

Notice-

Riverpark public star parties are now on Friday nights!



THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno

May-June 2023

CVA's April Meeting

Normally, CVA monthly meetings are not usually written up, but the meeting on April 1, 2023, produced, not only a good presentation, but also several proposals and decisions which will have a influence on CVA meetings and future activities.

President Hubert Cocetti started the meeting by giving a presentation on the galaxy cluster in Virgo, discussing the overall structure of the cluster, including the Markarian Chain, and several prominent galaxies in the cluster. It was a concise and informative talk. Afterwards, star party coordinator Brian Bellis announced that, with Covid at a low (but remember, it's still around and everyone still needs to be careful), several groups have asked about private star parties. One will be for Ballis Glass on May 5; another will be for the Girl Scouts on June 24, and a third will be for Madera Library on July 21. In addition, the Fresno Unitarian Church has asked CVA to bring telescopes for one of its outdoor events on a date to be announced. Also, CVA has decided to have two Star-B-Ques a year, one in the spring and one in the Fall. The first Spring one will be on May 20.

Steve Harness has been in touch with the Riverpark management; starting this spring, it has decided to set up a stage and host live music and performers in the same area and on the same Saturday nights as CVA's scheduled Riverpark starwatches. CVA has been given the option of moving to another area, but instead, the club will have its Riverpark starwatches on Friday nights instead. So, the Riverpark dates will be moved up by one day. The date changes will be posted on the club's website and Facebook pages. Steve also announced that he has been in contact with NASA about a speaker from UC Irvine who will talk about Dark Matter. This will be done live through Zoom at either the May or June meeting dates. Two more things concerning meetings were also discussed. One is a proposal to have what is sometimes known as a "hybrid" or "livecast" meeting, both live and on Zoom, in order to increase attendance. This will be looked into and possible started in the fall. A second proposal is to move the meetings from Saturday nights to Friday nights. Several members liked this idea; it would free up weekends for family events, trips, and other activities. This will be more seriously discussed at the CVA board meeting in August.

Astronomy Quote of the Month-

"The dinosaurs became extinct because they didn't have a space program. And if we become extinct because we don't have a space program, it'll serve us right."

Larry Niven (b.1938), science fiction writer

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Central Valley Astronomers

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CVA and Astronomical events in May and June

May 6-CVA monthly meeting. Fred Lusk will talk about globular clusters, aka "Cosmic Mothballs"

May 20-CVA monthly starwatch and Spring Star-B-Que* at Eastman Lake

May 26-River Park public starwatch

June 1-Millerton Lake public starwatch

June 3-CVA monthly meeting. Speaker and topic TBA

June 17-CVA monthly starwatch at Eastman Lake

June 23-River Park public starwatch

*No, that is not a mistake; CVA will have two Star-B-Ques a year from now on; one in the spring and one in the fall

May 5-Flower Full Moon(Named after flowers blooming in the spring)

May 6-Penumbral Lunar eclipse in Europe, Africa, Asia and Australia

May 6.7-Eta Aquarid meteor shower

May 19- New Moon

May 22/23-Moon passes between Venus and Mars

June 4-Strawberry Full Moon(named after the berries that grow at this time)

June 18-New Moon

June 21-Summer solstice in the northern hemisphere

Number of exoplanets found as of April 2023-

Confirmed-5,332 Candidates-9,432

How many more are out there?

Tens of thousands? Hundreds of thousands?

Maybe millions?

(From NASA's Exoplanet Exploration Website)



The President's Message-

Artificial Intelligence plays a key role in both our daily life and in astronomy. Advanced image processing tools use artificial intelligence techniques to denoise and enhance images. In the last few months, ChatGPT, a natural language processing tool driven by AI technology, allows us to have human-like conversations with a computer. To the question "Why are amateur astronomers important?", ChatGPT provides the following answer:

"Amateur astronomers play an important role in the field of astronomy for several reasons:

- 1. Citizen Science: Amateur astronomers can contribute valuable data to the scientific community by observing astronomical events and phenomena that are often overlooked by professional observatories. This data can be used to study the behavior of celestial objects, the evolution of the universe, and to identify new discoveries.*
- 2. Education: Amateur astronomers can inspire and educate the general public about the wonders of the universe. They can share their knowledge and experiences through public outreach events, online communities, and social media platforms. This can help promote an interest in science and astronomy, particularly among young people.*
- 3. Discoveries: Amateur astronomers have made significant contributions to the field of astronomy by discovering comets, asteroids, and other celestial objects. Some amateur astronomers have even discovered exoplanets, which are planets orbiting stars outside our solar system.*

Cost-Effective: Amateur astronomers can conduct their observations using affordable equipment, making it more accessible for people from all walks of life to participate in astronomy. This can lead to a broader and more diverse range of perspectives and insights in the field.

Overall, amateur astronomers provide a valuable and unique perspective on the universe and contribute to the scientific understanding of astronomy while inspiring and educating the public."

ChatGPT provides a good and clear answer. ChatGPT is a technology that cannot be ignored.

To the question "Can amateur astronomers be replaced by AI?", ChatGPT answers:

"AI can assist and enhance the work of astronomers, but it cannot replace the unique perspective and contributions of amateur astronomers. While AI can process large amounts of data quickly and efficiently, it lacks the creativity, intuition, and personal experience that amateur astronomers bring to their observations. Amateur astronomers are also able to adapt to changing conditions and unexpected events in real-time, which is not something that can be programmed into AI.

Additionally, amateur astronomers play a vital role in engaging and educating the public about astronomy. AI cannot replicate the human element of storytelling and personal connections that inspire curiosity and interest in science. Overall, AI can be a valuable tool for astronomers, but it cannot replace the passion, curiosity, and contributions of amateur astronomers."

Thank you for your answer ChatGPT. AI may not replace amateur astronomers, but it may replace the president's message.

It is currently the galaxy season; the Milky Way and globular cluster season is coming. After several months with bad weather preventing many members of the club from going out to look at the night sky, we are all delighted that club members will be able to meet more often during the following months with various events, including a Star-BQ in May.

Clear skies always-
Hubert Cocetti-CVA president

Profiles in Astronomy

James Gregory 1638-1675

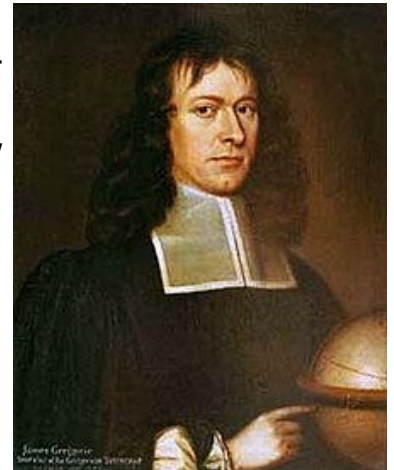
A few months ago, I was perusing through a small book entitled Scottish Clans and Tartans by Ian Grimble. While reading about the Clan Anderson, I came across a passage referring to a member of the family, David Anderson, who was a well-known mathematician in the early 1600s: "The family talent passed on through a daughter to his grandson, James Gregory, the inventor of the reflecting telescope." This piqued my interest, since popular history tells us that the modern reflecting telescope was invented by Isaac Newton. So, I decided to find out more about this James Gregory and the author's claim of him, rather than Newton, inventing the reflector telescope. –the editor

James Gregory was born in Drumoak, Scotland, in 1638. His father was a clergyman, and his grandfather and great-grandfather were both mathematicians. He attended Marischal College in Aberdeen (which in the 1800s would become the University of Aberdeen). Afterwards, he traveled, first to London, then to The Hague and Paris, and finally to Padua, in Italy, where he studied mathematics and physics (then called natural philosophy). He returned to Scotland in 1668, where he taught mathematics at the University of St. Andrews. In 1774, he quit St. Andrews and taught at the University of Edinburgh until his death the next year at the young age of 37.

While in London in 1663, Gregory wrote and published a treatise on optics, known as *Optica Promota*, which, among other things, described the reflective properties of mirrors. At the end of his treatise, he outlined his ideas for a type of telescope, one which used a parabolic mirror, rather than a lens. The mirror would be placed in a long tube, gather light, bounce it up to a smaller parabolic secondary mirror in the middle of the tube, then be bounced back to the observer through a small hole in the center of the primary mirror. This was not his original idea; several other scientists, including Galileo, wrote about using mirrors instead of lenses, in order to eliminate chromatic aberration, for telescopes as early as 1616. Apparently, Gregory tried to make an operational telescope from his ideas but was unable to do so before his death. His telescope with the hole in the primary mirror did not work with the available technology at the time; today, Gregory's design is known as the Gregorian Telescope, and is rarely used. Some science historians believe that Newton obtained and read a copy of Gregory's treatise and used it as an inspiration for his own reflector telescope, which he developed in 1668. Newton's telescope put a flat secondary mirror at the top of the tube and angled it so that the light came out through a hole in the side of the tube and focused at the eyepiece. So, Newton probably did not invent the reflector telescope from scratch but can be credited with developing the first practical and operational reflector.

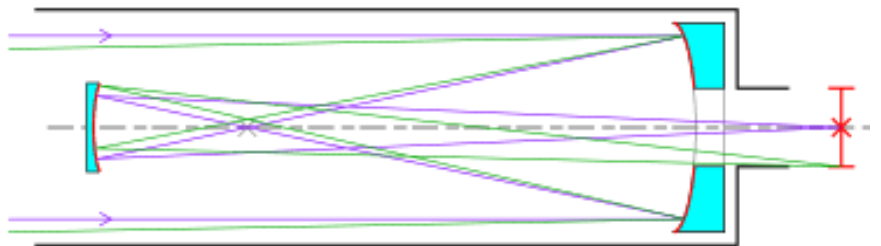
One of the other ideas in *Optica Promota* is that light could be used to find the distances to stars. With this, Gregory was introducing the concept of stellar magnitudes as a distance measurement, pre-staging stellar photometry, which would not be used as an astronomical tool for another 200 years.

In Padua from 1666 to 1668, Gregory made a name for himself by writing and publishing several treatises on mathematics, dealing mostly with geometry and what today is trigonometry. Some mathematical historians see the equations in one of his treatises as being very similar to calculus, which Newton had developed a few years earlier and Leibniz would a few years later. These papers brought him to the attention of other scientists and mathematicians in Europe, and when he returned to England in 1668, he was made a member of the Royal Society in London at the relatively young age of 30. After his death, he was all but forgotten, but in the late 1800s, with the advent of modern astronomy and the interest in reflective, rather than refractive, telescopes, his life and achievements came back into prominence.



The Gregorian Reflector Telescope

James Gregory based his telescope on ideas that were floating around Europe in the early and mid-1600s involving telescopes that used curved mirrors rather than lenses. He tried to build one himself, but did not have the optical skills, and could not find an optician willing to make one before his death. In 1673, Robert Hooke, one of the founders of England's Royal Society, built and used the first operational Gregorian telescope. Over the next 200 years, various other scientists used the Gregorian design, but it never became popular. Today, a few larger telescopes use Gregorian technology, including the Vatican Advanced Technology Telescope and the Giant Binocular Telescope, both in southern Arizona. The Jodrell Bank Radio Telescope in England as well as the Daniel Inouye Solar Telescope in Hawaii use Gregorian technology. The Giant Magellan Telescope, currently being built in Chile, is also based on Gregorian principles.



Top-a cutaway view of the Gregorian design

Left-a 4" brass Gregorian telescope built and used by English astronomer and optician George Adams(1750-1795)

Star Stories

Shaula



Shaula, also known as Lambda Scorpii, is the second brightest star in the constellation Scorpius, which forms the tail or stinger of the Scorpion. It has an apparent magnitude of 1.62 and an absolute magnitude of -3.7. Based on the latest measuring techniques, Shaula is 570 light years from Earth.

Scientists have determined that Shaula is actually a triple star system. The main star, known as Shaula A, is a B1 Beta Cepheid variable. It has a size 8.8 times that of our Sun and a mass eleven times that of our Sun. The second star, Shaula B, is also a B star and orbits Shaula A once every 2.9 Earth years. Its size is 5.7 times that of our Sun's and its mass is about eight times that of the Sun. The third star, known as Shaula Ab, which is 1.8 times the size of our Sun, is kind of an anomaly. Some astronomers believe that it is a pre-main sequence star that is still forming, drawing material off Shaula A as it orbits it every 5.9 days. Others, though, believe that it might be a neutron star, given the huge amounts of radiation, especially x-rays, that it is giving off. Given their proximity to each other, scientists believe that at least Shaula A and B were formed at the same time in the same nebula. They are estimated to be about fifteen million years old.

The name *Shaula* comes from Arabic and means "the raised tail," a reference to the tail of a scorpion. To the Chinese, it also meant "tail."

What's New In Space

More Soyuz Troubles

According to news media reports, Roscosmos will launch Soyuz MS24 in early June, almost three months ahead of its just-rescheduled launch in late August or early September. The reason for this is that, again, according to reports, Roscosmos engineers believe that the recently launched Soyuz MS23 may also have a coolant leak problem, as did the ill-fated MS22 in December and the Progress cargo spacecraft earlier this year (the Progress is essentially a Soyuz without the crew seats and instrument control console). They are now considering the idea that the leaks were not caused by micrometeorites, but a flaw in the manufacturing process by Energia, the company that builds Roscosmos's spacecraft. Roscosmos is now conducting an extensive investigation of Energia to try to pinpoint the source of the trouble, which is causing major concern with both it and NASA.



NASA and its Western partners in ISS have had questions about Roscosmos's manufacturing and quality control procedures for many years but have downplayed them in order to keep the partnership intact. Before MS22, the most famous incident involved the "hole in the Soyuz," Soyuz MS09 in 2018, in which Russia accused American Serena Anun-Chancellor of deliberately drilling a tiny hole in the spacecraft in order to return to Earth sooner (Russian political officials are so obsessed with this scenario that they have said if Anun-Chancellor ever returns to Russia, she'll be arrested and tried for criminal sabotage). NASA officials, however, strongly believe that it was caused by a manufacturing error in which a workman drilled a hole in the wrong place and tried to cover it up with putty that broke down after a few weeks in space. In his memoir *Endurance*, about his year aboard ISS, Scott Kelly wrote that a concern among the cosmonauts and astronauts was that on many missions, once a Soyuz was launched and in weightlessness, manufacturing debris such as nuts, bolts, screws, washers, and metal shavings would come floating out of hidden corners of the spacecraft.

NASA Names Artemis 2 and AX-2 Crews

On April 3, NASA unveiled the crew of the Artemis 2 mission, which will make a circumlunar flight aboard the Orion-SLS in November 2024. The commander is Reid Wiseman, the pilot Victor Glover, mission specialist 1 Christina Koch, and mission specialist 2 Jeremy Hansen of the Canadian Space Agency. All but Hansen are spaceflight veterans, and all will begin training almost immediately. A backup crew was not announced, but if past spaceflight procedures are followed, if a crewmember drops out, NASA will simply choose another from its astronaut corps.



Shortly before the Artemis 2 announcement, NASA and Axiom Space announced that the two mission specialists aboard Axiom's AX-2 mission to ISS in May are Ali Algania and Ryyanah Baruwai, both from Saudi Arabia. Baruwai will be the first Saudi woman to fly in space, while Algania will be the second Saudi man, after Sultan al Saud in 1985. The commander of AX-2, Peggy Whitson, a NASA astronaut veteran, and pilot John Stoffner, were announced almost a year ago. The AX-2 crew will spend twelve days aboard the space station involved in various experiments.

First Starship Launching a Failure

On April 20, after a three day delay, Space-X conducted the first launch of its giant Starship booster rocket and spacecraft from its space launch facility on the Texas gulf coast. It ended in a massive explosion about two minutes after launch; according to Space-X, the cause was that the second stage spacecraft failed to separate properly from the first stage booster, and that Space-X will try again as early as May. About two weeks before the launch

Space-X owner Elon Musk said that there was only about a "fifty-fifty" chance that the mis-

sion would succeed. The original mission called for a successful launch, the spacecraft making a little less than one orbit, and landing near Hawaii. Even though failures are not uncommon for new rockets, both Space-X and NASA were watching this event carefully, since NASA is relying on the Spaceship to take astronauts to the surface of the Moon as early as 2025. Still, NASA and Space-X said that much was learned from the failure and the next launch will hopefully be more successful.

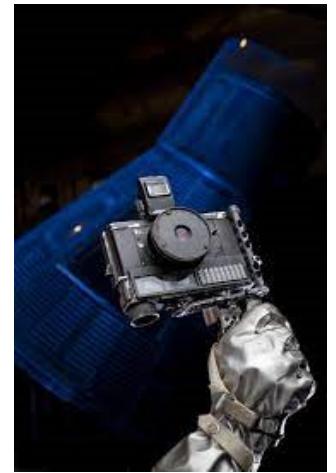


Spaceflight Short

The first few manned spaceflights were not (pardon the pun) focused on our planet, only seeing if humans could survive in space. By the time of John Glenn's Mercury flight in February 1962, he decided that people needed to know what the Earth looked like from space. About a week before the launch, he went to a drug store in Coco Beach, bought a \$40 point-and-shoot camera, and teamed with a NASA engineer to modify it for easier picture-taking while in a spacesuit. He also had a NASA photographer modify a 35mm film canister (remember those?) to hold double the usual number of exposures so he wouldn't have to change film, and became the first astronaut to bring back images of our Earth as space travelers see it.



Above right-John Glenn's modified drug store camera. It is now in the Smithsonian.



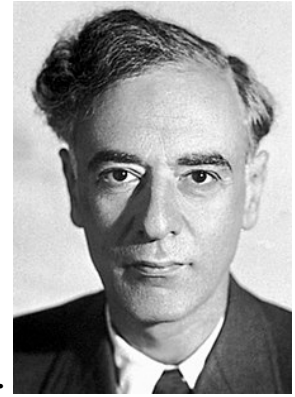
Above and right- Glenn's photos of the Earth from space during his Mercury flight in 1962



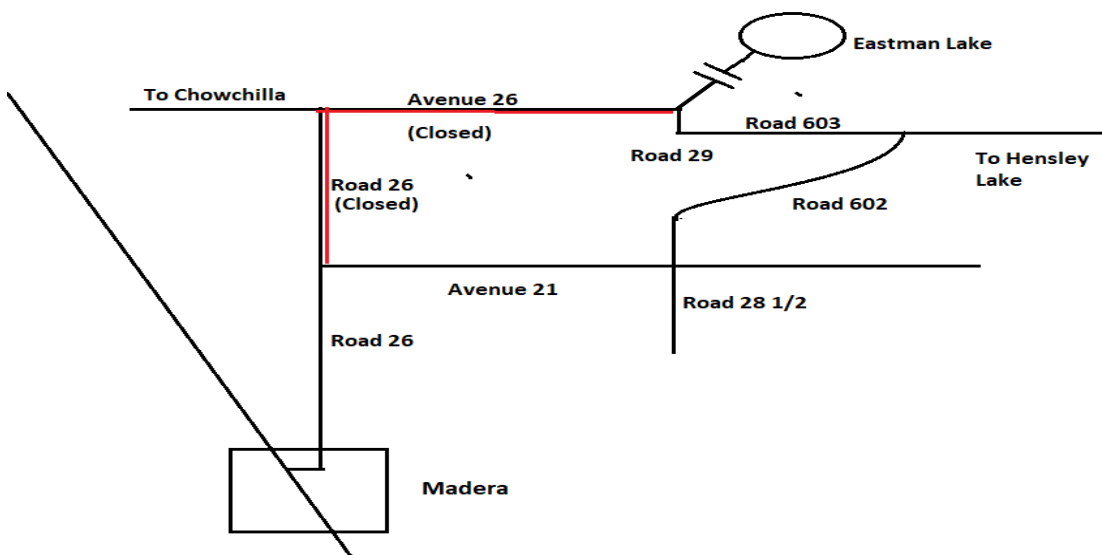
Science in Action

Landau's Minimum

Starting in the 1930s, Lev Landau(1908-1968), the famous Russian physicist who won the Nobel Prize for his work in superfluidity, instituted a series of exams for his students, which came to be known as "Landau's Minimum." It tested the students' knowledge in eight areas of mathematics and physics, starting with calculus and differential equations, and running through classical mechanics, quantum theory, relativity field mechanics, fluid mechanics, statistical physics, and thermodynamics. It was said that those who passed the (sixth) exam, in quantum electrodynamics, were allowed to read Landau's notebook, in which he listed what he considered the most interesting unsolved problems in physics. From 1935 to 1961, when it was last given by Landau himself, over 300 students started the Minimum, but only 45 passed all eleven exams, and they eventually became the cream of Russian physics. (In early 1962, Landau was seriously injured in an automobile accident, which left him in a coma for two months. Later that same year, he was awarded the Nobel Prize in Physics. He never completely recovered from his injuries, did almost no meaningful work after the accident, and died in 1968).



Today, the Minimum is still required for students at the Landau Institute for Theoretical Physics at Moscow State University. It has become so well known that many other graduate schools throughout the world have adopted versions of it for their physics students as well.



A New Alternative Route to Eastman Lake

Because of road damage caused by the recent storms, the regular route to CVA's monthly observing site at Eastman Lake has been closed. Road 26 north of Avenue 21 and Avenue 26 east to Road 29 are both closed, and since news reports say that Madera County does not currently have the funding to repair them, they will probably stay that way for months to come. There is, however, an alternative way to get to Eastman. Go north on Road 26, then turn east on Avenue 21. Take 21 to Road 28 1/2 and turn north. This road runs into Road 602. Take it all the way to Road 603 and then turn west. Take Road 603 to Road 29 and turn north. This is the familiar road that takes you to Eastman Lake.

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

The Kirkwood Observatory

The Kirkwood Observatory is on the grounds of Indiana University in Bloomington, Indiana, and is managed by the physics and astronomy department at the university. It is named after Daniel Kirkwood(1814-1895). who was a professor of mathematics and astronomy at Indiana for many years in the 1800s. He is best known for discovering what is now call the Kirkwood Gaps in the solar system's main asteroid belt.

The observatory was built in 1900 and officially dedicated the following year. Its main instrument, which is over 100 years old and still works well, is a 12" refractor telescope which is used for both public outreach and by undergraduate students in their astronomical research. The professors and graduate students at the university use 3.5m and .9 m reflector telescopes at Kitt Peak, Arizona, as part of the WIYN Telescope consortium. The Kirkwood Observatory also houses a more modern solar telescope, which is also used for public outreach and scientific research. Over the years, several asteroids have been discovered at the observatory, the best-known being 1764 Cogshall.



Galaxy in the Eyepiece M91-Messier's Lost Galaxy

M91, also known as NGC 4548, is one of the lesser-known objects in the Messier catalogue. It has the distinction of being the faintest of all the Messier objects, with an apparent magnitude of 10.2. It is also interesting for another reason: its true identity was unknown until recently. Charles Messier found and catalogued it in 1781, but in his notebook referenced it relative to M58. In 1784, William Herschel found an object near M58, which he thought was Messier's M91, but was eventually determined to be NGC 4571. At about the same time, he catalogued another object somewhat farther away, which he designated H II 120; In 1845 his son John Herschel identified an object in the same area that he first cataloged as h1367 and later as GC 3093. In the late 1800s, John Dreyer identified both Herschels' findings as the same object and gave it the designation of NGC 4548. Compounding all this was another galaxy nearby, which Messier identified as M89, but some scientists believed was actually M91. So, for a long time, scientists were not sure which galaxy was M91. This mystery was finally solved in 1969 by an American amateur astronomer, William C. Williams, who suspected that Messier's instructions for locating M91 mistakenly referred to M58 when he actually meant M89. He took Messier's original directions and coordinates, updated them, plotted them relative to M89, and found that they fell right on 4548. So, after almost 200 years, M91 had a face.

M91 is known as an SBb-barred spiral b type galaxy. The most recent measurements using Cepheid Variables imaged by the Hubble Space Telescope in 1997 show it to be 53 million light years, +-5, from Earth. It is now known to be in the constellation Virgo, is part of the Virgo cluster of galaxies, and was the last of the eight galaxies in the Virgo Cluster found by Messier.

