March-April
2013
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Issue 2

The Observer

The Newsletter of Central Valley Astronomers of Fresno

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CVA Calendar

March 9-Messier Marathon #1

March 16-Public Star Party at Riverpark

March 30_CVA Monthly meeting SCUF 7PM

April 13-Messier Marathon #2

April 15-21-Astronomy Week-April 20-CVA solar Viewing at CSUF

April 27-CVA meeting at CSUF 7PM

Visitors to a Small Planet

Scientists were expecting asteroid 2012 DA14 to make a splash on February 15; after all, it would miss the Earth by only about 17,000 miles. But it was upstaged a few hours earlier by a large meteorite that was easily seen over Siberia, caused over a thousand injuries, and eventually slammed into a lake near the city of Chelyabinsk. It's only February, and this may already be the stronomical event of the year.

Image-drexel.edu

Quote of the Month-

The chance of meteorite showers is 100%

-Gene and Carolyn Shoemaker

From Richard Preston, *First Light*

New Moon March 11 | Full Moon March 27 | New Moon April 10 | Full Moon April 25

Reminder-If you have not yet paid your 2013 CVA dues, do so as soon as possible!

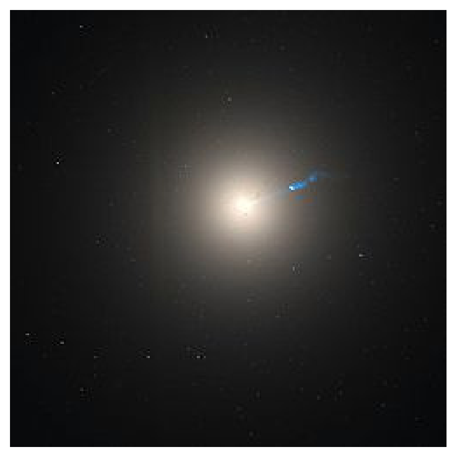
The Observer is the newsletter of the Central Valley Astronomers of Fresno

Special Dates Coming Up!

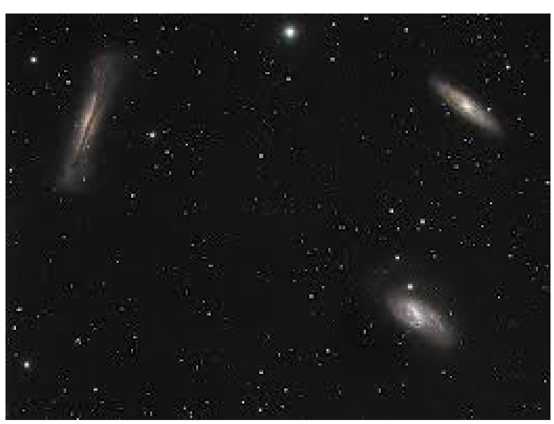
Two Messier Marathons-March 9 and April 13-Don't Miss them!

CVA is back at Riverpark-on March 16 and April 20!

Well Worth Seeing in the Spring Skies



M87, the great elliptical galaxy in Virgo. Many scientists consider it to be the largest galaxy in the known universe. It is approximately 50 million light years from Earth.

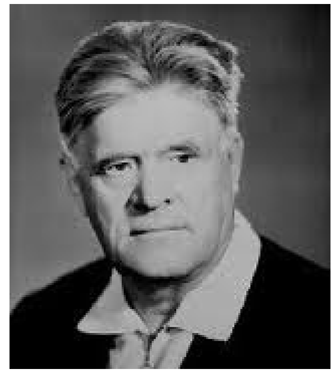


The spiral galaxies M 65 and M66, along with NGC 3628 in Leo-two of the most distinctive and best known objects in the springtime skies. They are about 35 million light years from Earth

Both images from NASA

Profiles in Science

Pavel Cherenkov 1904-1990



Cherenkov was not an astronomer or directly associated with astronomical research; he was a particle physicist by profession. Nevertheless, his discovery of what is now known as Cherenkov Radiation has led to greater understanding of astronomical processes, especially the mysterious cosmic rays, which are still not completely known.

Cherenkov was born in the Voronozh Obalst region of Russia. After grammar and secondary schools, he attended Voronezh State University, and graduated with degrees in mathematics and physics. Afterwards, he took a position as researcher at the Lebedev Institute of Physics. In 1940, after several years of research and studies, Cherenkov was awarded a doctorate in physics, and a few years later was made a professor of experimental physics at the Institute. In 1970, he became a full member of the Russian Academy of Sciences, the most prestigious scientific institution in the country. He would stay with the Academy until his death.

Cherenkov's most famous discovery came in 1934, when, with his professor, Sergei Vavilov, he performed a series of experiments involving bombarding water with different kinds of radiation. After one such test, he noticed and recorded a strange blue light coming from one of the water bottles. This, he calculated, was due to charged atomic particles whose apparent motion was faster than the speed of light in a local, restricted medium. He eventually developed a detector to record such particles; the phenomenon eventually became known at the Cherenkov Effect, and the detector the Cherenkov Machine, which was put aboard early Soviet satellites in Earth orbit to study the origin and nature of cosmic and other high speed particles. Today, the particles he discovered are known almost universally as Cherenkov Radiation. Cherenkov was awarded the Nobel Prize in Physics in 1958 for his discovery.

Besides his discovery of Cherenkov Radiation, Cherenkov also developed electron accelerators, and played a role in the discovery of several different kinds of nuclear reactions. Along with the Nobel Prize, he won many other awards for his researches.

The Peoples' Choice for Pluto's Two New Moons

Not that it matters a whole lot anymore, since Pluto isn't officially a planet right now, but the SETI Institute has just ended a competition for naming Pluto's fourth and fifth moons, discovered last year. People from all over the world were asked to Tweet in their votes for the top names, and runaway winner, with almost 200,000 votes was…Vulcan, which was, in fact, originally suggested by the original Captain Kirk of *Star Trek*, actor Willliam Shatner, who submitted it on February 12. The second place finisher was Cerberus, which was the name of the three headed dog that guarded the gates to Hades in Greek mythology. Some purist disputed the name of Vulcan, saying that traditionally, names for Pluto and its moons come from Greek or Roman mythology. But then, others pointed out that Vulcan, apart from being Mr.Spock's home planet, was also the name of the roman god of fire. So, the name works out. Shatner's suggestion for the second moon was Romulus, but it was nixed because it is already used for a moon of the asteroid Sylvia.

The winning names, in any case, are unofficial, and the final decisions will be made by the International Astronomical Association later this year. Right now, the two new moons are simply being called P4 and P5. How bland.

Image on right-an artist's depiction of the moons P4 and P5 orbiting Pluto. NASA/JPL

CVA Calendar March-April 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					March 1 Venera 3-first spacecraft to reach surface of Venus-1966	2
3	4	5	6	7	8	9 Messier Marathon #1 at Eastman Lake
10 Daylight Savings Time starts	11 New Moon	12	13	14 Pi Day Albert Einstein born-1879	15 The Ides of March	16 Robert Goddard launches first liquid fueled rocket-1926 CVA public star party at Riverpark
17 St. Patrick's Day	18 Alexi Leonov, first man to walk in space-1965	19	20 Spring Equinox Isaac Newton dies-1727	21	22	23
24 Palm Sunday	25 Passover Begins	26	27 Full Moon	28	29 First flyby of Mercury by Mariner 10-1974 Good Friday	30 CVA monthly meeting CSUF 7pm
31 Easter	April 1 April Fools' Day	2	3	4	5	6
7	8	9	10 New Moon	11	12 52d anniversary of first manned spaceflight by Yuri Gagarin-1961	13 Messier Marathon #2 at Eastman Lake
14	15 Begin Astronomy Week	16	17	18	19	20 CVA public star party at Riverpark Astronomy Day
21 Earth Day	22	23	24	25 Full Moon Partial Lunar Eclipse in Europe, Africa, Asia	26 Arbor Day	27 CVA monthly meeting at CSUF 7pm
28	29	30	May 1	2	3	4

What's New In Space

The History of the Saturn Rocket Part 2

Once the decision had been made to go to the Moon via the Saturn 5, NASA moved quickly to award contracts to build the giant rocket. Boeing was given the go-ahead to build the first stage, known as the S-1C. This would be a huge booster 33 feet in diameter and 150 feet in length; it would be powered by 5 F-1 engines. The second stage, the S-II, would be built by North American Aviation., and would employ 5 J-2 engines. Unlike the F-1s, which used conventional liquid oxygen and RP-1 kerosene, the J-2 would use newly developed cryogenic technology, liquid oxygen and liquid hydrogen, as their fuels. This meant a weight saving of over 40%, and allowed the rocket to carry much heavier payloads(one of the main advantages that the U.S. had over the Soviets in the space race was that it developed cryogenic technology early on. The first Soviet rocket to use liquid oxygen-liquid hydrogen fuels would not be launched until the 1970s). Rocketdyne was the prime contractor for the J-2 engines. The third stage, the S-IVB, which was also the second stage of the Saturn 1 and the Saturn 1B, used cryogenic fuels as well, and was powered by a single J-2 engine. It would be built by Douglas Aircraft.

The Saturn 5 program, in addition to the three main contractors, also had dozens of subcontractors, and the most important one was IBM, which designed and built what was known as the IU, the Internal Unit. This was the "brains" of the rocket, the computer system which told all of the some three million separate components what to do during the six to seven minute launch to orbit period. It contained the main guidance and control functions, as well as the sequence of commands from 30 seconds before launch to insertion into orbit. Its position was atop the S-IVB, and just below the Apollo service module.

Early in the Saturn program, mission managers made a crucial decision. Unlike previous rocket development programs, where each stage or component was tested separately in a process spread out over several years, the Saturn 5 would be tested "all up," fully assembled. Although this decision was criticized at the time, eventually it would save years of time and effort.

Moving the huge rocket was an effort in itself. The first stage was being built near New Orleans, and was far too large to be transported by plane or tractor-trailer. Eventually, it was decided that it would be put on a giant barge and, pulled by tugs, floated across the Gulf of Mexico to Florida. The second stage, the S-II, was built in Seal Beach, California, and again, was too large to be transported by truck or plane. It, too, was put on a barge, and floated down the West Coast to the Panama Canal, then out into the Gulf of Mexico to Florida. For the third stage, a C-130 cargo plane was specially modified to transport it; it was known as the "Pregnant Guppy," and flew the stage in its hold from Douglas's facility near Huntington Beach, California to the Cape. (above-The Pregnant Guppy)

Designing and building the Saturn 5 was only one part of the entire program. Originally, NASA had used the Air Force's launch pads and block house control rooms at the Cape Canaveral launch center. But the Saturn program would require huge new launch pads and support facilities. As such, in 1961, NASA, after rejecting several other possible launch sites(including one in the Aluetian Islands and another on the Texas gulf coast), bought 140,000 acres of land on Merritt Island, just north of Cape Canaveral. This would become the "Moonport," and would eventually be named the John F. Kennedy Space Center. NASA began building two giant launch pads, 39-A and 39-B, to use for the Saturn 5(it also had plans for a third pad, 39-C, which was never built. Eventually, the two pads were modified to launch the Space Shuttle, and are now being modified again for the Orion program). The space agency also built the VAB, the Vehicle Assembly Building(above right), to assemble the giant rockets; for a time, it was the largest single building in the world. Another major component was the "crawler," a giant flat-topped machine powered by 4,000 horsepower engines that would carry the assembled Saturn 5 from the VAB to the launch pad 3.5 miles away, an eight hour trip.

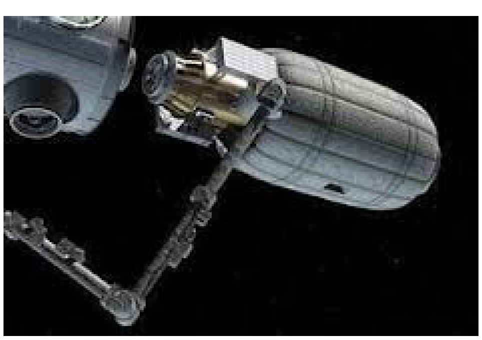
NASA also made one other major decision with the Apollo-Saturn program. When the space agency was established in 1958, it had no central facility for its manned spaceflight program. For planning and training for the Mercury missions, it used various military and old NACA facilities on the East Coast, as well as the Air Force's facilities at Cape Canaveral. But with the Apollo moon landing program, and follow up programs, which were already being discussed, it needed a place all its own which could train astronauts, plan missions, and control them after launch. Again, the space agency looked at several sites on the East Coast to build a main administrative, training, and control center. NASA has sworn that politics did not play a role in the decision, but it was more than a coincidence that then-Vice President Lyndon Johnson, the President's coordinator for the manned space program, was from Texas. All indications are that Johnson "persuaded" NASA to build the Manned Spacecraft Center just outside of Houston, in a deserted area full of scrub oaks and semi-swamps. Eventually the MSC, soon to named the Johnson Space Center, became a major facility in the Huston area, and a draw that would ultimately make that Texas city one of the largest in the country.

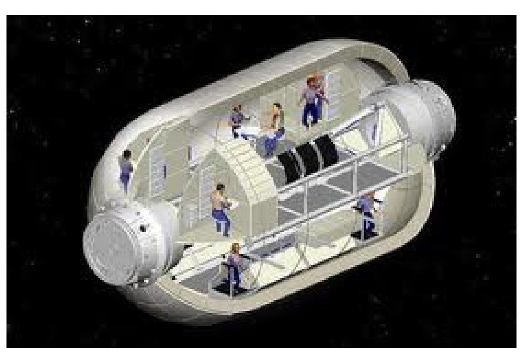
While all of this was going on, the Saturn 1, Von Braun's original rocket, was still being used. By 1965, it had made 15 launches, all of them successful, putting a number of heavy satellites into low Earth orbit. The last launch was in 1965. Its successor, the Saturn 1B(on right), with more powerful engines, was being prepared to launch the early Apollo Earth-orbit missions. The original planning schedule called for at least two, and possibly three Apollo manned Earth orbit missions to check out the flight hardware and practice rendezvous and docking. In addition, the 1B would be used for what was then known as the Apollo Applications Program, a manned space station that would eventually be named Skylab(the original Skylab program called for nine manned missions, all using the 1B. That, though, is another story). But the fact was that everyone was waiting for the Saturn 5. By late 1966, despite problems with the second stage, all the pieces were falling into place. The Saturn was getting ready to go to the Moon.

NASA Steps Ahead with the Orion-MPCV Program– ESA Gets Involved

NASA announced on January 17, 2013, that it had signed contracts with the European Space Agency(ESA)to build the service module for the Orion Multi-Purpose Crew Vehicle (MPCV). The contracts, which were agreed to in December, will have ESA taking a major role in the Orion MPCV program. The first service module is expected to be delivered to NASA in early 2017. NASA also outlined launch dates for the Orion MPVC program. In November 2014, it plans to launch an unmanned Orion atop a Delta 4 rocket, and send it 3,900 miles above the Earth for tests of the heat shield and other systems. Another unmanned test above Earth orbit may come in 2015. In December 2017, with the ESA built service module, the complete Orion MPCV system will be launched for an unmanned seven day circumlunar mission that will test all its systems. Its booster rocket will be a modified version of the SLS heavy lift booster. NASA also announced that it originally intended for the first manned circumlunar mission, with a crew of four, to be in 2021, but may launch it as early as 2019 if all goes well.

NASA has also announced that it is contracting with billionaire hotel and resort owner Frank Bigelow to built an inflatable module for ISS, which will be delivered to the space station as early as 2015. Bigelow has his own plans to build a private space station "hotel" using inflatable modules, which may be launched in 2015 as well. The artist's conceptions below show the Bigelow module being docked to ISS by the robotic arm(left), and a cutaway view of the module(right).





NASA's Chandra Suggests Rare Explosion Created Our Galaxy's Youngest Black Hole

A supernova remnant may contain the most recent black hole formed in the Milky Way galaxy. The remnant appears to be the product of a rare explosion in which matter is ejected at high speeds along the poles of a rotating star.The remnant, called W49B, is about a thousand years old as seen from Earth and located about 26,000 light-years away.

"W49B is the first of its kind to be discovered in the galaxy," said Laura Lopez, who led the study at the Massachusetts Institute of Technology. "It appears its parent star ended its life in a way that most others don't."

Usually when a massive star runs out of fuel, the central region of the star collapses, triggering a chain of events that quickly culminate in a supernova explosion. Most of these explosions are generally symmetrical, with the stellar material blasting away more or less evenly in all directions.

However, in the W49B supernova, material near the poles of the doomed rotating star was ejected at a much higher speed than material emanating from its equator. Jets shooting away from the star's poles mainly shaped the supernova explosion and its aftermath.

The remnant now glows brightly in X-rays and other wavelengths, offering the evidence for a peculiar explosion. By tracing the distribution and amounts of different elements in the stellar debris field, researchers were able to compare the Chandra data to theoretical models of how a star explodes. For example, they found iron in only half of the remnant while other elements such as sulfur and silicon were spread throughout. This matches predictions for an asymmetric explosion.

"In addition to its unusual signature of elements, W49B also is much more elongated and elliptical than most other remnants," said co-author Enrico Ramirez-Ruiz of the University of California at Santa Cruz. "This is seen in X-rays and several other wavelengths and points to an unusual demise for this star."

Because supernova explosions are not well understood, astronomers want to study extreme cases like the one that produced W49B. The relative proximity of W49B also makes it extremely useful for detailed study.

The authors examined what sort of compact object the supernova explosion left behind. Most of the time, massive stars that collapse into supernovas leave a dense, spinning core called a neutron star. Astronomers often can detect neutron stars through their X-ray or radio pulses, although sometimes an X-ray source is seen without pulsations. A careful search of the Chandra data revealed no evidence for a neutron star. The lack of such evidence implies a black hole may have formed.

"It's a bit circumstantial, but we have intriguing evidence the W49B supernova also created a black hole," said co-author Daniel Castro, also of MIT. "If that is the case, we have a rare opportunity to study a supernova responsible for creating a young black hole."

Supernova explosions driven by jets like the one in W49B have been linked to gamma-ray bursts (GRBs) in other objects. GRBs, which have been seen only in distant galaxies, also are thought to mark the birth of a black hole. There is no evidence the W49B supernova produced a GRB, but it may have properties -- including being jet-driven and possibly forming a black hole -- that overlap with those of a GRB.

From nasa.gov Feb 13, 2013

Number of extrasolar planets found as of February 2013-921

How many more are there?

The Art of Space Imagery

By Diane K. Fisher

When you see spectacular space images taken in infrared light by the Spitzer Space Telescope and other non-visible-light telescopes, you may wonder where those beautiful colors came from? After all, if the telescopes were recording infrared or ultraviolet light, we wouldn't see anything at all. So are the images "colorized" or "false colored"?

No, not really. The colors are translated. Just as a foreign language can be translated into our native language, an image made with light that falls outside the range of our seeing can be "translated" into colors we can see. Scientists process these images so they can not only see them, but they can also tease out all sorts of information the light can reveal. For example, wisely done color translation can reveal relative temperatures of stars, dust, and gas in the images, and show fine structural details of galaxies and nebulae.

Spitzer's Infrared Array Camera (IRAC), for example, is a four-channel camera, meaning that it has four different detector arrays, each measuring light at one particular wavelength. Each image from each detector array resembles a grayscale image, because the entire detector array is responding to only one wavelength of light. However, the relative brightness will vary across the array.

So, starting with one detector array, the first step is to determine what is the brightest thing and the darkest thing in the image. Software is used to pick out this dynamic range and to re-compute the value of each pixel. This process produces a grey-scale image. At the end of this process, for Spitzer, we will have four grayscale images, one for each for the four IRAC detectors.

Matter of different temperatures emit different wavelengths of light. A cool object emits longer wavelengths (lower energies) of light than a warmer object. So, for each scene, we will see four grayscale images, each of them different.

Normally, the three primary colors are assigned to these gray-scale images based on the order they appear in the spectrum, with blue assigned to the shortest wavelength, and red to the longest. In the case of Spitzer, with four wavelengths to represent, a secondary color is chosen, such as yellow. So images that combine all four of the IRAC's infrared detectors are remapped into red, yellow, green, and blue wavelengths in the visible part of the spectrum.

Download a new Spitzer poster of the center of the Milky Way. On the back is a more complete and colorfully-illustrated explanation of the "art of space imagery." Go to spaceplace.nasa.gov/posters/#milky-way.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Article courtesy of NASA Space Place January 2013

Right-M 101, taken by the Spitzer Space Telescope, showing the use of colorization in non-visible light imaging. The way the colorization was done is described above.

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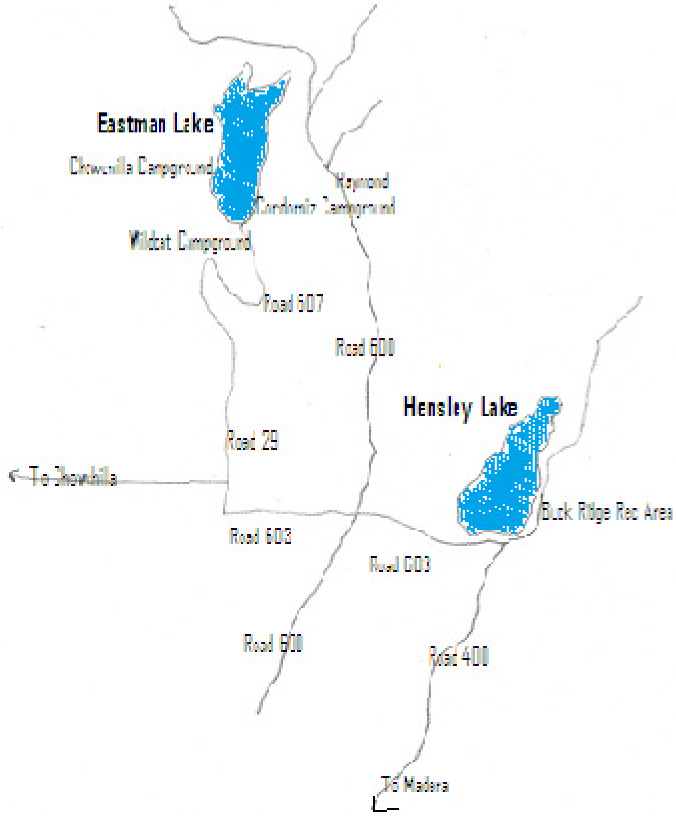
Deadline for articles submission for the May-June, 2013 issue
April 20

Please submit articles in Microsoft Word format

The Master Clock

Want to have *really* precise time for your astronomical experiments? The world's official master clock is at the U.S. Naval Observatory in Washington, D.C., and keeps time to within 100 picoseconds(.0000000001 of a second) every day. The master clock consists of 20 separate units which measure the decay of cesium atoms(known to be very precise), and ten units which measure time based on a hydrogen maser system. Accurate timekeeping like this is extremely important for things like GPS satellites and LORAN navigation systems. To the average person, though, the handy wristwatch or cell phone clock is just fine.
Info and images from usno.navy.mil



To Hensley and Eastman Lakes-Star party sites. The Eastman Lake starwatching site is at the boat ramp at the end of Road 29, just past the Cardinez campground.

Astronomy Short

Milton Humason was a high school dropout who started at the Mt. Wilson Observatory as a janitor and teamster, guiding mules up the narrow winding road to deliver supplies and equipment. Eventually, his interest and expertise in photography enabled him to assist the staff astronomers in imaging the skies. As his skills became more apparent, he was made an observatory assistant, then a junior astronomer, and finally one of the regular staff astronomers. When Edwin Hubble announced his "island universe" discovery in 1925 and the expanding universe in 1929, it was actually Humason who took most of the astrophotographs that made it possible. Humason would go on to become celebrated in his own right.

When he retired from Mt. Wilson in 1957, his son gave him a small telescope as a retirement gift. Humason took one look at it and exclaimed," Why would I want that? I've been looking at stars for forty years. I'm sick of looking at stars."

Humason rarely if ever did any starwatching during his retirement. He spent most of it salmon fishing.

From Marcia Bartusak, *The Day We Found the Universe*