1972. His first spaceflight came in 1988, when he spent 240 days aboard Mir. After his second record-breaking flight in 1995, he retired from the cosmonaut corps and spent the rest of his career as deputy director of the Russian Ministry of Health. One of the most iconic images of the space program is of him looking out Mir's window at the Discovery space shuttle in December 1994.



Second Russian Spacecraft at ISS suffers Leak

In December, the Soyuz MS22 spacecraft was apparently hit by a micrometeorite which punctured a pipe in its ammonia coolant system, spraying it into space and rendering it risky to use. On February 11, 2023, apparently the same mishap befell a second craft, the Progress MS21, which was docked to the Russian segment of ISS. A cloud of ammonia was seen leaking from the cargo module of the craft, which essentially an unmanned version of Soyuz. The Progress incident presents no immediate danger to the crew aboard ISS, but the Soyuz leak has forced Roscosmos and NASA to modify crew schedules. The MS22 crew of Francisco Rubio, Demetri Peletin, and Sergei Prokopyev, who had been scheduled to return in March, will now stay aboard ISS until at least August, and will return via the Soyuz MS23 spacecraft, which was launched uncrewed on February 24. The crew originally assigned to MS23 will be launched at a later date on another Soyuz.



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Boeing's Starliner to Make its First Crewed Mission in April

Also, NASA and Boeing announced in January that the Starliner, Boeing's commercial crew spacecraft, will make its first crewed and third flight in mid or late April. The crew of Barry Wilmore and Sunita Williams will be launched aboard an Atlas 5 rocket to ISS and spend at least eight days there, checking out the spacecraft's systems. After reentry, the craft will make a soft landing at the White Sands Missile Range in New Mexico. Starliner is over five years behind schedule; the first uncrewed flight in December 2020 had to be cut short due to both hardware and software issues; Boeing spent the next eighteen months working on the craft, only to discover more issues, this time with the thrusters. Finally, in August 2022, Starliner made its second, uncrewed, flight to ISS. Only a few minor problems were detected, and the craft is ready for crewed missions. If the April mission is successful, the first operational mission, with three crewmembers, may take place as early as October.



Ingenuity Keeps Truckin' On

In February, NASA announced that the Ingenuity chopper drone on Mars had completed its forty-third flight since the first one in May 2022. Ingenuity was expected to make only about ten flights before it broke down, but has performed so well that NASA and the Jet Propulsion Laboratory have changed its mission. It is now a scout, flying ahead of the Perseverance rover and imaging spots to explore and gather soil samples for eventual collection and return to Earth by a NASA-ESA return mission later this decade.



Spaceflight Short-

Over the years, many astronauts and cosmonauts have brought various musical instruments aboard ISS, including guitars, ukeleles, flutes, saxophones, bongo drums, and piano keyboards. Perhaps the most unusual instrument was a set of bagpipes, brought and played by Kjell Lingren during his six month stay on the space station in 2015-16.

Space Age Archeology

Vanguard

Vanguard was actually the first American satellite program. The first American orbital satellite launch, with a Vanguard satellite, known as TV3, on December 6, 1957 was a failure, with the rocket collapsing on the launch pad only a few seconds after launch. A second Vanguard launch attempt, on February 5, 1958, was also a failure. By the time Vanguard 1 was successfully launched on March 17, 1958, it was the second American satellite after Explorer 1, and the fourth in orbit, after Sputniks 1 and 2. It would be operational until 1964 and is still in orbit today. Several more Vanguard launches took place over the next two years



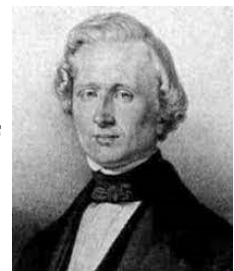
Vanguard was initiated by the Navy Research Laboratory in 1955; It grew out of a proposal in 1954 by the National Science Foundation to launch an artificial satellite in time for the International Geophysical Year in 1957-58. Originally, there were three IGY satellite programs, by the Navy, the Air Force, and the Army (the Air Force program figuratively and literally never got off the ground; the Army's proposal, known as Explorer, was directed by Wernher von Braun at the Redstone Arsenal in Huntsville, Alabama, and the Explorer satellite's main designer was James Van Allen. After launch on January 31, 1958, it discovered the radiation belts that are named for him). The Navy's program, dubbed Vanguard, was given first priority, with a scheduled launch date of September 1957. The rocket that would launch it, designed and built by Martin Aircraft, was also known as Vanguard, and was a larger version of sub-orbital sounding rockets that the Navy had been using for scientific research since the early 1950s. The satellite itself was designed and built by the Naval Research Laboratory in Washington, D.C. It was spherical in shape, about six inches in diameter, and weighed a little over three pounds (Nikita Khrushchev sarcastically called it a "little grapefruit," compared to the much larger Sputniks). Several antennas extended three feet out from the main body. It was the first satellite to use solar panels, along with internal batteries. Its main goals were to measure the diameter of the Earth, determine the extent of drag from the Earth's upper atmosphere, and test the military's newly established space tracking system. Vanguard 1's major accomplishment was determining that the Earth is not a perfect sphere, but slightly oblong in shape.



After Vanguard 1, eight more Vanguard satellites were launched. Only two of them were successful, Vanguard 2, launched on February 17, 1959, was a larger version of Vanguard 1, and Vanguard 3, which was even larger, was launched on September 18, 1959. Both Vanguards 2 and 3 were launched under the auspices of NASA, which took over the Vanguard program when it was established in October 1958.

Astronomy Short-

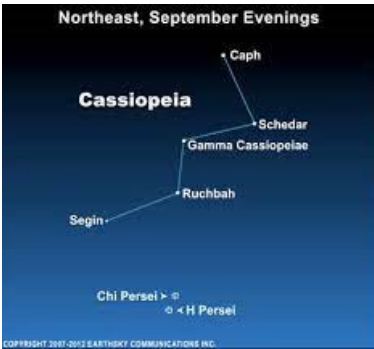
Urbain Le Verrier, who is given partial credit for the discovery of Neptune, also proposed that a planet, which he named Vulcan, was inside the orbit of Mercury. He based this on mathematical irregularities in Mercury's orbit. However, Vulcan was never found, and Mercury's anomaly was eventually explained by Einstein's Theory of Relativity.



Star Stories

Caph

Caph is officially known as Beta Cassiopeiae, the second brightest star in the constellation Cassiopeia. It is classified as a giant F2 star, is roughly three times the size of our Sun, and has about two times the mass of it. Caph, forming one of the stars of the "W" in Cassiopeia, has an apparent magnitude of 2.28 and an absolute magnitude of 1.3, making it one of the brighter stars in the sky. It is about 54 light years from Earth. It was once thought to have a small binary companion but is now known to be a single star.



Caph is classified as a Delta Scuti variable, the second brightest and best known as of such stars after Altair; it has a variability period of 2.5 hours while maintaining a very fast rotation. As such, it has a slightly elongated shape. It is currently ending its main sequence phase and scientists believe that it will soon become a red giant.

The name Caph comes from Arabic and means "Palm," referring to an outstretched hand reaching for the Pleiades. It was originally referred to as *al-Kaff al Khabid*, the "Stained Hand," a reference to a hand that is stained with henna. The ancient Chinese called it *Wang Liang Yi*, the First Star of Wang Liang, the Chinese name for Cassiopeia.

CVA's Eastman Lake star party on February 18



Another in a continuing series on lesser known-but still important-observatories throughout the world

McKim Observatory

The McKim Observatory is near the campus of DePauw University in Greencastle, Indiana. It is named after Robert McKim, a wealthy Irish-born businessman who lived most of his adult life in Indiana and bequeathed money to build the observatory before his death.

In 1884, McKim, who always had an interest in astronomy, gave \$10,000 (today almost \$1 million) to DePauw towards an observatory for students and faculty to use. The observatory was established shortly afterwards and McKim was able to see it go into operation by the time of his death in 1887. The original telescope, which is still used, is a 9.25"

Alvyn Clark refractor. In the early 1900s, a 4" meridian transit telescope was added. Since the 1980s, several modern telescopes have been added at the observatory, including three 8" and one 11" Celestron Schmitt-Cassegrain reflectors, a 17" Dobsonian reflector, and another 6" reflector with a CCD camera. The original 9.25" Clark refractor is used by both the professors and students for research and the local astronomical society for public outreach events, and the transit telescope is used for determining satellite orbits, while the Celestron reflectors, the CCD telescope, and the Dobsonian are used by the faculty and students at the university for studies and research. The observatory is managed by the physics and astronomy department at DePauw, and now listed on the National Register of Historic Places.



Galaxy in the Eyepiece NGC 3982

3982 is a spiral galaxy inside the cup of the Big Dipper, part of Ursa Major, approximately 68 million light years from Earth. It was discovered in 1789 by William Herschel and was originally classified as a planetary nebula. Its apparent magnitude is 12. Its diameter is 30,000 light years, making it only about a third the size of our Milky Way.

The galaxy is one of a whole cluster of galaxies with M109 as its central feature; it is estimated that there are over 50 galaxies in the M109 cluster. 3982 is also known to have a supermassive black hole at its core. 3982 is noted for two things; first, it is an area of intense star formation in its arms, especially Cepheid Variables; and second, it produced a very bright supernova in 1998, one of several over the past 50 years. Both characteristics have allowed scientists to use the galaxy as an accurate distance measurement marker.



3982 image-NASA/ESA/HST

Another Astronomy Short-

In England, the Big Dipper is commonly known as The Plough. In Germany, it is The Great Wagon, and in Holland, The Saucepan. To the Vietnamese, it is The Big Rudder (as in the rudder of a ship), and to Malaysians, it is referred to simply as The Boat.

