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The Observer

The Newsletter of Central Valley Astronomers of Fresno

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May 18-Oublic star party at RiverPark

May 25-CVA meeting CSUF 7pm

June 8-Star party at Eastman Lake

June 15-Public star party at Riverpark

June 22-CVA meeting at CSUF-7pm

June 29-Starparty at Millerton Lake

M92, the *Other* Globular in Hercules

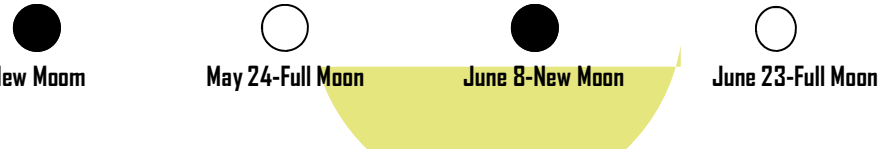
In the rush to see the well-known globular nebula M13 in Hercules, many astronomy enthusiasts overlook the second globular, M92, a beautiful sight in its own right. Also known as NGC 6341, it is about 27,000 light years from Earth, and, under ideal conditions, can be seen with the naked eye. Look for it this summer!

Image-NASA/HST

Quote of the Month-

A man gazing at the stars is proverbially at the mercy of the puddles on the road.

-Alexander Smith



May 9-New Moom | May 24-Full Moon | June 8-New Moon | June 23-Full Moon

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

The President's Message-

Spring is only half gone and already it's starting to feel like summer. Welcome to Fresno. On the other hand, we can now look forward to maybe six months' worth of clear weather for observing and imaging. Welcome to Fresno, again.

Our Eastman Lake star parties so far this year have mixed clouds and clear, meaning observing was good…at times and in certain, varying directions. From here-on out, though, expect mostly to entirely clear skies until November.

I hope everyone had a chance to see Comet C/2011 L4 (PANSTARRS). It never rose very high above the western horizon, but it was still a nice sight for comet-starved eyes. I think it was best on March 12, when it was only about 4° south of a one-day-old crescent Moon. I found it about 45 minutes after sunset in 15x70 binoculars. I estimated its magnitude as about 2.0. Its visible tail was about 15 arcminutes long, or half a Moon diameter. I saw Comet PANSTARRS again the next night, but that was it for me for weeks because of persistent low clouds and haze to the west. My next and last sighting was April 18 from Kingsburg Observatory. By then, it had faded to magnitude 6.2 and the first quarter Moon didn't help.

Comet PANSTARRS is our practice comet this year. In the fall, Comet C/2012 S1 (ISON) makes its way into the inner solar system. Comet ISON is a sungrazer and could become one of the brightest comets on record. Or maybe not. Comets are a fickle bunch. Regardless, we will keep you updated and if it looks like Comet ISON is living up to expectations, then CVA will organize one or more public observing events.

For those of you who want something astronomical to do on a full moon night, I suggest venturing to Yosemite Valley to photograph moonbows. Moonbows are a spring phenomenon at Upper Yosemite Fall, Lower Yosemite Fall, The Cascades, and maybe a few other strong-running waterfalls. Rather than attempting to fit in a full explanation here, I suggest you check out these links:

http://www.txstate.edu/news/news_releases/news_archive/2007/04/Moonbow041207.html
http://uweb.txstate.edu/~do01/moonbows2013upperyosemitefall.html
http://uweb.txstate.edu/~do01/moonbows2013loweryosemitefall.html

In case you're wondering what a moonbow looks like, here is one of the images I made of the Upper Yosemite Fall moonbow on April 25. I was set up in Cook's Meadow just north of Sentinel Bridge with about 40 other moonbow hunters. Moonbows are at best barely visible to the unaided eye, but are easy to capture with multi-second exposures. This image was made at ISO 800, f/2.8, and 10 seconds at about 10:45 p.m. The landscape is, of course, illuminated very nicely by the full Moon. There are stars visible in the image, but I don't know how well they will show up here. I will post a larger selection to our website, including several where I annotated the stars and constellations.

Fred

Profiles in Astronomy

James Jeans 1877-1946

Jeans was born and raised in Lancaster, England, and attended Trinity College, Cambridge, the same school as Newton, where he majored in mathematics. Afterwards, he came to the U.S. and taught at Princeton University for several years before returning to Cambridge in 1910. He would be associated with the university for the rest of his life.

Jeans made important contributions in quantum theory, cosmology, and stellar evolution. He was the first to propose the Steady State theory of the universe in 1928, that the universe is essentially stable, with matter being created to replace other matter. He also made an important discovery regarding interstellar gas clouds-if they were too large or small, or too cold or hot, they would fall apart. Only within a certain range of variables could they exist. Jeans also came up with what is now known as the Rayliegh-Jeans Rule, which relates the energy density of blackbody radiation to the temperature of the emissions source, a milestone in explaining certain aspects of quantum mechanics. He, along with his close friend and Cambridge colleague Arthur Eddington, was also an early and strong supporter of Einstein's Theory of Relativity at a time when it was being either ignored or rejected due to England's being at war with Germany during World War I.

Jeans was a prolific writer; he published hundreds of scientific papers, and also wrote a number of books on astronomy and physics, all of which became best sellers, for the general public. He was a member of England's Royal Society, and won the gold medal for the best scientific achievement of the year by the Royal Astronomical Society. Craters on the Moon and Mars are named after him

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Moonbow at Yosemite Falls

Nothing on Earth beats Yosemite Valley for sheer natural beauty-and when combined with the nighttime sky, it's even more so. Here (on right) is Fred Lusk's image of a moonbow at Yosemite Falls, which he describes in his President's message. Fred also explains how to take such images-they're not as hard as one may think, and with the right position, lighting and a little bit of perseverance, they can turn out to be stunning..

Try it sometime-and then share the results with CVA!

Also remember that the annual Glacier Point Star Park will be coming up later in the summer. CVA will send along the dates and times as soon as they are available.

CVA Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			May 1	2	3	4
5	6	7	8	9 New Moon  Annular solar eclipse	10	11 CVA star party at Eastman Lake
12 Mothers' Day	13	14	15	16	17	18 CVA public star party at River Park
19	20	21 Wilson and Penzias discover the Cosmic Background Radiation, 1965	22 Riverside Telescope Makers Conference –runs through May 27	23	24 Full Moon 	25 CVA monthly meeting at CSU Fresno 7pm
26	27	28	29 Eddignton finds evidence to Einstein's Theory of Relativity during solar eclipse-1919	30	31	June 1
2	3	4 200' Hale Telescope at Mt. Polomar dedicated-1948	5	6	7 CVA star party at Courtright Fri-Sat	8 New Moon  CVA star party at Eastman Lake
9	10	11	12	13	14 Flag Day	15 CVA star party at River Park
16 Fathers' Day	17	18	19	20 Summer Solistice	21	22 CVA monthly meeting at CSU Fresno 7pm
23 Full Moon 	24	25	26	27	28	29 CVA public star party at Millerton Lake
30 Tungusta explosion -1908	July 1	2	3	4 Independence Day	5	6

What's New in Space

The History of the Saturn Rocket part 3

November 9, 1967: the launch date of the first Saturn 5 rocket. This was the proving day for NASA's "all-up" testing philosophy, and also a portent of the space agency's recovery after the Apollo 1 tragedy ten months earlier. The rocket, carrying an unmanned Apollo capsule and a dummy lunar lander, was known as AS-501, and also Apollo 4. At 363 feet tall, it was the largest and most powerful rocket ever built; NASA engineers estimated that if, fully fueled, it exploded on the launch pad, LC-39A, it would completely obliterate everything within almost two miles. They tried not to think of that scenario.

At 7am, as the countdown reached zero, and the five F-1 engines came to life, the missile slowly lifted off the pad. Observers later said at first that they could see the ignition, but there was no initial sound. Then it hit them, a wave of noise that they had never experienced before. The sound and shock waves from the engines left them deafened for a time, pushed in the windows at the launch center, and dropped ceiling panels onto the monitors. CBS newsman Walter Cronkite's broadcasting booth was covered with dust and broken ceiling and wall panels. It was later found that people over 100 miles away heard the sound of the launch.(After the launch, NASA engineers examined the pad and found damage to it. As a result, they designed and instituted a system that poured thousands of gallons of water onto the pad at the moment of launch, damping the vibrations caused by the power of the engines, and preventing launch pad damage. Most of the smoke and clouds that were seen at the launch pad during Apollo-Saturn, and later Space Shuttle launches, was actually this water turning into steam.)

What mattered, though, was the rocket worked perfectly that day. The first stage, the S-IC, did its two and a half minutes of lifting; it dropped off and the S-ii second stage took over. A few minutes later, the S-IVB third stage put the Apollo capsule into an elongated orbit. Nine hours later, it reentered the atmosphere and splashed down in the Pacific Ocean, where it was recovered by Navy ships. NASA had risen from the ashes of Apollo 1 and had a rocket to take it to the Moon. (Left-an image of the Earth taken by the Apollo 4 capsule)

(Many people have wondered about the numbering of Apollo-Saturn missions and how they came to be the way they were. Apollo 1, which was the mission that Grissom, White, and Chaffee were training for when they died in the January 29, 1967 fire, was intended to be the first manned Apollo flight-hence the "1". However, after the tragedy, NASA decided to renumber the Apollo-Saturn program flights using a different criterion-according to the total number of launches, unmanned or manned. Therefore, they started with the first unmanned A-S test launch, using a Saturn 1B, in February 1966, also called AS-201. It tested the Apollo capsule's heat shield. The second Apollo-Saturn 1B test launch, known as AS-203, was in July 1966, and was a test of the S-IVB stage and engines; and the third was in August of the same year, also with a Saturn 1B, and was called AS-202. It was a test of the Apollo capsule's heat shield under high speed Lunar return conditions. So, the November 1967 Saturn 5 launch was the fourth of the Apollo-Saturn test launches, and was officially called Apollo 4. All subsequent Apollo-Saturn launches, using either the 1B or the 5, were numbered in sequence from then on. Technically, if people want to call the 1966 Saturn 1B launchings Apollos 1,2,and 3, they can, but they have never been officially designated as such.)

Apollo 5 was launched was launched on January 24, 1968, using a Saturn 1B, and carrying the lunar lander. It was put into Earth orbit and underwent several crucial tests which demonstrated its reliability; the mission was a complete success. Apollo 6, though, was much different. It was the second launch of the Saturn 5, on April 4, 1968, and experienced severed vibration problems(known, in engineerese as "pogo") in the second and third stages, almost to the point of aborting the entire mission. As it was, the unmanned Apollo capsule's service module engine had to be used to complete the mission, which was a second test of the capsule's ability to withstand high speed lunar insertion speeds and reentry to Earth. Afterwards, NASA reviewed the entire Saturn engineering design, and came up with fixes which would not entirely eliminate the pogo, but bring it within acceptable limits.

With the solving of Apollo 6's problems, NASA declared the Saturn 5 man-rated, and prepared to send astronauts to the Moon.

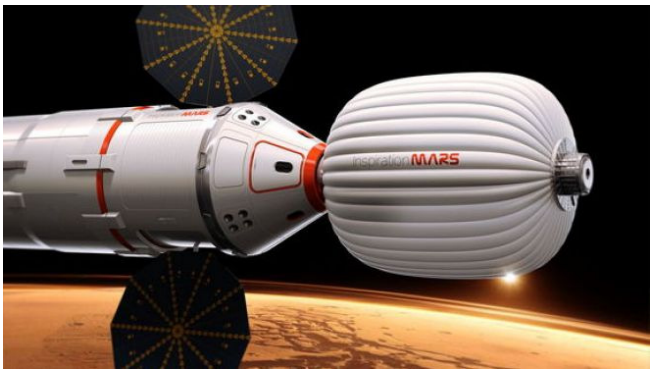
Russia Building New Space Center

For the past two years, RKA, the Russian Space Agency, has been working on a new space center that will eventually replace the Baukinaur Space Complex for manned and unmanned cpmmercial space flights. There is nothing secret about it, but it has been kept quiet while construction has been going on. In April 2013, Russian President Valdimir Putin traveled to the new complex on the 52d anniversary of Yuri Gagarin's historic Vostok 1 flight to lay a plaque commemorating the mission and also the building of the new complex. It is in the Amur River region(in red on the map), almost 4,000 miles east of Moscow; the closest large city is Vladivostok. Currently, seven launch pads are scheduled to be built; five will be for unmanned commercial flights, and will see the first launchings in 2015. The other two will be for manned Soyuz missions, and will be ready for use in 2018. In addition to Russian launches, Putin welcomed other space powers: the U.S., Europe, China, and Japan, to use the site as well. RKA said that the new launch center will cost approximately $10 billion by the time it is finished.

Since 1957, almost all Russian commercial and manned launches have taken place at Baikinaur, which is in the Central Asian desert in what was the Soviet Republic of Kazakhstan. In 1991, in the wake of the downfall of the Soviet Union, Kazakhstan became an independent nation; RKA and the new Russian government negotiated a 50 year lease with the Kazak government to continue using Baikinaur, but now the Russians want to reduce their dependency on it. Russia has two other launch sites; one handles some unmanned commercial launches, but the other is strictly for military missions, and neither has the launch pads or capabilities for manned flights. Right now Baikinaur sees 65% of all Russian space launches; with the new site, it will be reduced to about 10%.

Want to Go to Mars in a Few Years?

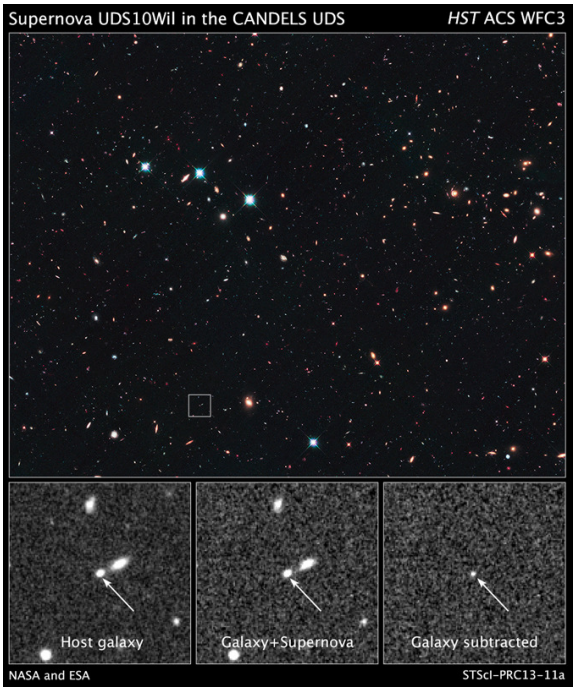
Dennis Tito, who has been given the title of the first "commercial" astronaut due to his paid flight to ISS in 2001, is now leading a group which is planning to launch a manned Martian mission as early as 2018. Tito and his consortium is looking for a couple, man and woman, preferably married, who would live for 510 days aboard a spaceship about the size of a medium RV. The craft would take approximately nine months to get to the Red Planet, but would not land on it, but simply loop around it and head back to Earth(it seems like a shame to go all that way and spend only a few hours there). One of the unspoken qualifications is that the group would prefer an older couple who have already had children or do not want to have any, due to the possibility of radiation in space. The craft would be launched using existing hardware; the capsule would be a variation of NASA's Orion spacecraft, with one of Frank Bigelow's inflatable space rooms attached to it. To save weight and space, everything in the spacecraft would be recycled, including the astronauts' waste products, in order to provide food, water, and oxygen. Tito and his group strongly believe they can pull it off; at the least, they have no shortage of volunteers: over 200 people have indicated a willingness to undertake the trip. Right-the proposed 2018 Mars manned spacecraft with the Bigelow inflatable module on its nose. It has been tentatively named *Mars Inspiration.*



The Number of Extra-Solar Planets Found as of April 2013-935

How many more are out there?(Thousands? Tens of thousands?)

Hubble Finds the Most Distant Supernova Yet Known



NASA's Hubble Space Telescope has found the farthest supernova so far of the type used to measure cosmic distances. Supernova UDS10Wil, nicknamed SN Wilson after American President Woodrow Wilson, exploded more than 10 billion years ago.

SN Wilson belongs to a special class called Type Ia supernovae. These bright beacons are prized by astronomers because they provide a consistent level of brightness that can be used to measure the expansion of space. They also yield clues to the nature of dark energy, the mysterious force accelerating the rate of expansion.

"This new distance record holder opens a window into the early universe, offering important new insights into how these stars explode," said David O. Jones of Johns Hopkins University in Baltimore, Md., an astronomer and lead author on the paper detailing the discovery. "We can test theories about how reliable these detonations are for understanding the evolution of the universe and its expansion."

The discovery was part of a three-year Hubble program, begun in 2010, to survey faraway Type Ia supernovae and determine whether they have changed during the 13.8 billion years since the explosive birth of the universe. Astronomers took advantage of the sharpness and versatility of Hubble's Wide Field Camera 3 to search for supernovae in near-infrared light and verify their distance with spectroscopy. Leading the work is Adam Riess of the Space Telescope Science Institute in Baltimore, Md., and Johns Hopkins University.

Finding remote supernovae provides a powerful method to measure the universe's accelerating expansion. So far, Riess's team has uncovered more than 100 supernovae of all types and distances, looking back in time from 2.4 billion years to more than 10 billion years. Of those new discoveries, the team has identified eight Type Ia supernovae, including SN Wilson, that exploded more than 9 billion years ago.

"The Type Ia supernovae give us the most precise yardstick ever built, but we're not quite sure if it always measures exactly a yard," said team member Steve Rodney of Johns Hopkins University. "The more we understand these supernovae, the more precise our cosmic yardstick will become."

Although SN Wilson is only 4 percent more distant than the previous record holder, it pushes roughly 350 million years farther back in time. A separate team led by David Rubin of the U.S. Energy Department's Lawrence Berkeley National Laboratory in California announced the previous record just three months ago.

By finding Type Ia supernovae so early in the universe, astronomers can distinguish between two competing explosion models. In one model the explosion is caused by a merger between two white dwarfs. In another model, a white dwarf gradually feeds off its partner, a normal star, and explodes when it accretes too much mass.

The team's preliminary evidence shows a sharp decline in the rate of Type Ia supernova blasts between roughly 7.5 billion years ago and more than 10 billion years ago. The steep drop-off favors the merger of two white dwarfs because it predicts that most stars in the early universe are too young to become Type Ia supernovae.

"If supernovae were popcorn, the question is how long before they start popping?" Riess said. "You may have different theories about what is going on in the kernel. If you see when the first kernels popped and how often they popped, it tells you something important about the process of popping corn."

Knowing the type of trigger for Type Ia supernovae also will show how quickly the universe enriched itself with heavier elements such as iron. These exploding stars produce about half of the iron in the universe, the raw material for building planets, and life.

Text and images from nasa.gov

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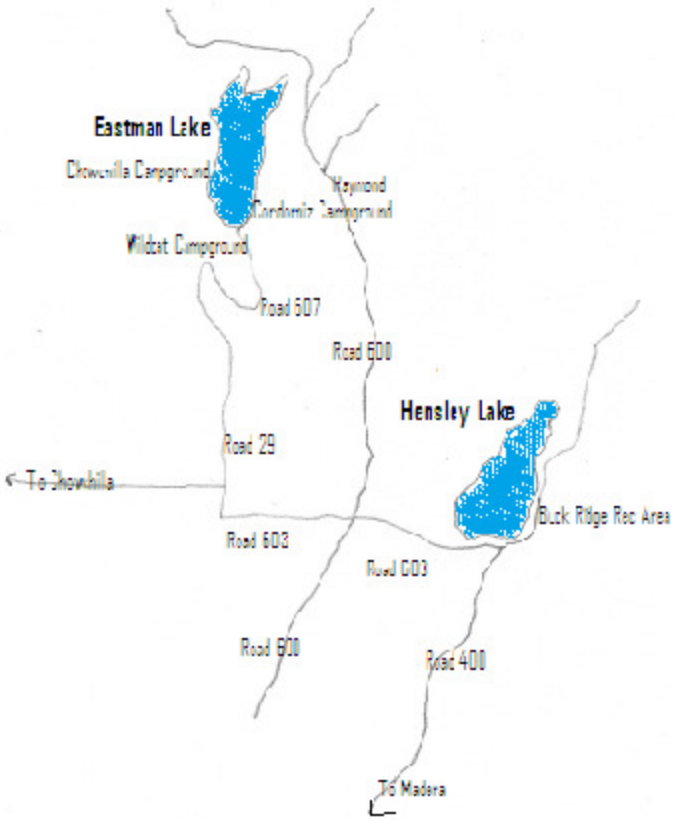
Deadline for articles submission for the July-August 2013 Observer June 25

Please submit articles in Microsoft Word format

Stunning New Hubble Image of the Horsehead Nebula

The Hubble Space Telescope just keeps getting better and better. On April 18, NASA and the Space Telescope Institute released this image of the iconic horsehead Nebula right in time for the 23d anniversary of Hubble's deployment into space. The image, taken in infrared, shows major star-forming regions, and, in such details, gives a less-than-horsehead view of the nebula. Nevetheless, it still shows what the old(yes, it's almost 40 years old actually; the space telescope design was finalized in 1976) boy has in him. The young whipper-snapper telescopes on Earth may be larger, but it's hard for them to be better.

Image by NASA/HST



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

The Palomar Observatory has had more than its share of colorful characters over the years; one of them, Fritz Zwicky, was profiled in this column recently. Another person who livened up things on the mountain was Byron Hill. Never heard of him? He wasn't an astronomer at all, but the chief engineer and superintendent of Palomar in the 1940s, 50s, and 60s. Hill was a tough-looking character who habitually wore a leather flying jacket and aviator's glasses, and became a legend at the observatory, so much so that eventually it was called "Byron's Hill." On one occasion, he told an astronomer to leave the dining hall because the man was wearing short pants. On another, one of the astronomers(it was rumored to be Zwicky) parked his car inside the dome of the 200" Hale telescope one day. Hill wrapped a cable around the vehicle and used a winch to hoist it to the top of the dome, where it hanged and swayed for several hours next to the telescope. One of the best among his many favorite sayings was "Palomar would be a great place if it weren't for the astronomers." On the other hand, he played a major role in the construction of the 200", and made sure that it stayed at the forefront of astronomy for many years.

-from *First Light* by Richard Preston