ANTELOPE VALLEY ASTRONOMY CLUB, INC.

Desert Sky Observer

Volume 29 | **Antelope Valley Astronomy Club Newsletter** | **June 2009**

Up-Coming Events

June 12: Club Meeting* RTMC 'Show and Tell'
June 15: Board Meeting @ Don's house
June 20: Dark Sky Star Party @ Mt. Pinos
June 27: Repair day

* Monthly meetings are held at the S.A.G.E. Planetarium on the Cactus School campus in Palmdale, the second Friday of each month. The meeting location is at the northeast corner of Avenue R and 20th Street East. Meetings start at 7 p.m. and are open to the public. *Please note that food and drink are not allowed in the planetarium*

President

Don Bryden

I've just returned from RTMC and it was quite an experience. Farah, John and the gang at Woodland Hills Camera & Telescope were working hard and the discounts were deep. By Sunday Farah put the price list away and just started making deals. It seemed that every time I walked by the booth there was another AVAC member in there picking up a few goodies.

On Friday I picked up a new Televue Panoptic 19mm eyepiece for $200 out the door (out the tent). I was proudly showing it off back at our enclave when Rose walked up with her new 17mm Ethos! I ended up going back for more, though and eventually had a 26mm Nagler Type 5 and an 11mm Type 6 (does anybody wanna buy some used WO SWANs?)

Probably the lowlight of the event was the bad luck spell that Doug Drake went through. First he left his trusses at home. That was o.k. since he had his Vixen 4" apo refractor and was picking up a new Vixen mount at the show. After three trips back to the WHT booth to get parts that were not included he was ready to go. We decided to move our scopes further to the West to avoid the towering motorhome that some inconsiderate fool parked right by our site (though it was two feet longer than Frank's…). Doug moved his scope off his carpet and started to drag it over when the soft earth caved in and his mount fell into Shane's trailer hitch. What a horrible sound! The dual speed crayford focuser was trashed but the scope and mount seemed o.k.

The cool thing was that the guys from Vixen offered to send Doug a new focuser shaft for free. They also loaned him a few parts and accessories that WHT did not have and even came out to show him how the Starbook controller works. I imagine Doug will be a loyal customer for life! But this is par for the course out at RTMC. You really get the feeling of what a great hobby this is where vendors and customers are really all just astronomers at the core.

Another great example was at the HoTech booth, makers of my favorite red light/white light/green laser flashlight. I always have it around my neck but lately, it keeps turning off. I was at the booth watching David Ho, the owner, demo his latest version of his Astro Aimer. I commented that I loved the one I have but it intermittently was shutting off. I asked if there was something I could do to adjust or clean it. Next

think I know, David had it wrapped up with my name and address and a promise to fix it, clean it, adjust the laser and mail it back – Total cost to me: Nada!

One other thing, that first night when Doug had no drives, no finder scope and nothing but a bent focuser with half a knob, he still was showing us showpiece objects like the Sombrero Galaxy! Amazing!

The weekend also had a number or great talks such as the astroimaging talk given by Bob Fera and the keynote address by Dr. Krupp of the Griffith Observatory. One great panel discussion that included our very own Tom Koonce was a talk on how best to run an Astronomy club. I think the panelists as well as the rest of us in the audience really got a lot out of that discussion.

Of course there were a number of way cool telescopes and mounts. One of my favorites was the 30" Planewave CDK on a Mathis MI-1000 fork mount. A new entry was Celestron's Edge HD with features such as flattener in the baffle tube, cooling vents in the tube, mirror lock with a new white paint scheme in the usual sizes (8", 9.25", 11", 14").

Alas, the Footscope did not win a merit award but if you saw some of the beautiful hand crafted instruments out there you would understand. Still I enjoyed working on my Messier sketchbook log while sitting at the eyepiece under the exceptional skies of Camp Oakes (especially since that eyepiece was a new 19mm Panoptic!).

Don Bryden

Vice President

Rose Moore

Summer is here and we have several club events coming up! Please check the website for information.

For our club meeting in June, we will have a RTMC 'Show and Tell' for those who were able to attend. Please bring any items, or stories to tell, to the meeting to share with all. Any pictures you want to put on the website or have Jeremy show at the planetarium, please contact Steve Trotta, Jeremy, or Don for the procedure for posting the pictures.

For July we have Chris Butler presenting 'Under the Southern Skies'. Please come out to here Chris speak about astronomy in the Southern Hemisphere, as well as his own recent experiences on a trip 'down under'!

September we have our own Doug Drake speaking on Cosmology. Hopefully by then the new Large Hadron Collider will have had its first test for this year, and there will be some exciting new information.

October is our yearly business meeting, followed by Jeremy Amarant's and Matt Leone's talk on Messier objects with a planetarium show at November's meeting!

August is our club picnic, at the Trotta's, so please plan to come out and enjoy the event with fellow members and their families. Observing to follow in the large field. Starting at June's meeting there will be signup sheets for the potluck. Anything you can bring will be appreciated! If you can't make it to the meetings prior to the picnic, please call one of the board members and let them know if you are attending and if you can bring a dish/non perishable items to the picnic. Also if you can donate an item for the silent auction or raffle, please bring it to a meeting, or contact a board member.

December will be our club Christmas Party, which will be at the same location as last year, the Antelope Valley Inn in Lancaster. More information will be coming in the early fall!

A good time was had by all at RTMC!! Clear skies, clean air, and no snow! Many thanks to the club members who attended and shared food, laughs, good conversation, and help with setting up and camping! Better friends could not be found anywhere!!

Clear skies,
Rose

Director of Community Development

Karole Barker

The turnout for Prime Desert Woodlands on May 16th was great. We had 154 people show up for the event, in addition to 14 club members. The next three Prime Desert Woodlands will be on June 27th @ 8:30 p.m., July 25 @ 8:30 p.m. & August 29 @ 8:30 p.m. We still need volunteers to bring out scopes those nights. Please let me know if you can make it.

We had a great turn for this year's Poppy Festival. Our club made $259.00 for the whole weekend.

Our club is now confirmed for a 1/2 night at Mt. Wilson on Saturday September 19th. The cost for the night is $900.00. We have 25 people going, so the cost will be $36.00 per person. Right now the signup sheet is closed, since we are already at 25 people signed up for the night. I will keep you posted.

One of our clubs big events is RTMC in Big Bear, which was on May 22nd thru May 25th. There were a lot of vendors and great key note speakers as there are every year at this event. A great time was had by all. We can’t wait till next year.

On May 12th was family night at the AERO Institute and we had a blast. They had a flight simulator, in which you got to land the shuttle, and it was a lot of fun.

Clear skies,
Karole

Space Place

Scoring More Energy from Less Sunlight

For spacecraft, power is everything. Without electrical power, satellites and robotic probes might as well be chunks of cold rock tumbling through space. Hundreds to millions of miles from the nearest power outlet, these spacecraft must somehow eke enough power from ambient sunlight to stay alive.

That’s no problem for large satellites that can carry immense solar panels and heavy batteries. But in recent years, NASA has been developing technologies for much smaller microsatellites, which are lighter and far less expensive to launch. Often less than 10 feet across, these small spacecraft have little room to spare for solar panels or batteries, yet must still somehow power their onboard computers, scientific instruments, and navigation and communication systems.

Space Technology 5 was a mission that proved, among other technologies, new concepts of power generation and storage for spacecraft.

"We tested high efficiency solar cells on ST-5 that produce almost 60 percent more power than typical solar cells. We also tested batteries that hold three times the energy of standard spacecraft batteries of the same size," says Christopher Stevens, manager of NASA's New Millennium Program. This program flight tests cutting-edge spacecraft technologies so that they can be used safely on mission-critical satellites and probes.

Helen Johnson, a spacecraft technician at NASA's Goddard Space Flight Center, works on one of the three tiny Space Technology 5 spacecraft in preparation for its technology validation mission.

"This more efficient power supply allows you to build a science-grade spacecraft on a miniature scale," Stevens says.

Solar cells typically used on satellites can convert only about 18 percent of the available energy in sunlight into electrical current. ST-5 tested experimental cells that capture up to 29 percent of this solar energy. These new solar cells, developed in collaboration with the Air Force Research Laboratory in Ohio, performed flawlessly on ST-5, and they've already been swooped up and used on NASA's svelte MESSENGER probe, which will make a flyby of Mercury later this year.

Like modern laptop batteries, the high-capacity batteries on ST-5 use lithium-ion technology. As a string of exploding laptop batteries in recent years shows, fire safety can be an issue with this battery type.

"The challenge was to take these batteries and put in a power management circuit that protects against internal overcharge," Stevens explains. So NASA contracted with ABSL Power Solutions to develop spacecraft batteries with design control circuits to prevent power spikes that can lead to fires. "It worked like a charm."

Now that ST-5 has demonstrated the safety of this battery design, it is flying on NASA's THEMIS mission (for Time History of Events and Macroscale Interactions during Substorms) and is slated to fly aboard the Lunar Reconnaissance Orbiter and the Solar Dynamics Observatory, both of which are scheduled to launch later this year.

Thanks to ST-5, a little sunlight can go a really long way.

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

Galactic Jewels by Tom Koonce

What inspired your earliest interest in amateur astronomy? Was it your first telescopic views of the Moon's craters or your first view of Saturn's rings? Perhaps it was watching the night sky for satellites passing overhead on a summer's night. Whatever inspired you to pursue astronomy as a hobby, it has probably been deep sky views of galaxies, nebulae, and beautiful star clusters that have kept your interest focused. For many of us, motivation has come from globular clusters appearing like spheres of sparkling jewels in the heavens.

Among the oldest objects in our galaxy, globular clusters have an abundance of older, metal-poor, redder stars. Formed billions years ago, all of the stars in these cluster were born at approximately the same time from a common cloud of interstellar dust. Astronomers have determined the age of the clusters by measuring the concentrations of heavy elements contained within them and comparing these amounts with the other stars in the galactic disk. As generation after generation of stars pass and stars die, supernovae release heavy elements out into space, so the next generations of stars in globular clusters appear to have less heavy elements than other stars.

I'll never forget the night when a fellow amateur astronomer showed me my first high power view of the rich pool of stars within the globular cluster M13. It was an awe-inspiring sight to see hundreds of thousands of stars orbiting around each other, packed into a spherical volume just 145 light years across. Pictures like the one here just don't do it justice. Now, each time I swing the telescope into the constellation Hercules and find M13, I still feel that sense of wonder and amazement.

Unlike our Sun, globular clusters are located in the halo of the Milky Way, the 'fog' of stars and matter that orbit the center of the galaxy above and below the plane of the galactic disk, with a significant concentration toward the Galactic Center. Our galaxy is associated with about two hundred globulars.

Try imagining what it might be like to stand on the surface of a planet circling a star just inside of a globular cluster… Surrounded by stars brighter than the planet Venus, perhaps two main concentrations of stars would be visible to you; one very large area of the sky towards the center of the globular cluster would be visible as a region more closely packed with stars; and perhaps opposite this, a view of the central bulge of stars of the Milky Way could be seen prominently in the night sky. The sky might be so dazzling at night that the subtlety of faint nebulae might be completely overwhelmed in the light. With so many bright stars surrounding you, your view of other galaxies might be severely limited. In fact your location within the Milky Way could be a limiting factor in your very understanding of the universe, a tradeoff between beauty and knowledge.

Sir Edmund Halley discovered M13 in 1714 and it was logged as a nebula by Charles Messier when he added it to his famous listing fifty years later. By the 1920 debate on the size of the universe between Harlow Shapley and Heber Curtis, globular clusters (including M13) featured prominently in Shapley's rough determination of the shape of the Milky Way. Since globulars are essentially spherical in shape, can be seen from great distances and are appear to be evenly distributed around the galaxy, they were a natural choice for Shapley's research. Globular clusters exist in most other galaxies too. The Hubble Space Telescope was used to detect approximately thirteen thousand (!) globulars associated with the galactic giant galaxy M87, indicating that globulars will remain an important focus of astronomical research into galactic evolution for years to come.

If you haven't observed M13 yet, get out your binoculars or at least a 3 inch telescope and you'll be able to resolve stars within the cluster, but you'll be able to see hundreds of stars and details of its structure using an eight inch telescope at about two hundred power. More details become visible as you add aperture so this cluster never gets boring. M13 is located one third of the way between the stars Eta and Zeta Hercules on an imaginary line connecting them. Through the eyepiece, stars will fill the field of view from edge to edge. Use fairly low power to see the overall structure of the cluster and then switch to much higher power to peer deeper into the depths of the globular, to see dust lanes and the tendrils of star chains. The view is worth the work of finding M13 and adding it to your 'star party favorites' list. It's 25,100 light years away and contains between hundreds of thousands to one million stars. One estimate put the age of M13 between 12 and 14 billion years old, making it certainly one of the oldest objects in our galaxy.

For M13's part in galactic history, perhaps none is more interesting and unusual than the fact that in 1974 it was selected as the target for one of Earth's first intentional radio messages to be beamed to the stars. The message was designed as a 'First Contact' message to possible extra-terrestrial intelligent races and sent by SETI using the Arecibo Observatory. The message will take about 25,100 years to reach the cluster, so that an answer cannot be expected for over fifty thousand years. You can relax, there's still time to go out and observe M13 through your telescope while you're waiting!

As you gaze upon the galactic jewels in the globular cluster M13 and are imagining the view from a planet orbiting a star nestled within, also try to imagine what possible creatures living there might think upon receiving this message in another 25,065 years. Hopefully our species will be around to get the answer.

Clear Skies,
Tom

Other Globular Clusters to observe in Hercules: M92 and NGC 6229

References: *The Munich Astro Archive: http://www.maa.clell.de/Messier/E/m013.html*
SETI Institute: http://www.seti.org/Page.aspx?pid=1241

Roswell's Report by Roswell

Greetings to all earthlings from Belluckleonia or as you pronounce it, Belt Buckle!

As your part of the planet starts its seasonal warming up, that is usually a pretty good indication that it is time to visit Longfellow Elementary School in Riverside for their annual Space Day event sponsored by our friends at Lockheed Martin. (Lockheed Martin is pretty popular with us Belluckleonians, as a few of us work over there in their Skunk Works, if you don't believe me ask Tom Koonce!) Once again; a fun time was had by all.

Terry was his usual awesome self as he explained things to the kids. Dick Hague, well, what can you say about Professor Hague that hasn't been said already! Tom Koonce took this event to the extreme by renting a costume and trying to convince everyone that he was Kepler! And during all of this time, where was Jeff's wife Charlotte? She was off somewhere teaching kids about intergalactic propulsion systems. I guess she's some sort of rocket scientist.

Jeff Riechmann, what a knucklehead! As Jeff walked through the hotel lobby Friday morning on his way to the event, he was met by Tom. Tom in his Kepler outfit stopped Jeff and said "good morning, Jeff". Jeff, still half asleep and feeling the after effects a the mudslide that Kay Hague forced him to drink the evening before at dinner, said good morning Reverend and tried to put a quarter in Tom's coffee cup.

At the school, it was fun and games as usual. As Terry, Professor Hague and Reverend Koonce talked to kids about Kepler; I would then jump out of my hiding place and tell the kids that you earthlings don't know anything about finding planets. We Belluckleonians have been finding planets for millenniums. In fact, I destroyed one planet! At this point I would hand one of the guys my meteorite and they would explain what meteorites are.

Some of the kids were a little scared of me. But things lightened up a little bit when I would accuse their teacher of being an alien. The truth hurts.

During one of our breaks, Reverend Koonce, the official Space Day photographer and yours truly decided to pay a visit to the alleged captured UFO. When we arrived, there were a bunch of kids looking at the UFO and two kids were sitting inside. In all of my space travels I have never seen a UFO quite like this one. So I decided to climb inside and check it out. The only problem was that one of the kids inside acted like he had never seen an alien before. He started screaming! I didn't know what he was screaming about; in fact I interpreted it as some sort of warning so I really wanted to get inside the UFO and see if I could get the heck out of Riverside. This only made him scream even more and much louder! This kid's behavior was out of this world, so I decided to leave. Earthlings, can't live with them, can't dissolve them!

During another break, Jeff decided to go get a soda. For some reason, he wanted to wear my shoes. He learned real fast not to ask to wear my shoes again! It seems as he was walking through the school, kids started yelling "hey alien" at him! What a knucklehead!

In the afternoon, we were visited by kindergarten and first graders. Talking with my associates, it was decided that "big" Roswell might scare these younger kids, so we decided that I would shape-shift into infant Roswell.

The kids would come into the room and see Jeff sitting in a chair holding what looked like a baby. After the other guys finished their talk, Jeff would invite the kids to come look at his baby. That's when I would pop out of the blanket! Every time we did this, about ¼ of the students would head for the door!

So there you have it. My adventures in Riverside!

Until next time, may the Force be with you!

International Year of Astronomy

Clusters of Stars

Look up in a dark sky and you will see from a few to a few thousand stars. Some of these stars, like our Sun, are loners as they move around the galaxy. Many stars are gravitationally bound in pairs, called binaries, and some are caught in a gravitational dance of three or more companions. Others reside in bigger clusters, and these clusters can be some of the most beautiful sights visible in a backyard telescope. Why are some stars in clusters and some not?

To begin with, there are two different types: open clusters and globular clusters. They are both groups of stars but that is where the similarity ends. Think of an open cluster like a stellar kindergarten class while a globular cluster could be thought of as huge retirement home for the stars in the countryside

Open clusters contain up to a few hundred young stars that have been recently born from a cloud of gas and dust in the spiral arms of our Milky Way Galaxy. Usually these clusters don't stick together very long. Like teenagers, they eventually leave home. The Pleiades (also called the Seven Sisters) is a well-known open cluster in the Northern Hemisphere.

Globular clusters, like the one pictured at the right, are much bigger and older than open clusters. They shine steadily in their "retirement community" where they will stay for many billions of years. In spiral galaxies they don't stay in the disk like most stars, but orbit in all directions, making what scientists call a "halo," or spherical pattern. In 1918, astronomer Harlow Shapley used their locations to determine that we live in the "suburbs" of our galaxy, instead of the center as we thought before.

The age of globular clusters was a source of confusion for scientists for many years because they appeared older than the universe. It turns out that astronomers were very good at measuring the age of stars, but not at calculating the age of the universe. Estimates based on data from the Hubble Space Telescope, and observations of the early universe by NASA's WMAP spacecraft, have put things right. Stars in globular clusters are almost 12 billion years old, in a universe that is 13.7 billion years of age. That's old!

Learn more about Star Clusters from NASA.

News Headlines

Snoopy Celebrates 40th Anniversary of His Moon Flight
Snoopy, the irreverent dog from the "Peanuts" comic strip, took time from his World War I dogfights as world-famous flying ace to become a world-famous astronaut for NASA's Apollo 10 mission.
http://www.space.com/entertainment/090515-apollo-snoopy.html

NASA Selects Student's Entry as New Mars Rover Name
NASA's Mars Science Laboratory rover, scheduled for launch in 2011, has a new name thanks to a sixth-grade student from Kansas. Twelve-year-old Clara Ma from the Sunflower Elementary school in Lenexa submitted the winning entry, "Curiosity."
http://www.nasa.gov/home/hqnews/2009/may/HQ_09-122_MSL_named_Curiosity.html

New, Deep Image of Virgo Cluster Reveals Galaxy Cut Short in its Youth
Astronomers have peered deep inside the Virgo cluster, and measured the size of one of its most famous members — Messier 87 — with surprising results. The giant elliptical galaxy isn't quite as giant as previously believed.
http://www.universetoday.com/2009/05/20/new-deep-image-of-virgo-cluster-reveals-galaxy-cut-short-in-its-youth/

'Whole Earth Telescope' Spies White Dwarf
A worldwide network of telescopes is spending time every night watching the odd death throes of a star very much like the sun.The project is the latest in an elaborately choreographed collaboration called the Whole Earth Telescope.
http://dsc.discovery.com/news/2009/05/19/whole-earth-telescope.html

Cosmologists Improve on Standard Candles Measurement
Cosmologists have found a new and quicker technique that establishes the intrinsic brightness of Type Ia supernovae more accurately than ever before. These exploding stars are the best standard candles for measuring cosmic distances and are the tools that made the discovery of dark energy possible. An international team has found a way to do the job of measuring stellar distances in just a single night.
http://www.universetoday.com/2009/05/19/cosmologists-improve-on-standard-candles-measurement/

An exploding star in an "exploding galaxy"
An international team of radio astronomers has discovered the secret explosion of a massive star, a new supernova, in the nearby galaxy M82. Despite being the closest supernova discovered in the last 5 years, the explosion is exclusively detectable at radio wavelengths because the dense gas and dust surrounding the exploding star leave it invisible in other wavebands.
http://www.astronomy.com/asy/default.aspx?c=a&id=8312

Active Mercury
A NASA spacecraft gliding over the surface of Mercury has revealed that the planet's atmosphere, magnetosphere, and its geological past display greater levels of activity than scientists first suspected. The probe also discovered a large impact basin named "Rembrandt" measuring about 430 miles in diameter.
http://science.nasa.gov/headlines/y2009/30apr_mercury.htm

Astrophoto of the Month

Flame & Horsehead Nebulae
By Don Bryden

SBIG ST2000XCM
Stellarvue SV-105
64 45" images stacked
Taken May 10th to 11th 2008

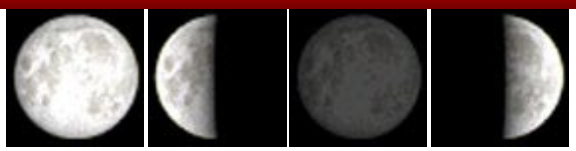
Aerospace Committee Report by Jeff Riechmann and Roswell (co-chairbeings)

- Membership in the Aerospace Committee is open to any active member of the Antelope Valley Astronomy Club.
- The LRO / LCROSS launch has been moved to no early than June 2, which moves the impact out to mid-October 2009. Exact date is TBD. Once they launch, they'll know the impact date and location pretty accurately.

Vandenberg Launch Schedule: As of 2009 May 16

Date	Launch Time/Window (PST/PDT)	Vehicle	Pad/Silo
JUN 29	To Be Announced	Minuteman III	---
Vehicle will probably send one or more unarmed warheads on a ballistic trajectory to the central Pacific			
Summer	~09:12	Atlas V	SLC-3
Payload is the DMSP F18 military weather satellite.			
SEP-OCT	To be announced	Delta II	SLC-2W
Payload is the WorldView-2 commercial reconnaissance satellite.			

June Sky Data



Best time for deep sky observing this month:
June 17 through June 24

Mercury is at its greatest elongation westwards from the Sun on June 13th. But it's rising less than an hour before the Sun: we are unlikely to see this elusive little planet at all, this month.

Venus is rising an hour or two before the Sun, and we should be able to see the brilliant "Morning Star" very low in the east at dawn. Although it is so low in the twilight sky, Venus is so bright that it can be picked up easily, in clear conditions.

Mars appears very close to Venus in the sky this month. At the start of June, Mars is 5 degrees to the left of Venus; by the middle of the month, Mars is close to the upper left of Venus, with a gap of just 2 degrees. At the end of June, Mars is above Venus and a little to the right, but they are still only 3 degrees apart. So both planets will fit into the same field of view in a pair of binoculars, all month. But the Red Planet is far further away at present, so it looks much fainter, just like a dim yellowish dot.

Jupiter is rising in the south-east around midnight, and it's well up in the southern sky at dawn. Relative to the stars, the giant planet is moving very slowly south-westwards in Capricornus. If you can find the three bright stars of the "Summer Triangle", you will find Jupiter far below Deneb, the upper left-hand star in the

Saturn is in the western sky at dusk, and doesn't set well after midnight. Relative to the stars it is moving slowly south-east, in the constellation of Leo, well to the left of the bright star Regulus. Saturn appears brighter than Regulus, and it shines with a steady, untwinkling light, slightly more creamy in colour than the blue-white star.

On most clear nights, we see the occasional **meteor** or "shooting-star", as tiny specks of interplanetary débris burn up in the Earth's atmosphere. At certain times of the year, the Earth travels through a cloud of this dust, and we get a meteor-shower. However, there are no significant meteor-showers in June, and it will be hard to see even sporadic meteors in the twilight sky.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
6/1/2009	14:34	01:46	05:37	20:06
6/5/2009	18:44	03:47	05:36	20:08
6/10/2009	22:42	07:57	05:35	20:11
6/15/2009	00:31	12:49	05:35	20:13
6/20/2009	03:12	18:26	05:36	20:14
6/25/2009	08:57	22:48	05:37	20:15
6/30/2009	14:33	00:44	05:39	20:15

Planet Data

June 1

	Rise	Transit	Set	Mag
Mercury	04:45	11:38	18:35	1.8
Venus	03:19	09:53	16:27	-4.3
Mars	03:27	10:10	16:53	1.2
Jupiter	00:36	06:09	11:42	-2.5
Saturn	12:50	19:22	01:55	0.9

June 15

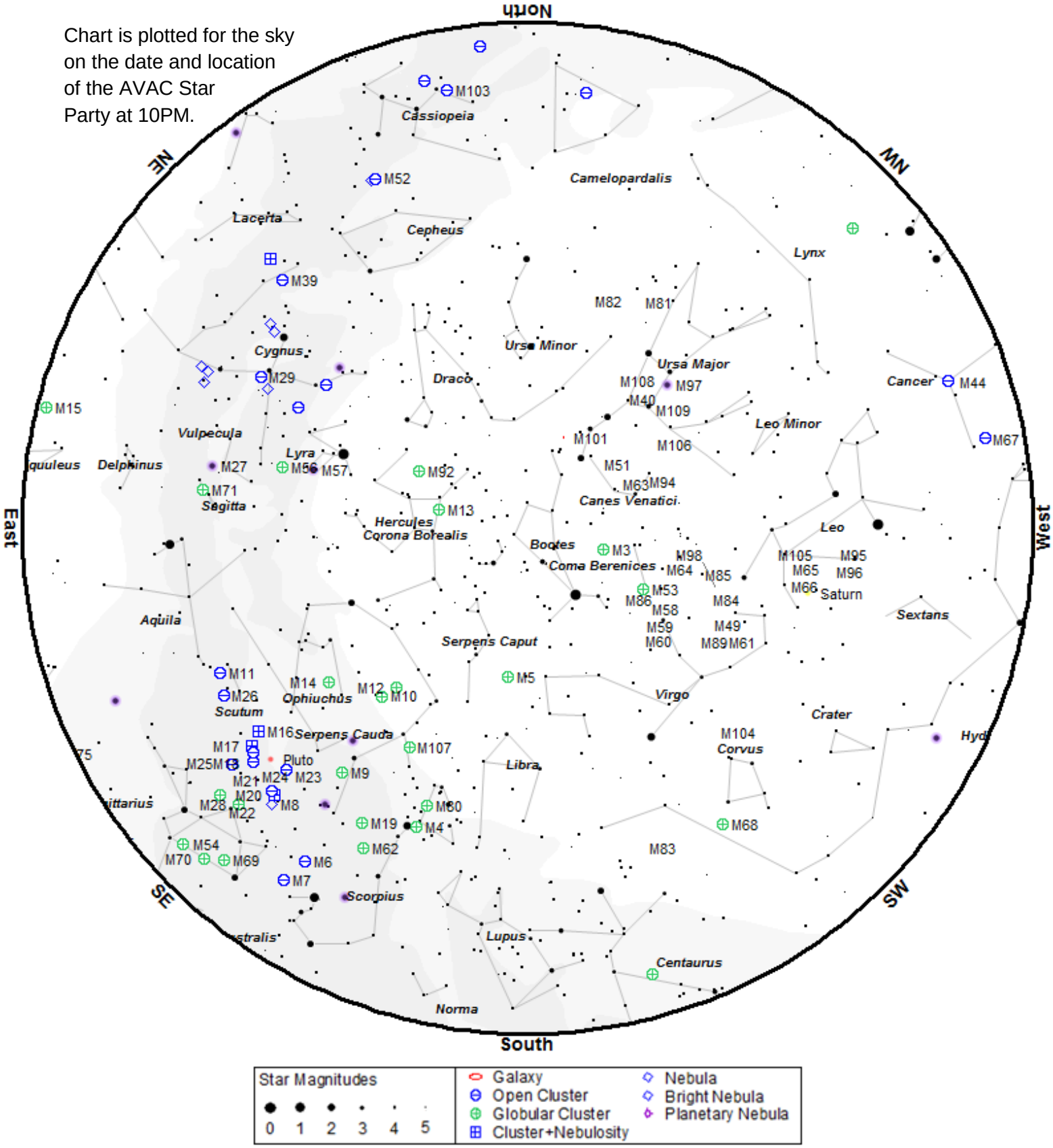
	Rise	Transit	Set	Mag
Mercury	04:18	11:22	18:24	0.3
Venus	03:04	09:51	16:37	-4.2
Mars	03:01	09:54	16:49	1.1
Jupiter	23:42	05:15	10:48	-2.6
Saturn	11:54	18:29	01:01	0.9

June 30

	Rise	Transit	Set	Mag
Mercury	04:37	12:00	19:18	-1.0
Venus	02:54	09:55	16:54	-4.1
Mars	02:35	09:39	16:43	1.1
Jupiter	22:42	04:15	09:47	-2.7
Saturn	10:59	17:34	00:05	1.0

Planet, Sun, and Moon data calculated for local time at Lancaster, CA

Chart is plotted for the sky on the date and location of the AVAC Star Party at 10PM.



To use the chart, go outside within an hour or so of the time listed and hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge.

Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Star Party. The list is sorted by the best time to observe the object. The difficulty column describes how difficult it is to observe the object from the current location on a perfect night in a 6 inch Newtonian telescope.

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
NGC 5139	Glob	3.9	Cen	13h26m46.0s	-47°28'36"	21:28	21:42	22:07	detectable
M 68	Glob	7.3	Hya	12h39m28.0s	-26°44'36"	21:29	21:47	22:31	detectable
NGC 3227	Gal	11.5	Leo	10h23m30.6s	+19°51'54"	21:37	21:51	22:18	difficult
M 65	Gal	10.1	Leo	11h18m55.7s	+13°05'32"	21:32	21:53	22:28	detectable
M 66	Gal	9.7	Leo	11h20m14.9s	+12°59'30"	21:32	21:53	22:28	detectable
M 104	Gal	9.1	Vir	12h39m59.3s	-11°37'22"	21:29	21:53	22:20	detectable
M 83	Gal	7.8	Hya	13h37m00.8s	-29°51'56"	21:28	21:52	23:08	detectable
M 86	Gal	9.8	Vir	12h26m12.2s	+12°56'44"	21:33	21:57	23:15	detectable
M 84	Gal	10.1	Vir	12h25m03.9s	+12°53'12"	21:33	21:56	23:25	detectable
M 87	Gal	9.6	Vir	12h30m49.2s	+12°23'29"	21:31	21:57	23:29	detectable
M 49	Gal	9.3	Vir	12h29m46.8s	+08°00'01"	21:31	21:56	23:23	detectable
NGC 4565	Gal	10.1	Com	12h36m20.8s	+25°59'15"	21:35	21:58	23:29	difficult
M 64	Gal	9.3	Com	12h56m43.8s	+21°41'00"	21:30	21:59	00:09	detectable
M 106	Gal	9.1	CVn	12h18m57.6s	+47°18'13"	21:34	22:01	00:09	detectable
M 94	Gal	8.7	CVn	12h50m53.1s	+41°07'12"	21:30	22:01	00:47	easy
M 82	Gal	9.0	UMa	09h55m52.4s	+69°40'47"	21:33	22:02	23:24	easy
M 81	Gal	7.8	UMa	09h55m33.1s	+69°03'56"	21:35	22:02	23:20	detectable
M 3	Glob	6.3	CVn	13h42m11.0s	+28°22'42"	21:28	22:02	01:03	easy
NGC 5195	Gal	10.5	CVn	13h29m59.6s	+47°15'58"	21:33	22:04	00:56	detectable
M 51	Gal	8.7	CVn	13h29m52.3s	+47°11'40"	21:29	22:04	01:35	easy
M 101	Gal	8.4	UMa	14h03m12.4s	+54°20'53"	21:33	22:08	01:24	detectable
NGC 5897	Glob	8.4	Lib	15h17m24.0s	-21°00'36"	21:36	22:20	23:49	difficult
M 5	Glob	5.7	Ser	15h18m34.0s	+02°05'00"	21:28	22:21	01:52	easy
NGC 5986	Glob	7.6	Lup	15h46m03.0s	-37°47'12"	21:37	22:45	00:18	detectable
M 80	Glob	7.3	Sco	16h17m02.0s	-22°58'30"	22:09	23:16	00:22	detectable
NGC 6124	Open	6.3	Sco	16h25m20.0s	-40°39'12"	22:27	23:24	00:22	difficult
NGC 6178	Open	7.2	Sco	16h35m47.0s	-45°38'36"	21:47	23:35	01:24	easy
NGC 6193	Open	5.4	Ara	16h41m20.0s	-48°45'48"	22:13	23:40	01:07	easy
M 13	Glob	5.8	Her	16h41m41.0s	+36°27'36"	21:31	23:41	04:10	easy
M 12	Glob	6.1	Oph	16h47m14.0s	-01°56'48"	21:31	23:46	03:08	easy
M 10	Glob	6.6	Oph	16h57m09.0s	-04°06'00"	21:36	23:56	02:58	detectable
M 19	Glob	6.8	Oph	17h02m38.0s	-26°16'06"	21:53	00:01	02:12	detectable
M 62	Glob	6.4	Oph	17h01m13.0s	-30°06'48"	21:50	00:01	02:13	detectable
M 92	Glob	6.5	Her	17h17m07.0s	+43°08'12"	21:32	00:16	04:19	easy
M 9	Glob	7.8	Oph	17h19m12.0s	-18°31'00"	22:23	00:18	02:13	detectable
NGC 6322	Open	6.5	Sco	17h18m25.0s	-42°56'00"	22:09	00:17	02:26	easy
NGC 6383	Open	5.4	Sco	17h34m48.0s	-32°34'00"	22:10	00:34	02:57	easy
M 14	Glob	7.6	Oph	17h37m36.0s	-03°14'48"	21:45	00:36	03:39	detectable
NGC 6388	Glob	6.8	Sco	17h36m17.0s	-44°44'06"	23:04	00:35	02:06	detectable
M 6	Open	4.6	Sco	17h40m20.0s	-32°15'12"	22:02	00:39	03:17	easy
IC 4665	Open	5.3	Oph	17h46m18.0s	+05°43'00"	21:46	00:45	03:53	detectable
NGC 6543	PNe	8.3	Dra	17h58m33.4s	+66°37'59"	21:19	00:52	04:36	obvious

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 7	Open	3.3	Sco	17h53m51.0s	-34°47'36"	22:42	00:52	03:02	easy
M 23	Open	5.9	Sgr	17h57m04.0s	-18°59'06"	23:05	00:56	02:48	detectable
M 20	Open	5.2	Sgr	18h02m42.0s	-22°58'18"	23:55	01:01	02:10	easy
M 8	Neb	5.0	Sgr	18h04m02.0s	-24°23'14"	00:22	01:03	01:43	easy
M 21	Open	7.2	Sgr	18h04m13.0s	-22°29'24"	23:49	01:03	02:17	detectable
NGC 6541	Glob	6.3	CrA	18h08m02.0s	-43°42'54"	23:43	01:07	02:28	detectable
NGC 6572	PNe	8.0	Oph	18h12m06.4s	+06°51'12"	21:19	01:11	04:42	obvious
M 16	Open	6.5	Ser	18h18m48.0s	-13°48'24"	22:49	01:18	03:45	obvious
M 17	Open	7.3	Sgr	18h20m47.0s	-16°10'18"	23:07	01:19	03:31	detectable
M 18	Open	7.5	Sgr	18h19m58.0s	-17°06'06"	23:12	01:19	03:25	easy
M 28	Glob	6.9	Sgr	18h24m33.0s	-24°52'12"	00:58	01:23	01:49	detectable
NGC 6633	Open	5.6	Oph	18h27m15.0s	+06°30'30"	21:40	01:26	04:27	easy
M 25	Open	6.2	Sgr	18h31m47.0s	-19°07'00"	23:40	01:30	03:22	detectable
M 22	Glob	5.2	Sgr	18h36m24.0s	-23°54'12"	00:43	01:34	02:26	detectable
M 70	Glob	7.8	Sgr	18h43m13.0s	-32°17'30"	23:45	01:42	03:39	detectable
M 11	Open	6.1	Sct	18h51m05.0s	-06°16'12"	22:45	01:50	04:21	detectable
NGC 6716	Open	7.5	Sgr	18h54m34.0s	-19°54'06"	00:09	01:53	03:37	detectable
M 57	PNe	9.4	Lyr	18h53m35.1s	+33°01'45"	21:34	01:52	04:30	easy
M 54	Glob	7.7	Sgr	18h55m03.0s	-30°28'42"	00:07	01:53	03:41	detectable
NGC 6723	Glob	6.8	Sgr	18h59m33.0s	-36°37'54"	00:14	01:58	03:42	detectable
M 56	Glob	8.4	Lyr	19h16m36.0s	+30°11'06"	22:34	02:15	04:21	detectable
M 55	Glob	6.3	Sgr	19h40m00.0s	-30°57'42"	00:36	02:39	04:19	detectable
NGC 6818	PNe	10.0	Sgr	19h43m57.8s	-14°09'12"	00:17	02:42	04:36	easy
M 71	Glob	8.4	Sge	19h53m46.0s	+18°46'42"	22:42	02:52	04:29	easy
M 27	PNe	7.3	Vul	19h59m36.3s	+22°43'16"	22:42	02:58	04:29	easy
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	22:29	03:04	04:29	easy
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	22:28	03:20	04:28	easy
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	22:40	03:20	04:29	easy
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	22:48	03:47	04:33	obvious
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	23:08	03:46	04:29	easy
NGC 7009	PNe	8.3	Aqr	21h04m10.9s	-11°21'48"	01:20	03:49	04:40	obvious
M 52	Open	8.2	Cas	23h24m48.0s	+61°35'36"	01:25	03:52	04:21	detectable
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	00:39	03:51	04:24	detectable
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	00:39	03:51	04:28	easy
M 2	Glob	6.6	Aqr	21h33m27.0s	-00°49'24"	01:09	03:53	04:28	detectable
NGC 7790	Open	7.2	Cas	23h58m24.0s	+61°12'30"	00:57	03:54	04:29	obvious
NGC 7789	Open	7.5	Cas	23h57m24.0s	+56°42'30"	02:03	03:55	04:20	detectable
M 103	Open	6.9	Cas	01h33m23.0s	+60°39'00"	02:33	03:57	04:29	obvious
NGC 457	Open	5.1	Cas	01h19m35.0s	+58°17'12"	02:26	03:57	04:28	obvious
M 30	Glob	6.9	Cap	21h40m22.0s	-23°10'42"	03:32	03:58	04:28	detectable
NGC 1027	Open	7.4	Cas	02h42m40.0s	+61°35'42"	03:39	03:59	04:19	detectable
NGC 884	Open	4.4	Per	02h22m18.0s	+57°08'12"	03:32	03:59	04:28	obvious
NGC 869	Open	4.3	Per	02h19m00.0s	+57°07'42"	03:28	03:59	04:28	obvious
M 76	PNe	10.1	Per	01h42m19.9s	+51°34'31"	03:03	03:59	04:20	detectable
M 110	Gal	8.9	And	00h40m22.3s	+41°41'09"	02:35	03:59	04:22	detectable
M 31	Gal	4.3	And	00h42m44.3s	+41°16'07"	02:28	03:59	04:26	easy
M 32	Gal	8.9	And	00h42m41.8s	+40°51'58"	02:28	03:59	04:26	easy
M 33	Gal	6.4	Tri	01h33m50.9s	+30°39'36"	03:40	04:02	04:22	detectable
NGC 7293	PNe	6.3	Aqr	22h29m38.5s	-20°50'14"	03:52	04:02	04:28	detectable

A.V.A.C. Information

Membership in the Antelope Valley Astronomy Club is open to any individual or family.

The Club has three categories of membership.

- Family membership at $30.00 per year.
- Individual membership at $25.00 per year.
- Junior membership at $15.00 per year.

Membership entitles you to…

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- The Reflector – the publication of the Astronomical League.
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- To borrow club equipment, books, videos and other items.

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