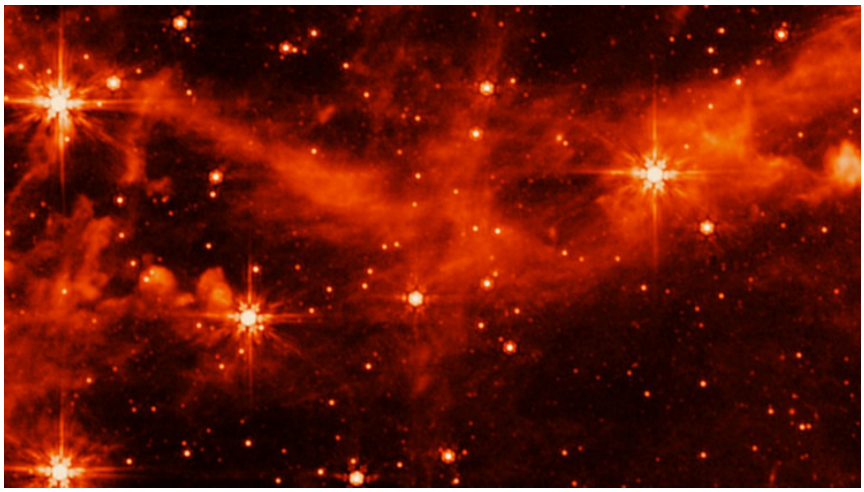
Lots of Good Summer Skyviewing and CVA Activities-See the CVA Website

THE OBSERVER

The Newsletter of Central Valley Astronomers of Fresno July-August 2022

JWST Ready to Change Our View of the Universe



The above image, of a portion of the Large Magellanic Cloud taken in May 2022, shows how sharp and detailed images from the James Webb Space Telescope will be. The JWST, now going through its final alignment and calibration tests, will begin regular operation in July, and scientists cannot wait to see what discoveries it will make. Over twenty years in the making and beset with delays and cost overruns, JWST may well redeem itself, as Hubble did after its deformed mirror problem, by showing people on Earth the cosmos as its never been seen before. Scientists will use it during its now ten year expected lifetime to study exoplanets, galaxies, quasars, and objects at the very edge of the universe as we know it.

Image-JWST/NASA/ESA

Quote of the month-

"Fritz, leave the goddamn moon to the lovers!"

Milton Humason to Fritz Zwicky in the 1950s, when Zwicky proposed sending a rocket to the moon to collect rock and soil samples

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The Badlands Observatory

Central Valley Astronomers

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CVA Summer Outings

Millerton Lake Public Starwatch June 18

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Number of exoplanets found as of June 2022-5,044

How many more are out there?

Tens of thousands? Hundreds of thousands?

Profiles in Astronomy

Baron Wilhelm von Biela 1782-1856

Wilhelm von Biela was born and raised in Northern Germany, but his family was originally from what is now the Czech Republic. After early schooling, he attended a military academy in Dresden and was commissioned an officer in the Austrian Army in 1802. He was involved in several battles during the Napoleonic Wars of the early 1800s, was wounded in one of them, and rose to the rank of Captain. In 1815, he was assigned to Prague, where he began his studies of astronomy under Martin David, a well-known astronomer of the time. He was later assigned to military positions in Italy and was military governor of the city of Rovigo for several years. After leaving the Army, von Biela moved to Venice, where he lived until his death in 1856.

Von Biela is best known for his comet studies. He calculated the orbits of several comets, rediscovered two already known comets, including the Great Comet of 1823, and discovered one on his own, now called Biela's Comet, in 1826. It had originally been observed by Charles Messier, but not knowing what it was, Messier ignored it and it was forgotten. Biela found it, studied it, and correctly identified it as a periodic comet. Von Biela also studied sunspots and did planetary work as well; he calculated the rotations of several of the planets to a high degree of accuracy.

Although he was not well known in his lifetime, after his death, von Biela was honored with both an asteroid and a crater on the Moon named after him.

How many Galaxies are in the Universe? Probably Trillions and Trillions

Scientists now believe that the number of galaxies in the known universe has been severely undercounted.in the 1980s and 90s, most astronomers thought that there were about a hundred billion galaxies total, but there were a few who disagreed Based on research from the Hubble Space Telescope's Extreme Deep Field Survey and a recounting of galaxies in the local group, among other things, astronomers have expanded the possibilities of galaxies, especially those with low brightness and/or diffuse appearances. As an example, for many years, it was thought that the number of galaxies in our Local Group; i.e., the Milky Way, the Andromeda Galaxy, the Triangulum Galaxy, and others up to about five million light years away; was about thirty or forty. Today, with a number of faint galaxies having been discovered over the last twenty years or so, the Local Group now contains at least a hundred galaxies and probably many more. Scientists now are certain that the same is true throughout the known universe, that most galaxies are being overlooked due to their faintness and also distance. A recent study shows that the total number of galaxies in the known universe is at least four to five trillion and may go up to as many as twenty trillion. That's a lot of fuzzy spots in the sky.

What's New In Space

Second Starliner Test Flight Successfully Completed

Boeing's Starliner commercial crew spacecraft, which has been plagued with problems for several years, was launched atop an Atlas 5 rocket on May 19, docked with the International Space Station on May 20, and after a six day stay, returned to Earth, landing at the White Sands test range on May 26. NASA and Boeing officials declared the flight, known as OFT(for Orbital Flight Test)-2 a success, although there were some problems, especially with malfunctioning thrusters. Problems aside, it was a major step forward for the spacecraft, whose first test flight was cut short in December 2019 due to serious software flitches, and whose initial attempts at a second launch in July 2021 had to be cancelled because of stuck thruster valves. The Starliner program is currently over four years behind schedule and $500 million over budget. In its competition with Space-X's Crew Dragon, Starliner has yet to make a crewed flight, while Dragon has made seven, and NASA recently signed a contract with Space-X for five more Crew Dragon flights due to the delays involving Starliner.

The third Starliner test flight, OFT-3, will be crewed, with veteran shuttle astronauts Barry Wilmore and Sunita Williams, and may now take place as early as October 2022, depending on the review of OFT-2. OFT-3's exact flight plan has not been finalized, but Wilmore and Williams will spend at least two weeks aboard ISS, testing various aspects of the spacecraft while helping with activities aboard the space station. If OFT-3 is successful, the first operational Starliner flight, OM-1, may take place in February or March of 2023.

SLS Tries Again after Multiple Problems

Like Starliner, NASA's huge heavy lift moon rocket, the Space Launch System, or SLS, has been beset with overruns, delayed tests and numerous problems, and is now over six years behind schedule and $8 billion over budget. After aborted tests in the spring of 2022, the SLS was taken back to the Vehicle Assembly Building for repairs. It was returned to the pad in mid-June and on June 19, a full "wet" launch rehearsal was conducted; despite a few problems, according to officials, it went well. On June 24, NASA announced that the SLS will have its first launch between August 23 and 29 for an eight-day uncrewed mission, Artemis-1, carrying the Orion spacecraft around the moon and back. If Artemis-1 is successful, Artemis-2, carrying a crew of four, will be launched in late 2023 or early 2024 for another circumlunar mission. Artemis-3 will be a moon landing mission, but most experts believe it will not take place until at least 2025, using the Orion and Space-X's Starship landing craft.

In early 2022, the government's Inspector General office came out with a review of the SLS program, criticizing it as being "unstainable," due to its high costs(almost $4 billion a launch) and seemingly unending delays. The IG report has recommended that NASA eventually cancel the SLS and switch to the far cheaper and more readily available private commercial heavy lift rockets, such as Space-X's Starship, Blue Origin's New Glenn, or ULA's Vulcan Heavy, all of which will become operational in the next three-four years. On the other hand, senators from the states where the SLS is being build are fighting any suggestions to end the program, seeing it as bringing in major revenues to their peoples. Many critics of the SLS have taken to calling it a "public works program" that seems to be going nowhere.

The Russian Invasion and the International Space Program

The Russian invasion of the Ukraine, starting on February 28, has created an upheaval in geopolitics. This has been especially important in the international space program, where the United State and Russia are the two major powers(although China is rapidly closing the gap). After the invasion, President Biden announced that the U.S. would impose severe economic sanctions on Russia, with several Western European countries quickly following. In addition, the European Space Agency announced that the Exo-Mars program between ESA, involving the Franklin rover, which was scheduled to be launched aboard a Soyuz rocket from Baikour later this year, would be indefinitely postponed until another launch carrier is found. Estimates are that it will not be launched until at least 2028. A number of countries and organizations which had contracts to launch payloads, over forty of them, aboard Russian rockets, were cancelled(Space-X will now launch many of them). Also, the United Launch Alliance is ending the purchase of Russian-built RD-180 rocket engines, which it uses for its workhorse Atlas 5 rocket. It says it already has enough of them to fulfill demand through 2023, when the new Vulcan rocket, with American-made engines, will replace the Atlas.

The fallout from the Russian invasion has been seen most noticeably in the International Space Station program. Before the invasion, RKA head Demetri Rogozin said that Russia would leave the ISS program by 2025 and build its own national space station if existing sanctions were not lifted. When the U.S. imposed new sanctions after the invasion, Rogozin, a close friend and associate of Russian President Vladimir Putin, threatened to move up the pullout to 2023 if sanctions were not ended, taking the Russian modules with them. This would be considered serious because the Russian segment on ISS is responsible for the navigation and stability of the entire structure. He also hinted that American astronaut Mark Vande Hie, who was launched aboard a Soyuz spacecraft in April 2021 and was scheduled to return with his two Russian colleagues at the end of March 2022, might not be allowed aboard the Russian spacecraft, and the U.S. would have to figure out a way to get him back to Earth. In the face of these threats, NASA head Bill Nelson tweeted that "Rogozin is just being Rogozin," and both Space-X and Grumman said that they could handle navigation and stability problem in the absence of the Russian modules. As it was, a few days before the scheduled date, RKA announced that Vande Hei would return in the Soyuz, and he did, landing safely on March 31. In late April, Rogozin sent out a Twitter message saying that without Russia, "the U.S. would have had nothing but broomsticks to get to ISS for several years" after the end of the space shuttle program. The next day, Elon Musk tweeted an image of a Falcon 9 launch two days previously, saying "Here's our broomstick!"

According to sources in NASA, the space station program will continue as before, even during the invasion. Despite Rogozin's bluster, both American and Russian space officials see it as one of the few good-will links between the two countries. American space officials have said that the Russians, including the cosmonauts, in both Moscow and Houston who are working on the program, are strongly in favor of continuing it for as long as possible. When Oleg Artemeyev, the head of the Soyuz MS-21 crew, took over as commander of the space station in May, he said in so many words, "Don't let what's going on down there interfere with what we're doing up here," a pointed rebuke to Rogozin and Putin, who want to break up the ISS partnership out of anger and frustration.

with the U.S. As of now at least, Russian Anna Kikana is scheduled to be launched to ISS aboard Crew Dragon flight C-5 in September, and a few weeks later American Francisco Rubio is scheduled to be launched aboard Soyuz MS22.

The wild card in all of this is China. The country's space agency is currently in the process building its Tiangong space station, launched its third crew to in on June 4, and plans to complete it in 2023. Russia has been talking to the Chinese about possibly using the Tiangong for its cosmonauts, but so far there is no agreement; a number of technical and political problems are involved. On June 2, Rogozin announced that Russia and China are ready to sign an agreement to jointly build and occupy a lunar space station similar to the Gateway by 2032 and a moon base by 2035. It is known that China is rapidly expanding its human spaceflight program to compete and possibly overtake the Americans by 2030.

In the meantime, NASA is going ahead with its long-range plans to abandon ISS in 2030 and deorbit it in 2031, finance building and using at least three commercial space stations by 2029, starting construction on the Gateway and sending astronauts to the moon by 2026, building a moon base at the lunar south pole by 2032, and making plans for crewed Mars missions as early as 2035. NASA tried to get the Russians to be partners in the Artemis moon program, but they have now decided to go with the Chinese instead. Only time will tell if their intuition was correct or if they made a big mistake because of Vladimir Putin's invasion of Ukraine.

Sierra Space to Begin Astronaut Training

On June 14, Sierra Space, formerly a division of Sierra-Nevada Space Systems, announced that it will establish an astronaut training center and select and begin training its first cadre of private commercial astronauts in 2024 for Dreamchaser flights starting in 2026. The training center will be headed by former NASA astronaut Janet Kavandi, who is now a Sierra Space executive, and will be located at the Kennedy Space Center, where Sierra Space currently has offices and support facilities. The announcement said that the astronauts will be broken into three groups: permanent pilot astronauts, those who will work and fly for Sierra Space; specialist astronauts, whose who will fly on specific missions to space stations, similar to mission and payload specialists for NASA; and commercial "tourist" astronauts. Sierra Space is looking forward to the time when its Dreamchaser mini-shuttle will service Blue Origin's Orbital Reef space station in the late 2020s.

China Plans Soil Sample Return Mission to Mars

Reports say that the Chinese Space Agency is planning a soil sample return mission to Mars which may be launched as early as 2028. According to the reports, the mission will involve two spacecraft and will be simpler than the proposed NASA-ESA sample return mission. One craft will land on the surface, scoop up a small sample of rocks and soil, then blast off and rendezvous and dock with a second spacecraft, which will return it to Earth by 2031. Currently, the NASA-ESA return mission will be launched in 2028 as a three part plan. One spacecraft will carry a rover which will pick up sample tubes now being collected by the Curiosity rover and deliver them to a second vehicle which will be launched from the surface and in turn deliver them to third craft in Martian orbit which will return them to Earth in 2033. It is conceded, though, that if the Chinese mission is delayed, the NASA-ESA mission will probably return soil samples first. Also, observer point out, the NASA mission is more complex and riskier, but far more rewarding in terms of scientific discovery and knowledge

Star Stories

Regulus

Regulus, known as the "Heart of the Lion," is the brightest star in the constellation Leo. It is also designated as Alpha Leonis. Regulus is actually a multiple star system, with four stars in two binary pairs. The brighter pair is known as Regulus A, and consists of a B8 type blue-white star and a much smaller companion which is so faint that it has not been extensively studied; together, they have an absolute magnitude of -.57. The other binary pair, called Regulus BC, consists of a K2 star and a much smaller and dimmer companion. The K2 star has an absolute magnitude of 6.2 and its companion is 11.5. the entire Regulus system has an apparent magnitude of 1.35, making it the 21st brightest star in the sky. The brightest and best studied star in the Regulus system, Regulus A, is a little bit less than four times the size of our Sun. Using the latest measuring techniques, the Regulus system is about 80 light years from Earth.

The name Regulus comes from Latin and means "Little King." It was also known at one time as Cor Leonis, the "Heart of the Lion." The Arabs called it Qalb-al-Asad, which also means "Heart of the Lion." To the people of ancient India, it was Magha, the "Mightly One," and the Babylonians knew it as Shar-ru, "The King," all references to royalty and greatness.

Galaxy in the Eyepiece

NGC 3628

NGC 3628, also known as the Hamburger Galaxy, is part of a small cluster known as the Leo Triplet, along with M65 and M66. It is an unbarred spiral, seen almost edge-on, with a very distinguishing and prominent dust lane going through its center. It has an apparent magnitude of 9.5, which is at the edge of visibility for an 8", is about the same size as the Milky Way, about 100,00 light years in diameter, and is 35 million light years from Earth, according to the latest measurement scales.

NGC 3628 was first seen by William Herschel in 1784. One of the great mysteries in astronomical history is why Charles Messier did not see it while observing and cataloging M65 and M66 several years before Herschel. In the mid-1900s, scientists discovered that it has a tidal tail over 300,000 light years long, as a result of interactions with its two larger neighbors. They have also found evidence that it has recently(relatively speaking) merged with a smaller galaxy. Because of its odd shape, Halton Arp catalogued it as Arp 317 in his list of peculiar galaxies. It is also known as Sarah's Galaxy; many science historians believe the name comes from the English poet Sarah Williams(1837-1868), whose best-known work is "The Old Astronomer," written around 1860. Its most famous line is "I have loved the stars too fondly to be fearful of the night."

Galactic Trivia-

M82, sometimes called the Cigar Galaxy, has had a long and controversial observing history. First seen by Johann Bode in 1774, its convoluted shape was for a long time thought to be caused by the entire galaxy exploding. Today, though, scientists know that the shape is an optical illusion due to a high rate of star formation and gravitational forces from its companion M81.

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

Badlands Observatory

The Badlands Observatory is located outside of Quin, South Dakota, in the western part of the state, and was named after nearby Badlands National Park. It was founded in 2000 by an amateur astronomer, Ronald Dyvig, who had worked at both the Stewart Observatory and the Kitt Peak Observatory and wanted a remote light pollution -free site to do observing. As it was, when he proposed the observatory to the town, the residents and town council changed the overhead lights to make them dimmer. The observatory is currently managed by the Black Hills Astronomical Society

The observatory, which is housed in a former medical facility, consists of one telescope, a 26" reflector, which can be used either on-site or remotely. It has become well known for its research into asteroids and minor planets. The most recent tallies show 25 asteroids having been discovered at the facility, the best known being 2008AQ3, which was found by an Italian amateur astronomer in 2008.

From the Observer Archives

Astrology Lives!

"The moon controls what days and weekends and your vacations fall. While it is true that them oon isn't full every weekend, you will also note that this body influences how much free time you have. When the moon is new and its antiwork luminescenceis nil you will most often find it to be a Monday. If it should be a weekend or if M31 exerting its "gotta get some time with the scope" influence-your spouse's primal "get ut and clean the garage" urge wil lbe a fever pitch.

A full moon most often drives away extra work, thus giving you free time. It also causes your boss to let you take a vacation that week. (New moon often signals the start of an important project, thus delaying your vacation until the new moon can restore order)."

From the November 1991 *Observer*

Astronomy (Bad) Joke

Why don't aliens ever visit our solar system?
They read the reviews-only one star

-From thecosmiccompanion.com

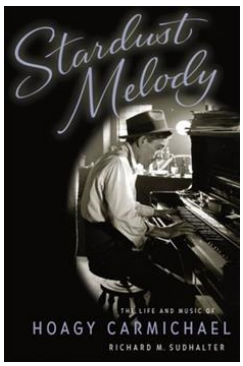
Right-when I was working on this issue and looking for a joke, I also came across this cartoon. It had no copyright warning and was too good to pass up.

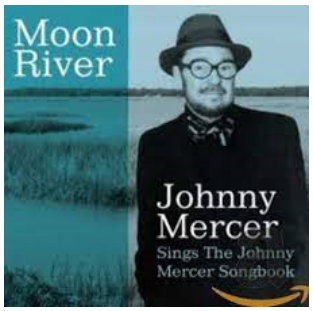
From 9gag.com

Space Songs

One day I was thinking about songs with themes of astronomy and space travel and decided to look into them on the internet. There's actually quite a number that have been written and recorded over the years. So, here's a sampling of just a few, starting with the classic "Stardust" that goes all the way back to the 1920s.

-the editor





Stardust-Hoagy Carmichael 1927

Moon River-Johnny Mercer 1961

Telstar-The Tornados 1962

Mr. Spaceman-The Byrds 1966

2,000 Light Years from Home-Rolling Stones 1967

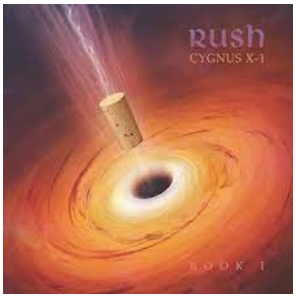
Space Cowboy-Steve Miller 1969

Space Oddity-David Bowie 1969

Space Truckin'-Deep Purple 1972

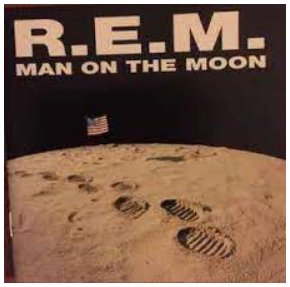
Rocketman-Elton John-1972

Spaceman-Harry Nilsson 1974



Cygnus X-1 Rush 1977

Walking on the Moon-The Police 1979



The Man on the Moon-R.E.M. 1992

We Are all Made of Stars-Moby 2002

Sky Full of Stars-Coldplay 2014

Astronomy Short-

Although the Magellanic Clouds were named after the explorer Ferdinand Magellan while on his round-the-world voyage in 1519-1522, they were previously known for thousands of years by the native peoples of South America, Southern Africa, and Australia. They are also said to have been studied by the Arabs as early as 850 AD. Some scientists today believe that there are three Magellanic Clouds, not two; observations suggest a smaller irregular galaxy is behind the Small Magellanic Cloud.