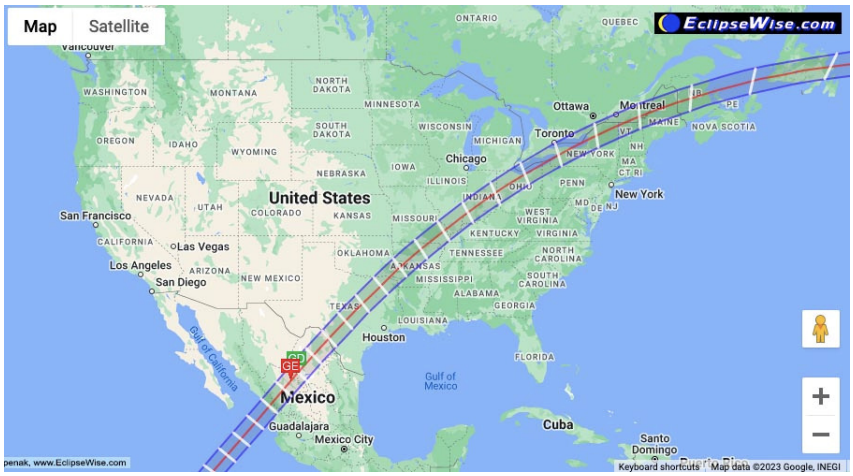
THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno March-April 2024

The April 8, 2024 Total Solar Eclipse



April 8 will see another total eclipse in the U.S., this one beginning in the Pacific Ocean, traversing through north-central Mexico, swinging through Texas and the Midwest, as well as the Northeast before heading out to sea east of the Canadian Maritime Provinces. On many places along the totality line, the period of totality will be almost twice as long as the 2017 eclipse, over four minutes in some areas. The Fresno area will experience 51% of totality; the eclipse in the San Joaquin Valley will begin at 10:12am, maximum will occur at 11:15am, and end at 12:21pm. As with the 2017 eclipse, the *Observer* will be asking for reactions and images from CVA members who plan to travel either south or east to view this amazing solar event. Yours truly will be in southern Missouri, right on the eclipse line, with hopefully clear skies and unobstructed views (ironically, the paths of both the 2017 and the 2024 eclipses cross only a few miles from where I'll be). It should be a great view.

Astronomy Quote of the Month-

" Astronomy is much more fun when you're not an astronomer…"

-Brian May, guitarist for Queen and an astrophysicist

In this Issue-

Central Valley Astronomers

Web address www.cvafresno.org

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The President's Message

CVA meetings are now at Round Table Pizza; the CVA events so far have been successful with good attendance and participation. It represents an pportunity to meet and socialize in better settings than the dark skies that we all enjoy.

On April 8, 2024, a total solar eclipse will cross North America, passing over Mexico, the United States, and Canada. A total solar eclipse happens when the Moon passes between the Sun and Earth, completely blocking the face of the Sun. The sky will darken as if it were dawn or dusk. It is not the only event happening in April. It is also the ideal time for most people to participate in a Messier Marathon, which is during a new Moon or on the weekends closest to a new moon, from mid-March to early April. Unfortunately, the weather is often bad for such an event. A Messier Marathon is an event in amateur astronomy where participants attempt to observe all 110 Messier objects in a single night. Messier objects are a set of astronomical objects cataloged by the French astronomer Charles Messier in the late 18th century. These objects include galaxies, nebulae, and star clusters, and they are popular targets for amateur astronomers due to their brightness and accessibility. The timing of a Messier Marathon is usually chosen to coincide with a night when all 110 objects are visible within a single night, typically during late winter or early spring when the Milky Way is visible in the sky and the nights are long enough to accommodate the observation of all objects. For such an event, it is possible to meet at Eastman Lake with dark skies and clear weather to maximize the chances of completing the marathon successfully. Messier Marathons are both a challenge and a social event for amateur astronomers, providing an opportunity for enthusiasts to test their observing skills, share knowledge, and enjoy the beauty of the night sky. We hope that this year will bring us an opportunity to meet and have a Messier Marathon.

Clear skies-Herbert Cecotti

Number of exoplanets found as of February 2024-

Confirmed-5,587 Possibles-10,103

Confirmed planetary systems-4,288

How many more are out there?

Tens of Thousands? Hundreds of Thousands?

Millions?

(From NASA's Exoplanet Exploration Website)

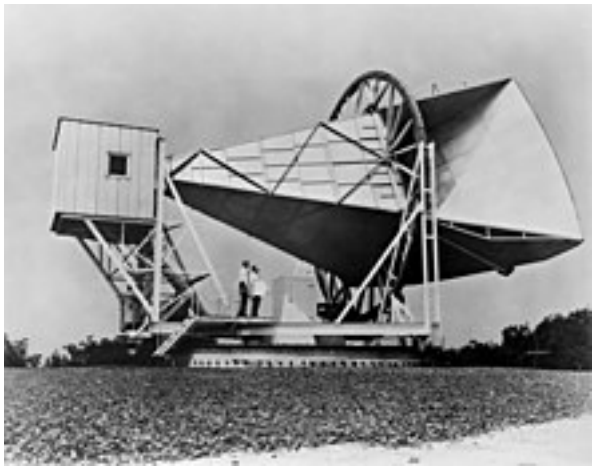
Profiles in Astronomy

Arno Penzias 1933-2024

Arno Penzias, who, along with Robert Wilson, won the Nobel Prize for the discovery of the cosmic microwave background radiation, died on January 22, 2024, at an Alzheimer's care facility in San Francisco. He was 90 years old.

Penzias was born in Munich, Germany in 1933, where his father was a leather salesman. The Penzias family was Jewish, and in 1939, they fled from Nazi Germany, first to England, and then to the United States, where they settled in the Bronx in New York City. After attending local schools, Penzias went to City College of New York, where he earned a bachelor's degree in physics in 1951. He then served in the Army for several years before returning to school at Columbia University, where his graduate advisor was Charles Townes, who would eventually win the Nobel Prize for the discovery of the maser. He earned both a master's degree and a doctorate in physics from Columbia.

After receiving his Ph.D. in 1962, Penzias was hired by Bell Labs in New Jersey. There, he teamed up with another young physicist, Robert Wilson, to help build satellite communications receivers. Their main project was a 15-meter horn antenna in Holmdel, not far from Bell, which had been modified for transmissions involving the Telstar satellites. Once they rebuilt it, they were allowed to use it for radio astronomy research. However, starting in 1964, they kept getting an odd low frequency radio signal which had no known origin. They thought it might be interference from nearby power lines, which was quickly proven wrong. They then theorized that loose bolts and screws on the horn might be causing it; not that, either. Neither was bat and pigeon poop inside the horn. Finally, in 1965, the two wrote a paper on their "noise," which was published in a science journal. It was read by Robert Dicke, an astronomer at nearby Princeton University, who immediately contacted them, realizing that they had stumbled across the cosmic microwave background (CMB) radiation, the remnant signature of the Big Bang, which had originally been predicted by George Gamov and his associates in the 1940s. Penzias and Wilson themselves knew almost nothing about the CMB; Wilson was in fact a supporter of the Steady State theory of the universe. Within a few months after the article's publication, several other scientists tuned into the CMB and its validity was confirmed; it was one of the most important astronomical finds of the 20th century. For their serendipitous discovery, Penzias and Wilson were awarded the Nobel Prize in physics in 1978.



Penzias spent his entire career at Bell Labs, eventually becoming its vice-president and chief scientist before retiring in the late 1990s. He won many other honors besides the Nobel Prize, including the Henry Draper Medal from the National Academy of Sciences.

Above-Penzias and Wilson at the famous horn radio receiver in Holmdel, New Jersey, in which they detected the cosmic microwave background radiation

Space Age Archeology

Alouette 1

Alouette was the first satellite built and launched by Canada, which became the fourth country to launch a satellite into Earth orbit, after the Soviet Union, the United States, and Great Britain. It was part of a joint agreement between the U.S. and Canada.

The Alouette program began in 1959. Three satellites were originally built, with two intended to go into space, one as the primary, the other as a backup. Most of the design and construction was done at the Defense Research Telecommunications Establishment Electronics Laboratory in Ottawa, Ontario; RCA Victor in New Jersey also provided some of the electronics. The primary satellite, known as S27-B, was shaped roughly like a child's spinning top, covered with solar panels, and displaying several"whip" antennas. It carried four scientific instruments, used to study Earth's upper atmosphere: a sweep-frequency sounder to measure electron density; an energetic particle detector; a VLF(very low frequency) receiver; and a cosmic ray detector. At launch, it weighed 320 Earth pounds. Shortly before launch the satellite was given the name of Alouette, meaning "skylark" in French. It was also the name of a popular French-Canadian folk song.

Alouette 1 was launched atop a Thor-Agena B rocket from Vandenberg Air Force Base on September 29, 1962, and put into a near-circular polar orbit of about 620 miles above the Earth. It remained in operation for over ten years, transmitting data about the ionosphere, until it was switched off on September 30, 1972. It is still in orbit today. The backup satellite, S27-C, was launched as Alouette 2, along with the U.S.'s Explorer 31, from Vandenberg on November 30, 1965, into an orbit similar to Alouette 1's. It, too, was designed to study the upper atmosphere, was operational for ten years, and finally switched off in 1975.(If one is wondering what happened to the first satellite, S27-A, it was a prototype that was used for ground testing and was never intended to be launched. Today it is in a museum in Canada).

Galaxy in the Eyepiece-

NGC 5195-M51's "Other" Galaxy

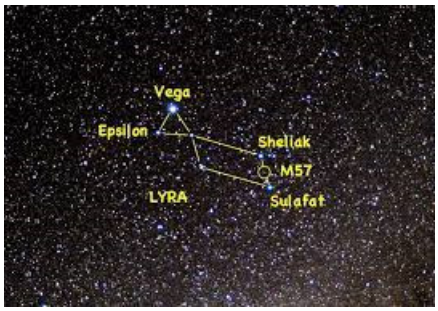
M51, the Whirlpool Galaxy, is one of the best-known objects in the northern skies and has been studied by astronomers for over 200 years. Much less known, though, is its companion, NGC 5195. As such, it is sometimes referred to as M51b; it is also included in Halton Arp's catalogue of peculiar galaxies and is known as Arp 85. In Hubble's classification of galaxies, it is known as an irregular lenticular galaxy. NGC 5195 was first noticed and described as a distinct object by Charles Messier's assistant, Pierre Mechain, in 1781. It has an apparent magnitude of 10.4 and is about the same distance as M51 from the Earth, 25 million light years away.

NGC 5195 is attached to M51 by a long stream of dust and gas; many scientists believe that it is being greatly influenced by M51's gravitational pull. One indication of that is a three-pronged "crown" which comes off NGC 5195; it is made up of gas and newly formed stars. Scientists also believe that 5195 has a huge black hole at its center which, ironically, is powering star formation through gravitational tides and shock waves. They note massive numbers of new stars in the smaller galaxy.

Star Stories

Sulafat

Sulafat, also known as Gamma Lyrae, is the second brightest star, after Vega, in the constellation Lyra. It is the star at the opposite end from Vega and is easily visible with an apparent magnitude of 3.2. Its absolute magnitude is -3.14. It is classified as a B9 star, and like many other easily seen stars, was well known to the ancients. It has a mass 5.75 times that of the Sun and is fifteen times the diameter of the Sun, meaning that it has moved off the main sequence and is beginning the later stages of its existence. According to the latest parallax measurements, it is 620 light years from Earth.



In 1909, Canadian astronomer Samuel Mitchell identified Sulafat as a spectroscopic binary. However, more recent studies indicate that it is a single star which is spinning at a very high rate of speed, which may account for its unusual spectrum.

The name Sulafat comes from the Arabic word *al-sulhafat*, which means "turtle." This relates to the fact that in ancient times, lyres, or harps, were made from turtle shells.

CVA Calendar for March and April 2024

March 1-Monthly meeting at Round Table Pizza at First and Bullard. Priyansk Joshi, a graduate student in physics at Fresno State, will give the presentation. Begins at 7pm

March 9-Monthly star party at Eastman Lake

March 15-Riverpark monthly public star parties begin for 2024

April 2-Volunteer private star party event at Rafer Johnson Middle School in Kingsburg

April 5-Monthly meeting at Round Table Pizza. Fred Lusk will give the presentation. Begins at 7pm

April 6-Monthly star party at Eastman Lake

April 13- Fresno State Vintage Days

April 12-Riverpark public star party

April 26-Volunteer private star party event at Fresno Chaffee Zoo

Astronomy Short-

Ernst Mach(1838-1916), the Austrian-born physicist who measured and formulated the speed of sound, which we know as Mach numbers, also wrote several books on the philosophy of science. His most important idea was that any concept which could not be proven through objective experimentation should be rejected by scientists. Today, it is part of the Scientific Method.

What's New in Space

Another Spaceflight Pioneer Sails into the Cosmos
Richard Truly 1937-2024

Just as this issue was being finished up, it was learned that Richard Truly, one of astronaut trainees who was chosen for the Air Force's MOL(Manned Orbiting Laboratory) program in the 1960s, then was transferred to NASA's astronaut corps, died on February 27 at the age of 86. Truly not only flew two shuttle flights, but was also the first astronaut to become NASA's chief administrator.

Truly was born and raised in Fayetteville, Mississippi, where he became an Eagle Scout among other distinctions. He attended the Georgia Institute of Technology, majoring in aeronautical engineering and participating in the Navy ROTC program. Afterwards, he joined the Navy and became a Navy fighter pilot. He was first a student and then an instructor at the Air Force's Advanced Research Pilot's School at Edwards Air Force Base, considered an important stepping stone to becoming an astronaut. In 1965, he was chosen, along with eight other Air Force, Navy, and Marine pilots to participate in the MOL program, a military space station which would use a modified Gemini capsule and a Titan second stage as the station. However, the Vietnam War took away from the MOL budget and it was cancelled in 1969. Not wanting to waste valuable training, the Air Force asked NASA to take the MOL astronauts into its astronaut corps, even though the space agency, with its own budget problems, really didn't need them. Truly and the others became NASA employees. Truly was first assigned to the Skylab program, then to the Space Shuttle test program. In 1981, he was the commander of STS-2, and in 1983, he served as commander of STS-8. He then left NASA to be the first director of the Naval Space Command. However, after the Challenger tragedy in 1986, he returned to NASA as Associate Administrator for Manned Spaceflight, and in 1989, he was promoted to Chief Administrator of NASA, the first astronaut to head the space agency. He held that office for three years until, 1992, when he was forced out in a power struggle with then Vice-President Dan Quayle. He then returned to Georgia Tech as a vice-president of the institution, and later worked for the Department of Energy before retirement.

Mars Ingenuity Will Fly No More

On January 25, NASA and the Jet Propulsion Laboratory announced that the Mars Ingenuity helicopter has been permanently grounded. JPL lost contact with the mini-helicopter on January 20, then regained it on January 22, However, it also detected problems with it, and an image showed that one of the rotors was damaged. JPL said that Ingenuity will still be useful in its stationary position on the surface of Mars and is now uploading all the data in its information banks for relay to Earth.

Ingenuity was designed and built as a technology demonstrator and was intended to make only five flights. But, over a period of almost three years, it made 72 flights in all. It worked so well and was so successful that, after a while, JPL gave it operational status as a scout, flying ahead of the Perseverance rover and imaging interesting areas for further close-up study. Its longest flight, in April 2022, was almost half a mile.

On February 9, NASA announced that the area in which Ingenuity landed for the final time will be named Valinor Hills, a reference to the Never-Ending lands in J.R.R. Tolkien's *The Lord of the Rings* fantasy stories.

In the meantime, Perseverance has found definitive evidence that Jezero Crater, which it is now transversing, was indeed once a lake with vast amounts of water, and is collecting soil samples which will eventually be brought back to Earth as part of the soil return mission, now scheduled for the late 2020s.

Japan's Lunar Lander Makes it to the Surface in an Odd Way

On January 19, the Japanese lunar lander, known as SLIM, for Smart Lander for Investigating the Moon, made a soft landing on the Moon's surface, but mission managers quickly realized that something was wrong. The craft was losing power, and at first appeared to be a failure. Then, after several days, the Sun's light started hitting one of the solar panels, generating enough power to use the main cameras and relay images back to Earth. They revealed that the craft had landed safely, but was upside down; it had apparently flipped over after landing. Once the situation had been revealed, mission manages devised a plan to keep the craft going: it will be shut down every two weeks during the lunar "night," then reactivated once the sunlight comes back into position to hit the solar panels and generate electricity. Already, SLIM has discharged two small rovers, known as LEV-1 and LEV-2. LEV-2 sent back an image of SLIM on the lunar surface(right -what the image shows is that it probably landed on an incline and then tumbled down the slope)), clearly showing its inverted position. Despite the mishap, mission officials still hope to do a nearly full range of experiments and return high-definition images of the lunar surface.

IM's Odysseus Spacecraft Also Lands, but Awkwardly as well

Following the Japanese SLIM lander by a few weeks, Houston-based Intuitive Machine's Odysseus Lander touched down on the moon on February 22, the first American landing on the Moon since 1972, and the first ever private commercial spacecraft to land on our only natural satellite. Odysseus was launched aboard a Space-X Falcon rocket on February 15, and landed near the crater Malapert A, about 140 miles from the moon's south pole, not far from where the Artemis moon landings, now starting in 2026, will occur. Both IM and NASA said that Odysseus's descent navigation system malfunctioned, and a quick patchwork program using NASA's experimental laser navigation system aboard the craft, which was originally not intended to help with the landing, had to be employed. After landing IM's president revealed that at first mission controllers were unsure if the craft had landed safely, then received a radio signal from it about ten minutes later. On February 23, IM said that images and data showed that after landing, the craft tipped over on its side, not unlike Japan's lander. They feel confident, though, that it should perform most of its experiments. The mission was partially funded and sponsored by NASA, which is part of the long-term commercial partnership designed to save money and resources.

Space Flight Short

Very early in the Space Age, NASA realized that ball-point pens didn't work when taken into space and used by astronauts to write reports and check off lists. The gravity on Earth that forces the ink downward to write is absent, making them useless in weightlessness. Pencils were deemed too dangerous in space; the tips might break off and float around. The solution? A space pen. Designed by an engineer named Paul Fisher, the Fisher Space Pen has been used on every American crewed space mission since 1968. It looks like a regular pen but has a small cartridge of pressurized nitrogen which forces ink down the tube to the writing tip, resulting in well-written documents in space. Today, the Earth-bound writer can also get them on the internet, but doesn't really need them.

A Visit with SOFIA

In late February, Aileen and I spent a week in one of our favorite places: Tucson, Arizona. We've been there many times in the past, but this year, decided to visit the Pima Air and Space Museum, an attraction we had never been to before now. It's a much larger version of the Castle Air Museum, not far from the Tucson International airport and across the street from Davis-Monthan Air Force Base. To make a long story short, it has a distinct emphasis on World War II and post-WWII aircraft(including several Russian fighter jets, like the Mig 15 and Mig 29), as well as retired Air Force One jetliners, and the "Super Guppy," which was used to fly Saturn 5 moon rocket stages to Florida. What caught my attention, though, was that Pima is the final stop for SOFIA, NASA's flying observatory which was retired in 2022.

SOFIA, which stands for Stratospheric Observatory for Infrared Astronomy, was a joint program between NASA and the German Space Agency and was operational between 2010 and 2022. It ended because Congress felt that $85 million a year was too much in the age of Hubble and the JWST. So, it made its last flight on September 29, 2022, and eventually came to Pima. Its centerpiece was a 2.5 meter reflector telescope, housed in a sealed compartment towards the back of a NASA 747, which flew up to 40,000 feet above the Earth for up to ten hours at a time, above the water vapor layer to allow infrared observations of celestial objects. The Pima museum was offering limited-time tours of the inside of SOFIA, and I jumped at the opportunity to see this groundbreaking scientific plane.

While waiting in line, and fortunately the line was not very long , I struck up a conversation with the man behind me. It turned out he was a retired geology professor from the University of Hawaii, had specialized in planetary geology, studied the Apollo moon rocks,* and at times worked with NASA. He told me, among other things, that one of his students had done research aboard SOFIA. We were allowed to go into SOFIA in groups of twenty. When our turn came, we climbed up the stairs(no jetway for this), and made jokes about not having to go through TSA. Once inside, we saw a miniature version of a NASA control room, with three banks of stations and computer screens. The docent explained that the mission director and assistant director sat in the front bank and the scientists involved in that night's observation program sat at the other banks, monitoring the telescope's sightings. He then took us to the back of the plane where the telescope was situated. Here, we could see a replica of the telescope mount; he said that the telescope itself was owned by the Germans; they took it back after SOFIA was grounded, and eventually plan to use it for another observatory. While SOFIA was operational, a several-inches thick bulkhead separated the telescope from the control room, but for tourist purposes it was open. After a picture-taking session, we were ushered out, another group came to take our place, and we moved on to visit other aeronautical sights. The Pima Air Museum was an altogether worthwhile day, made even more special by the encounter with SOFIA.

***I mentioned to this man that I had recently written an article about the moon rocks for the CVA newletter, and how they were stored at Houston's Manned Spacecraft Center. He told me that while some are at the MSC, the rest are in a special vault at Brooks Air Force Base near San Antonio, as an insurance policy against an enemy attack or a natural disaster. Apparently, that's not a secret, but it's not publicized either.**

From NASA's Night Sky Network (NSN)

Constant Companions: Circumpolar Constellations, Part I

By Kat Troche

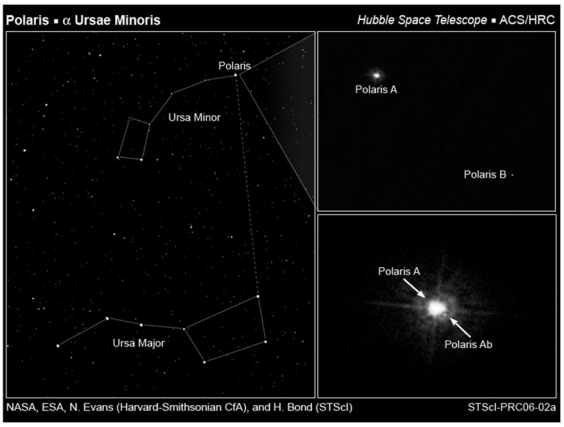
Winter in the northern hemisphere offers crisp, clear (and cold!) nights to stargazers, along with better views of several circumpolar constellations. What does circumpolar mean when referring to constellations? This word refers to constellations that surround the north and south celestial poles without ever falling below the horizon. Depending on your latitude, you will be able to see up to nine circumpolar constellations in the northern hemisphere. Today, we'll focus on three that have gems within: Auriga, Cassiopeia, and Ursa Minor. These objects can all be spotted with a pair of binoculars or a small to medium-sized telescope.

The counterclockwise circumpolar constellations Auriga, Cassiopeia, and Ursa Minor in the night sky, with four objects circled in yellow labeled: Pinwheel Cluster, Starfish Cluster, Owl Cluster, and Polaris.

Credit: Stellarium Web

The Pinwheel Cluster: Located near the edge of Auriga, this open star cluster is easy to spot with a pair of binoculars or small telescope. At just 25 million years old, it contains no red giant stars and looks similar to the Pleiades. To find this, draw a line between the stars Elnath in Taurus and Menkalinan in Auriga. You will also find the Starfish Cluster nearby.

The Owl Cluster: Located in the 'W' or 'M' shaped constellation Cassiopeia, is the open star cluster known as the Owl Cluster. Sometimes referred to as the E.T. Cluster or Dragonfly Cluster, this group of stars never sets below the horizon and can be spotted with binoculars or a small telescope.



Polaris: Did you know that Polaris is a triple star system? Look for the North Star on the edge of Ursa Minor, and with a medium-sized telescope, you should be able to separate two of the three stars. This star is also known as a *Cepheid variable star*, meaning that it varies in brightness, temperature and diameter. It's the closest one of its kind to Earth, making it a great target for study and conceptual art.

Up next, catch the King of the Planets before it's gone for the season with our upcoming mid-month article on the Night Sky Network page through NASA's website!

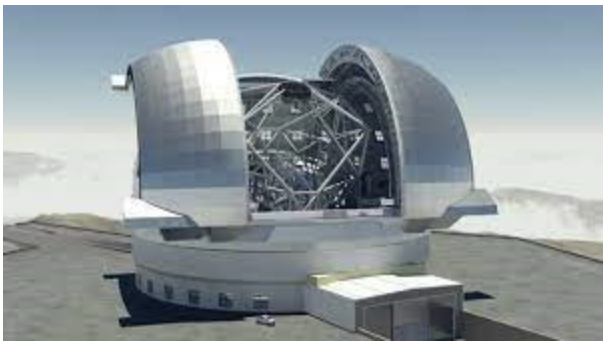
From the CVA Archives

How Time Flies…

"Astronomers are urging a 25-meter telescope. Yep! That's right! 25 meters! They realize that our 5 meter and Russia's 6 meter single mirrors are at about the ultimate technological limit for the casting of a single mirror, but work on a multi-morror 'scope has shown that it is possible to coordinate the movements of the optics with the aid of later beams and computers and therefor would build this one of several mirrors. The projected cost would be 'only $250 million,' about the cost of an aircraft carrier or the current generation of particle physics labs. They should be able to see to the 27th magnitude at 1000 angstroms, or even fainter for certain narrow bands of the spectrum. Would you believe dark dwarf stars, planets around other stars, stellar motions in other galaxies, and weather changes on large planets in our solar system?"

From the April 25, 1977 *Observer*

This was from 47 years ago. At the time, the 200" Hale Telescope at Palomar was the largest working telescope in the world(Note that I said "working." Russia's 6-meter telescope in the Caucasus Mountains, which saw first light in 1976 and is known as BTA-6, has never worked well due to flawed optics and a poorly chosen site. It is currently on its third mirror), the Hubble Space Telescope was drawings on drafting paper and JWST wasn't even thought of, planets around other stars was solely in the realm of science fiction, and cloud changes on the outer planets was something new to scientists. Today, 2024, the 200" Hale is the *seventeenth* largest telescope in the world, and will soon be the nineteenth. The world's largest telescope, the Southern European Observatory's thirty-nine meter giant, will see first light in 2026; it's gone way beyond twenty-five meters, and Caltech's thirty meter telescope on Mauna Kea is now scheduled to be completed in 2028. Even then, both of them will be dwarfed by the proposed seventy-four meter telescope, tentatively named Colossus, which is scheduled to see first light in 2040. Since 1994, over 4,000 exoplanets have been found, and NASA gives daily updates on the weather on Jupiter and Saturn. In ten to twelve years, the Habitable Worlds Telescope, which will detect life on exoplanets, will be launched, and NASA and ESA are planning a huge one-hundred meter telescope on the back side of the Moon. In 1610. Galileo wrote in his notebook after viewing the moons of Jupiter for the first time: "I have seen the most wonderful things!" Indeed, he did, and today we are still seeing the most wonderful things, thanks to ever increasing technology.



(Bad) Astronomy Joke

Astronomer #1: So anyway the cop pulls me over and asks if I realized that I had just run a red light. So I said that I did not see the light as being red, because it must have blue-shifted as I was approaching it.
Astronomer #2: And he let you go?
Astronomer #1: No. He gave me a speeding ticket instead.

From angelo.edu

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

The Hoder-List Observatorium

The Hoder-List Observatorium was originally the Bonn Observatory. It is situated on Hoder-List Mountain about 40 miles southwest of the city of Bonn near the town of Daun in the area of Rhineland-Palatinate in Germany.

The Bonn Observatory was founded by the German astronomer Friedrich Argelander, who is famous for his star catalogue which contains more than 325,000 entries. He taught at Bonn and established the observatory in 1844 with the support of Prussian Emperor Friedrich Wilhelm IV. The original facility was in the city of Bonn and was part of the University of Bonn. There, the observatory thrived for over one hundred years. However, in the post-World War II period, the then-observatory director Friedrich Becker realized that the city's increased population and subsequent light pollution, as well as the university's growing astronomy program, was rendering the facility obsolete, and that a new, more remote site, was necessary. In 1949, a suitable location was found on Hoder-List mountain, at 549m((1,830 feet) above sea level. Construction was started the following year, and in 1954, Hoder-List saw first light.

The first telescope was a .5m Schmidt Camera; it was soon joined by a 36cm double refractor from the old observatory in Bonn. In 1966, the largest telescope on the mountain was built, a 1m Cassegrain reflector.

By the late 1990s, however, the light pollution in the area had grown so much that serious scientific observations were difficult; most of the professors at the university were by then using larger telescopes in other, more remote sites, and the Hoder-List facility was used mostly for student projects and education. In 2012, the observatory was officially shut down and some of the telescopes were transferred to other facilities. However, a local amateur astronomy club continued to use the remaining telescopes. In 2020, the observatory and its facilities were purchased from the university by a former staff member, and today all the remaining telescopes are managed by the AVV, a Friends-of-the-Observatory private group, which conducts both amateur observations and public outreach events.

Eight operational telescopes are currently at the observatory. In addition to the 1m Cassegrain and the 36cm double refractor, there are also several smaller telescopes, including a .6m Richey-Chretien reflector, a .3m Zeiss reflector, a.28m Celestron Schmidt-Cassegrain reflector, and a .15m refractor. They are used by students, amateur astronomers, and the general public.

Images-Top right-the observatory facilities Bottom left-the 1 meter telescope at Hoder-List
Source-Wikipedia