The Newsletter of Central Valley Astronomers of Fresno November-December 2026

The Observer



NASA Asks Private Companies to Help Save the Hubble Space Telescope

On October 30, 2026, NASA released a letter to a number of commercial aerospace companies, asking for their assistance in keeping the Hubble Space Telescope operational through the 2030s and into 2040s. The space agency emphasized that HST, even though it is now overshadowed by newer and more powerful instruments like the James Webb, Vera Rubin, and Nancy Grace Roman Telescopes, is still doing cutting-edge scientific research and demand for its use far exceeds its available observing time. NASA estimates that Hubble has perhaps seven or eight years left before its orbit decays to the point where it could plunge into the atmosphere and burn up. Ideally, it would like a rescue and repair mission to be launched by 2032 at the latest, one that would keep the telescope going until at least 2045 or even 2050, when it will have been in orbit for 60 years. NASA would like to hear suggestions and possible commitments within the next six months.

Central Valley Astronomers-2026

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Number of Exoplanets found as of October 2026-
Confirmed-6,451
How many more are out there-
Tens of thousands?
Millions?

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The President's Message

By Hubert Cecotti

We are already nearing the end of 2026, and we'll enter November by changing the clock to gain 1 hour of evening observing. After a long, hot summer in the Central Valley, it is finally time to enter cooler months, but also cloudy months that will prevent us from looking at the night sky. The previous Star-BQ was unfortunately canceled, but we do hope to have a Star-BQ in November or early December at Eastman Lake, where the weather should be more suitable for a barbecue.

As the year winds down, the night sky offers two bright full Moons, a planet pairing, and the Geminids, one of the year's best meteor showers. November opens with a chance to catch Mars and Jupiter appearing close together on November 2-3. On November 20, Mercury reaches its greatest western elongation, making it easier to spot low in the morning sky before sunrise. The Leonid meteor shower peaks around November 16–17. Its rates are usually modest, but its meteors are fast; find a dark location such as the Helipad, dress warmly, and give your eyes time to adjust. The November full Moon, traditionally called the Beaver Moon, falls on November 24 UTC and is also a supermoon. Uranus reaches opposition the next day, when it is well placed for observing; binoculars - as we would suggest some of our CVA members - or a telescope will help reveal this faint planet. The full Moon's brightness may make faint objects harder to see, so save deep-sky observing for darker nights.

December's main meteor event is the Geminids, peaking on the night of December 13-14. Under ideal conditions, they can produce many meteors, and this year the Moon will be a slim crescent, leaving much of the sky dark. The Ursids follow around December 21-22. They are usually a quieter shower, and the bright Moon may wash out fainter meteors. A second supermoon closes out the year. The December full Moon occurs on December 24 UTC, on the evening of December 23 in much of North America, adding a bright lunar display to the holiday week.

For our CVA members heading into winter, cloudy, cold, or wet nights can temporarily pause observing. That makes Black Friday, November 27, a good opportunity to compare prices on

astronomy gear you've been considering so we can discuss good deals in our gadget night meeting in January. As usual, a sale is most useful when it matches a real need. And when the skies are cloudy, there's still plenty to do indoors: read, plan an observing list.

CVA Calendar for November-December

November 6-Monthly meeting at Round Table Pizza
November 7-monthly starwatch at Eastman Lake
December 4-Monthly meeting at Round Table Pizza
December 12-Monthly starwatch at Eastman Lake

Profiles in Astronomy
David Axion 1951-2012

Axion was born and raised in Yorkshire, England, and educated at the University of Durham, receiving both bachelors and doctorate degrees there. Afterwards, he was active at several universities and research centers, including the University of Manchester, the University of Herfordshire, The Jodrell Bank Radio Observatory, and the Space Telescope Science Institute. He was a professor of astronomy and physics at the University of Sussex when he died suddenly from a heart attack.

Axion studied galaxies that have very active nuclei. He discovered the first "superwind" galaxy, one with an extremely strong solar wind component , which he theorized was being caused by clusters of young stars. It was later confirmed that such winds come out of starburst galaxies, those with regions that produce massive numbers of new stars. He found that YSOs-Young Stellar Objects, have very strong magnetic fields, which give clues to their formations. He also discovered that a kind of galaxy known as a BL Lac object gives off x-rays, indicative of its active central regions.

CVA's 2027 Calendar

Monthly meetings-at Round Table Pizza, Bullard and First Street-begin at 7pm
January 8
February 5
March 5
April 2
May 7
June 4
July-no meeting
August-no meeting
September 3
October 1
November 5
December 3

Club star parties

January 9	**Eastman Lake**
February 6	**Eastman Lake**
March 6	**Eastman Lake**
April 10	**Eastman Lake**
May 8	**Big Stump-Spring Star-B-Que**
June 5	**Big Stump/Courtright Reservoir**
July 3	**Big Stump/ Courtright Reservoir**
July 31	**Big Stump/Courtright Reservoir**
August 27-29	**Sequoia-Kings Canyon Dark Sky Festival**
September 4	**Big Stump**
October 2	**Eastman Lake-Fall Star-B-Que**
November 27	**Eastman Lake**
December 4	**Eastman Lake**

Public outreach events- The dates for the Millerton Lake star watches will be added later

February 12	**Riverpark**
March 12	**Riverpark**
April 16	**Riverpark**
May 14	**Riverpark**
June 11	**Riverpark**
July 9	**Riverpark**
August 6	**Riverpark**
September 10	**Riverpark**
October 8	**Riverpark**

How Many Exoplanets?

By Fred Ringwald

Number of Exoplanets found as of October 2026-
Confirmed-6,336

How many more are out there-
Tens of thousands?
Millions?

We now have an answer to this. After the European Space Agency's *Gaia* spacecraft publishes its fifth and final data release, planned for 2030, the number of known exoplanets is expected to be in the tens of thousands. NASA's *Nancy G. Roman Space Telescope*, launched on August 30 for a 5-year mission, is expected to find over 100,000.

How many more will be out there?

Observations so far have found an average of one exoplanet per star, at minimum. That implies at least as many exoplanets as there are stars. We still don't know exactly how many stars there are in the Milky Way Galaxy. That's because we're in the Milky Way: it's like not being able to see the forest because there are too many trees in the way. But it's estimated there are between 100 billion and 600 billion stars in the Milky Way, with the most likely number being 400 billion.

So, there should be over 100 billion exoplanets in the Milky Way. And the Milky Way is only one of over 6 trillion galaxies in the Observable Universe---although only about half of them are metal-rich enough to have very many planets. "Only," he says.

What's New In Space

Air Force Secretary Reveals the U.S. has Orbital Space Weapons

On September 14, Air Force Secretary Troy Mienk, in a talk, revealed that the United States has developed anti-satellite weapons and has deployed them in space. Although he did not go into details, indications are that they consist of two kinds: laser-like particle beam weapons and kinetic energy devices. It has been widely speculated for several years that the US has been working on such weapons to counteract what are believed to be "killer satellite" spacecraft being developed by both China and Russia. The September 14 announcement has led space experts to believe that the Russian and Chinese satellites have been perfected and are now operational. Their goal is to destroy American communications, navigation, optical, and internet satellites in order to leave the U.S. vulnerable to an attack. The US anti-satellite weapons program, which experts believe has been operational for at least four-five years, may be part of the "golden dome" which has been previously announced, a program that will protect US satellites from destruction in the sky.

Aerospace experts believe that the anti-satellite weapons program goes back as far as the 1980s, when then-President Reagan announced what was called the Strategic Defense Initiative, or SDI, the so-called "Star Wars" orbital defense program. It is known that the Air Force and DARPA, the main military research and development laboratory, have been working on particle beam weapons since the 1990s, and the end result may be what the Air Force Secretary mentioned on September 14.

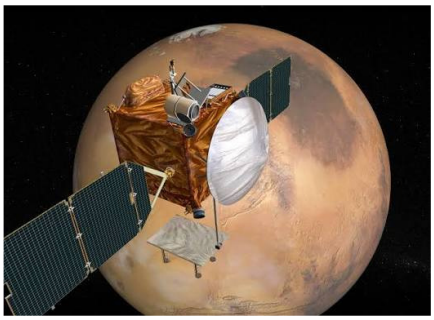
Trump Proposes a Space Academy



On August 29, while in Houston to honor the Artemis II crew, President Trump announced that the U.S. will establish a space academy to train cadets to work on space related programs on Earth as well as undergo astronaut training for future space missions. The President stressed that the growing emphasis on commercial missions as well as plans to establish a permanent base on the moon and eventual trips to Mars, will need a highly trained cadre of space grounded engineers and technicians. The President named NASA chief Jerod Isaacman to head a task force which will explore the pros and cons of a new academy dedicated to space activities and report back to Mr. Trump within 120 days. According to those familiar with the proposal, the academy would be semi-civilian and a branch of NASA, not strictly a military academy. Even if the Isaacman commission is positive on such a proposal, the new academy would still have to get approval from Congress.

President Trump's space academy is not a new idea. Talk of it has been floating around the aerospace community and in Washington, D.C. for several years and members of Congress have suggested such a school. Isaacman himself has, at times in the past, proposed an institution similar to the Starfleet Academy depicted in the TV and movie series "Star Trek." However, those opposed to it say that it would cost too much to establish, and also the Air Force Academy already trains cadets for possible spaceflight roles. As it is, almost all the officers in the U.S. Space Force are Air Force Academy graduates.

NASA Awards Funding to Blue Origin for Next Mars Spacecraft



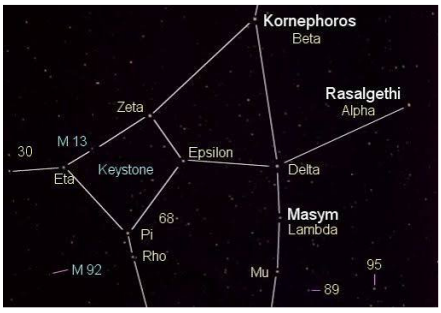
On September 2, NASA awarded Blue Origin a $700 million funding grant to develop the Mars Telecommunications Network satellite, which will be ready for launch in early 2029 and be operational around the Red Planet by 2030. This is in keeping with NASA's next step of Mars exploration: establishing a planet-wide communications system for Mars landers in the 2030s and 40s. The current Mars orbiters, which also serve as communications relays, are aging, having been in orbit since the early 2000s, and their primary roles were science and data-based. The MTN, as it's called, will be purely a communications relay satellite, similar to the Tracking Data and Relay satellites(TDRSs) that NASA uses in Earth orbit today. The space agency is also preparing for eventual human missions to Mars as early as the late 2030s. NASA expects Blue Origin to deliver the satellite to it no later than December 2028.

Mars Soil Sample Return Mission Cancelled

Also dealing with Mars exploration, on October 13, NASA announced that the Mars Soil Sample Return mission, which is five years behind schedule and has ballooned from $2 billion to almost $11 billion, has been cancelled. This was not unexpected; the program had been having problems for several years, mostly due to the sheer complexity of it. Originally, scheduled to be launched in 2024 for a return by 2030, it would have involved three different spacecraft, four, if the Mars Perseverance rover, which has been gathering the soil samples, is counted. Now, the samples, which are lying on the Martian surface in pencil-sized containers, will have to await another return mission, which may not be for another ten to twenty years.

Star Stories

Kornephoros

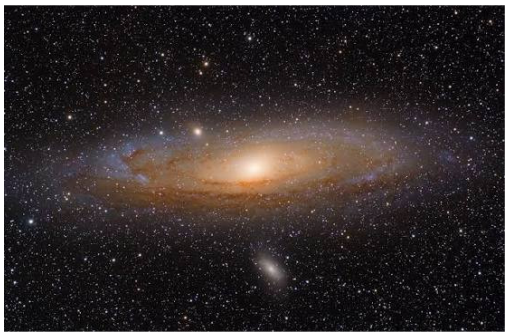


Kornephoros, also known as Beta Herculis, is considered by many astronomers to be the brightest star in the constellation Hercules, even brighter than Rasalgethi, the alpha star. It is classified as a G7 star with an apparent magnitude of 2.81 and an absolute magnitude of -.49. Its mass is 2.85 times that of our Sun, and its distance from Earth, by the latest measurements, is 139 light years. It is estimated to be approximately 450 million years old. In 1977, measurements at the Palomar Observatory showed that Kornephoros has a very small companion star which has a mass of roughly .9 that of our Sun and orbits around the main star every 410 days.

Astronomers believe that Kornephoros has gone off the main sequence and is now a red giant whose diameter is sixteen times that of the Sun. Their studies show that at one time it was probably a B-type star that has slowly changed over the years. Eventually, they believe, not having enough mass to become a supernova, it will end up as a white dwarf.

The name Kornephoros comes from the Greek and means "club bearer." In China it was "Tian Si You Yuan," one of eleven stars that formed an asterism meaning "The Wall of the Heavenly Market." The Arabs knew it as "al-Nasaq al Shami," another asterism which meant "The Northern Line."

Galaxy in the Eyepiece
M31



M31, the Great Galaxy in Andromeda, is one of the most familiar objects in the nighttime sky and, at 2.5 million light years away, is widely considered to be the most distant object that can be seen with the unaided eye. Yet, its features and history go far beyond that, so let's take, in a sense, a closer look at it.

As of the latest measurements, Andromeda is, at 150,000 light years in diameter, about 50% larger than the Milky Way and is estimated to contain approximately one trillion stars. Yet, its overall mass is now thought to be only slightly larger than our galaxy. It is officially classified as an SAB(s)B galaxy; like the Milky Way, it is now known to be a barred spiral. It has an apparent magnitude of 3.44, which is well within human eyesight ability, and an absolute magnitude of -21.5. Unlike most other galaxies, instead of being redshifted, it is blueshifted, meaning that it is coming towards the Milky Way and will probably merge with it in the next 4-5 billion years, and form either an elliptical or lenticular galaxy(although some recent studies show this might not happen after all) At least fifteen dwarf galaxies are satellites of Andromeda, NGC 205 and M32 being the best-known ones. As well, it has almost 500 globular clusters. It is also now known that almost three billion years ago, another galaxy collided with and merged into Andromeda.

Although the ancients probably saw it in the nighttime skies, the first written mention of Andromeda came in the year 964 AD by the Persian scientist Abd al-Rahman al-Sufi, who described it as a "smudge or smear" in the sky. The German astronomer Simon Marius is believed to be the first person to see it with a telescope, in 1612. In 1745, the French mathematician Pierre Louis Maupetuis theorized that it was an "island universe" all its own, like the Milky Way. In 1755, the German philosopher and scientist Immanuel Kant stated that, based on studies of Andromeda, the Milky Way is only one of many galaxies. In 1888, Welsh astronomer Isaac Roberts took the first known photograph of Andromeda(on right). In 1912, Vesto Slipher at the Lowell Observatory did spectrographic studies of Andromeda and found that its radial velocity was over 300km/second; in his estimation too fast to be a part of the Milky Way. A few years later, Heber Curtis at Lick Observatory found nova stars in Andromeda, and, after calculating their magnitudes, estimated that the galaxy was over 500,000 light years away, far outside the Milky Way. He used these measurements in the 1920 Great Debate with Harlow Shapley to argue that the so-called "spiral nebulae" were actually galaxies in their own right, and far away. However, it was not until 1925 that Edwin Hubble, using Cepheid Variables, settled the question of the galaxies being separate "island universes." (Although Hubble is today given credit for discovering that the galaxies are separate from the Milky Way and far distant from it, the evidence shows that he simply confirmed what Curtis and Slipher, among others, had already found).



In 1943, Walter Baade at the Mount Wilson Observatory, in his studies of Andromeda, found that two populations of stars exist: Type 1 and Type 2(he also used Andromeda to develop a new distance measurement, over doubling the distance to the galaxy).* In the 1950s, radio astronomers at Jodrell Bank Observatory in England made the first radio "images" of a galaxy using Andromeda. In the 1980s, using several different measurement systems, astronomers fixed the distance to Andromeda at 2.55 million light years from Earth. More recently, in 2009, using microlensing, a

planet was discovered circling a star in the Andromeda Galaxy, the first known one outside the Milky Way.

Given its prominence in the sky, Andromeda is in many celestial catalogs. The best-known is probably Charles Messier's M31 in his famous list of objects. It is 33 Andromedae in John Flamsteed's catalogue, and NGC 224 in John Dreyer's, based on the Herschel catalog; William Herschel himself first saw it in 1785. In the Second Cambridge Catalogue of Radio Objects, it is 2C 56, and in the Uppsala General Catalogue of Galaxies, it is listed as UGC 454.

***When World War II started for the US, Baade was a German national, and as such, was restricted to a five-mile radius from his house in Pasadena. Walter Adams, the director of Mt. Wilson, talked to Justice Department officials and got Baade's restriction extended to the telescopes on the mountain. This was fortunate, since most of the other Mt. Wilson astronomers, including Edwin Hubble, took leaves of absence to help with the war effort. On top of that, the entire Los Angeles basin was blacked out at night in the(unlikely) event of a Japanese attack. So, Baade had almost unlimited access to the 100" Hooker Telescope, the world's largest at the time, for over three years. He took full advantage of it, making fundamental discoveries in stellar evolution and galaxy formation, among many other things.**

Astronomical Nomenclature

On star charts, most amateur astronomers are familiar with abbreviations like M and NGC. M, of course, refers to Charles Messier's famous catalogue of 103, later expanded to 110, objects, and NGC means New General Catalogue. It was originally simply the GC, compiling the findings of William, Caroline, and John Herschel, and updated and revised by John Dreyer in the late 1800s.Dreyer started the IC(Index Catalogue) as a supplement to the NGC. But other references on celestial charts may be more enigmatic. What is UGC, for instance? Or PK? Or even Cr? Here, then is a guide to deciphering the more puzzling letters and numbers in otherwise familiar star charts

Arp-A catalogue of almost 400 of what he called "peculiar galaxies" by Halton Arp, an American astronomer, in the 1950s and 60s.

Cr-the Collinder Catalogue, a listing of open clusters compiled by Per Collinder, a Swedish astronomer in the 1920s

ESO-European Southern Observatory Catalogue. Celestial objects compiled by the European Southern Observatory in Chile

Lalande-a catalogue of celestial objects compiled by the French astronomer Jerome Lalande, in the mid and late 1700s. He and Messier were contemporaries and friends

LDN-Lynds's Catalogue of Dark Nebulae. A listing of dark nebulae compiled by American astronomer Beverly Lynds. It contains over 1,800 objects

Mel-The Melotte Catalogue. Consists of 245 star clusters compiled by Philbert Melotte, a British astronomer, in 1915.

Mrk-The Markarian Catalogue, a listing of over 1,500 galaxies complied by Benjamin Markanian, an Armenian astronomer, starting in the 1960s

PK-a general designation given to any one of several catalogues compiled by Lubos Perek and Lubos Kohoutek, Czech astronomers, in the 1960s. They list planetary nebulae.

Ru-the Ruprecht Catalogue, a listing of open stars cluster compiled by Jaroslav Ruprecht, a Czech astronomer, in the 1960s

SAO-The Smithsonian Astrophysical Observatory star catalogue. Consists of 258,000 stars, and first published in 1966

Sh2-the Sharpless Catalogue, a listing of HII regions compiled by American astronomer Stuart Sharpless in the 1950s

∑(Sigma)-refers to a catalogue of double stars compiled and published by the German astronomer Frederich von Struve in 1827

Tr-The Trumpler Catalogue. A listing of open clusters compiled by Robert Trumpler, a Dutch-born American astronomer, in the 1930s

2C and 3C-The second and third Cambridge catalogues of radio objects. Complied at Cambridge University in the 1950s and 60s. The most famous is 3C 273, the first known quasar

UGC-The Uppsala General Catalogue. Published in 1972 by Peter Nilson at Uppsala University in Sweden. It contains over 12,000 faint galaxies

V-usually refers to little-known variable stars

vdB-The van den Bergh catalogue, a listing of reflection nebulas compiled by Sidney van den Bergh, a Canadian astronomer, in the 1960s

Zw-Referring to any one of several catalogues of galaxies compiled by Fritz Zwicky, a Swiss-born American astronomer, from the 1930s to the 1960s

Space Age Archeology

Pioneer 10

Although, like many other early spacecraft, it is almost forgotten today, Pioneer 10 was a true space pioneer; it was the first craft to go beyond the inner solar system to one of the outer planets. It is now drifting and has become the first spacecraft to leave the solar system.



Pioneer 10 originated with the Pioneer program to explore the solar system in the late 1950s. By the early 1960s, NASA had eyes on a program to make a "grand tour" of the outer planets, taking advantage of their orbital locations in the late 1970s and 1980s to travel from one to another using their gravity to shorten the travel time. This would eventually become the Voyager missions. It was decided to first mount scouting missions of sorts using two spacecraft, originally designated Pioneers F and G. Pioneer F, whose goal was to fly by Jupiter, was designed and managed at NASA Ames Research Center in California, and the contract to build it was awarded to TRW Space Systems(now part of Northrop-Grumman) in 1969. The craft had to be built and tested for a 1972 launch, to take advantage of Jupiter's position at the time. Pioneer F's

main feature would be an eight-foot wide dish antenna; attached to it was a hexagonal "bus, which would carry several scientific instruments, including a plasma detector, cosmic ray detector, magnetometer and micrometeorite counter, along with high resolution cameras. On booms extending out from the bus would be additional instruments and radioisotope-thermal generators that would produce electricity. Complete, it weighed 570 Earth pounds at launch. Since the craft would leave the solar system and drift in interstellar space for thousands of years. Astronomer Carl Sagan, who was part of the Pioneer scientific team, designed a plaque depicting humans and Pioneer's origin, to be attached to the side of the bus in the event it was found by an extraterrestrial civilization.

Pioneer F, renamed Pioneer 10, after the earlier Pioneer spacecraft, was launched atop an Atlas-Centaur rocket from Cape Canaveral on March 3, 1972. As part of the launch process, it reached the highest speed yet achieved by any Earth craft, of 32,400 miles per hour, necessary to leave the inner solar system and head for Jupiter. On November 6, 1973, Pioneer 10 entered Jupiter's area of influence and program managers at the Jet Propulsion Laboratory in California turned on its cameras. On November 8, it passed through the orbit of Sinope, Jupiter's then most distant moon. By November 26, it had passed all the outer moons and directed its cameras and instruments on the inner moons and the planet itself. In early December 1973, the spacecraft passed by the large moons Europa and Ganymede, and then made its closest approach to Jupiter itself on December 3, coming within 82,200 miles of the upper atmosphere and traveling at 82,000 miles per hour. It continued to transmit information and images of the giant planet; eventually, over 500 high-quality images were received from it.

Afterwards, using Jupiter's gravity assist, Pioneer 10 made a slingshot trajectory into the outer solar system. It crossed Saturn's orbit in 1976, Uranus's in 1979, and Neptune's in 1983, becoming the first craft from Earth to leave the solar system. NASA communicators kept in touch with it until January 23, 2003, when its signals were too weak to be heard. All that time, it kept sending back important data on the trans-solar medium. NASA again tried to contact it in 2006 but got no response. It is now in interstellar space, and heading towards the star HIP 117795, which it may reach in 90,000 years. It was humanity's first messenger to the stars, and a most successful one at that.

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

The Godlee Observatory



The Godlee Observatory is located on the campus of Manchester University in Manchester, England. It was established in 1902, when a wealthy patron, Francis Godlee, donated funding for an observatory tower atop the Sackville Street Building on the campus near the center of the city. What is interesting about the dome is that it is one of only two surviving astronomy domes from the 1800s and early 1900s made of paper-mache(although it seems odd, paper-mache was widely used for telescope domes at the time because it was cheap and lightweight, and apparently it did hold up against the elements). For many years, the observatory was run by the University and used by professors and students. In the 1970s, with growing light pollution in the city, it was taken over by the Manchester Astronomical Society, which uses it for star watches and public outreach events. However, it has been closed since 2022 for extensive renovation and repairs.

The observatory has two telescopes, both made by the Thomas Grubb Company(see the September-October 2026 issue of the Observer) in the early 1900s. One is an 8" refractor and the other is a 12" Newtonian reflector. With the ongoing repairs, there is no indication when they will be used again.