ANTELOPE VALLEY ASTRONOMY CLUB, INC.

Desert Sky Observer

Volume 29 *Antelope Valley Astronomy Club Newsletter* **April 2009**

Up-Coming Events

April 10: Club Meeting*
April 12: Board Meeting
April 18: Moon Walk and Star Party @ Prime Desert Woodlands
April 25: Antelope Valley Poppy Festival @ Lancaster City Park
April 25: Dark Sky Star Party @ Devil's Punchbowl
April 26: Antelope Valley Poppy Festival @ Lancaster City Park

* 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

Happy Spring! It's not been very Spring-like however. Our Dark Sky party in February was well attended (if we were playing pinochle) but there was a nice crowd for Jeremy and Matt's Lunar club event at the SAGE. Tomorrow's not looking too good for Prime Desert but I have my fingers crossed for the Messier Marathon.

April promises to be more agreeable and we hope to have a nice turnout for the 100 hours of Astronomy (tentatively set for Prime Desert Woodlands for the evenings of April 2-5). Later in April you can sign up to work the club's booth at the Poppy Festival and come out to Telescope night at Devil's Punchbowl for a Dark Sky party on the 25th.

At the April 10th meeting you can hear a talk by our own Dick Hague about extra-solar planets and the Kepler mission. We also have some great speakers upcoming; just look a bit further down for Rose's report. Speaking of speakers, non-club speakers are entitled to a $25 club-paid honorarium. Additional donations may be collected by the treasurer from members present at the time. The reason I mention this is that so many excellent speakers travel great distances at personal expense. Some ask for a little more than the club honorarium, most do not, but all deserve much more. Please keep this in mind the next time we have a guest speaker and let's all show our gratitude.

Also in April, just before the new moon on the 24th, the Lyrids meteor shower peaks on the 22nd. Also on the morning of the 22nd a waning crescent moon occults Venus which is now the Morningstar. After our Dark Sky party on the 25th, Mercury will be at greatest Eastern elongation (up just before sunset) and the rest of that week it'll be just a degree or so from the Pleiades.

Let's hope for clearer skies,

Don Bryden

Vice President

Rose Moore

Dick Hague will be heading a team of club members that will be discussing a Night Sky presentation focused on the recently launched Kepler Mission, and search for exosolar planets! Come out to our meeting and learn about this new exciting mission on its search for terrestrial planets in our area of the galaxy!

May's meeting will be with Gary Peterson of San Diego State University who will be presenting 'Exploring The Lunar Landscape'. Gary has spoken to our club in the past, and this promises to be another wonderful presentation!

July's meeting will be with Chris Butler who will be speaking on 'Under The Southern Skies'. This should be a wonderful presentation for those of us who have never traveled to south of the equator. Chris has recently made a trip to the southern hemisphere, so he'll have some personal experiences to talk about as well!

September's meeting will be our own Doug Drake who will be giving a 'Cosmology' presentation, geared towards the amateur astronomer. He promises not to have 'equations and high levels of quantum physics'!

And for our last club meeting in November, we'll have our own Jeremy Amarant and Matt Leone giving a presentation on Messier objects with an overhead Planetarium presentation!

Our club has lots of activities coming up, so please come out and support our club for the IYA!!

Hoping for clear skies,

Rose

Director of Community Development

Karole Barker

The turnout for Prime Desert Woodlands on March 21st was great. The sky cleared up at the last minute and even though it was cold, we had 87 people show up for the event, in addition to 8 club members. The next two Prime Desert Woodlands will be held on April 18th @ 8:00 p.m. and May 16th @ 8:30 p.m. We still need volunteers to bring out scopes those nights. Please let me know if you can make it.

March 7th was the 1st lunar event of the year, which was held at the Sage Planetarium. We had a great turn out at the planetarium, around 30 to 45 people showed up. In addition, we had around 15 club members come to the event.

The Poppy Festival is coming up. This year's event is scheduled for April 25-26. Please specify on the signup sheet, or online, which day you can assist at the booth.

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.

March 28th is our annual Messier Marathon. Our club is confirmed at the Poppy Reserve. This event is a lot of fun to do, come out and see how many Messier objects you can find in one night. We are going to set up around 6:00 p.m.

One of our club big events is RTMC in Big Bear, which is going to be on May 22nd thru May 25th. There are a lot of vendors and great key note speakers every year at this event. It snowed on us last year. We can't wait to go again this year and see what happens.

Clear skies,

Karole

Astrophoto of The Month

M-20 - Trifid Nebula by Paul Miller

M20 - Trifid Nebula - Approx. 5,000 Light Years Distant
Image taken with a Canon EOS DIGITAL REBEL XT at Mt. Pinos CA - June 2007

Space Place

Apollo Upgrade

The flight computer onboard the Lunar Excursion Module, which landed on the Moon during the Apollo program, had a whopping 4 kilobytes of RAM and a 74-kilobyte "hard drive." In places, the craft's outer skin was as thin as two sheets of aluminum foil.

It worked well enough for Apollo. Back then, astronauts needed to stay on the Moon for only a few days at a time. But when NASA once again sends people to the Moon starting around 2020, the plan will be much more ambitious—and the hardware is going to need a major upgrade.

"Doing all the things we want to do using systems from Apollo would be very risky and perhaps not even possible," says Frank Peri, director of NASA's Exploration Technology Development Program.

So the program is designing new, more capable hardware and software to meet the demands of NASA's plan to return humans to the moon. Instead of staying for just a few days, astronauts will be living on the Moon's surface for months on end. Protecting astronauts from harsh radiation at the Moon's surface for such a long time will require much better radiation shielding than just a few layers of foil. And rather than relying on food and water brought from Earth and jettisoning urine and other wastes, new life support systems will be needed that can recycle as much water as possible, scrub carbon dioxide from the air without depending on disposable filters, and perhaps grow a steady supply of food—far more than Apollo life-support systems could handle.

The Chariot Lunar Truck is one idea for a vehicle equal to the lunar terrain. Each of the six wheels pivot in any direction, and two turrets allow the astronauts to rotate 360°.

Click on picture for a larger view

Next-generation lunar explorers will perform a much wider variety of scientific research, so they'll need vehicles that can carry them farther across the lunar surface. ETDP is building a new lunar rover that outclasses the Apollo-era moon buggy by carrying two astronauts in a pressurized cabin. "This vehicle is like our SUV for the Moon," Peri says.

The Exploration Technology Development Program is also designing robots to help astronauts maintain their lunar outpost and perform science reconnaissance. Making the robots smart enough to take simple verbal orders from the astronauts and carry out their tasks semi-autonomously requires vastly more powerful computer brains than those on Apollo; four kilobytes of RAM just won't cut it.

The list goes on: New rockets to carry a larger lunar lander, spacesuits that can cope with abrasive moon dust, techniques for converting lunar soil into building materials or breathable oxygen. NASA's ambitions for the Moon have been upgraded. By tapping into 21st century technology, this program will ensure that astronauts have the tools they need to turn those ambitions into reality.

Learn more about the Exploration Technology Development Program at: www.nasa.gov/directorates/esmd/aboutesmd/acd/%20technology_%20dev.html.

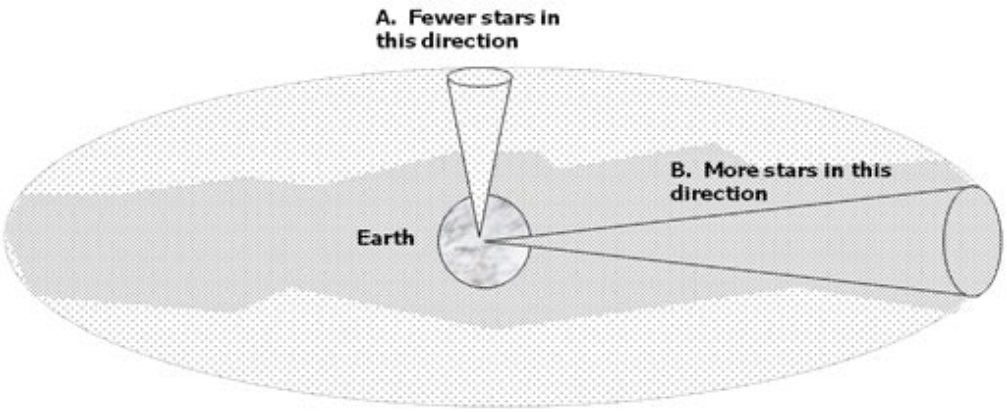
Kids can build their own Moon habitat at spaceplace.nasa.gov/en/kids/exploration/habitat.

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

We Live in a "Shapley" Galaxy! by Tom Koonce

Today, 400 years after Galileo, during the International Year of Astronomy, we live in a "Universe of Galaxies," and galaxies are this month's IYA focus. We take for granted that M51, the Whirlpool Galaxy, and M31, the Andromeda Galaxy, are separate collections of stars and energy, millions of light years distant from our own Milky Way galaxy. But just 90 years ago this wouldn't have been known. Back then each of these smudges of light was called a 'nebula', with no fundamental distinction between them, the Orion Nebula, Crab Nebula or the Veil Nebula. An unbroken line of scientists from William Herschel to Howard Shapley would change all of that by 1920…

As far back as William Herschel, in the latter part of the 18th century, astronomers were trying to determine the size and shape of the universe. Herschel made some fundamental working assumptions to estimate shape. He made a guess that "brightness meant nearness." In other words, the brighter a star was, the nearer to Earth it was. Since astronomers of his day were only beginning to understand what stars were and that they may be made up of different mixes of elements, and thus masses, this was a good assumption. His second assumption was that all stars were equally luminous and gave off the same amount of light. Using these two working assumptions, he began to count the stars that he could see in different parts of the sky. This implied that the Milky Way extended further in direction "B" than direction "A".



Even though he couldn't prove it, Herschel believed that all spiral shaped nebulosities were distant stellar systems that would ultimately be resolved into stars by large enough telescopes. He thought these nebulae clouds were other galaxies, viewed from a great distance.

Herschel's working assumptions were only a good *starting point*. They were later modified as science came to understand more about stars. All stars are <u>not</u> the same and <u>don't</u> give off the same amount of light, and they are <u>not</u> equally luminous. These modifications had important implications in the determination of the size and shape of our galaxy.

(Please bear with me for a couple of minutes as I discuss Luminosity, Distance, Absolute Magnitude, Temperature, Spectrum, and something called Statistical Parallax, which we'll need to understand the final discovery. It will be worth it, because at the end of this article, you'll be able to see how some very smart scientists were able to figure out the answers we have been looking for: The shape of our galaxy and the Sun's location within it.)

Today, we know that two factors determine the brightness of a star: Its **luminosity** - how much energy it puts out in a given time, and its **distance** - how far it is from us. For instance, a searchlight puts out more light than a penlight. That is, the searchlight is more **luminous**. If that searchlight is 5 miles away from you, however, it will not be as bright because light intensity decreases with its distance away from you squared. A searchlight 5 miles from you may look as bright as a penlight just 6 inches away from you. The same is true for stars. This relationship is called an "inverse-square" relationship. As you move farther away from the bulb, the radiation is spread over a larger area.

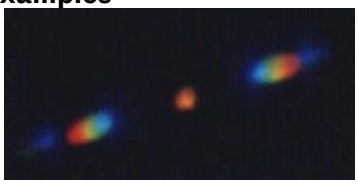
Scientists needed a level playing field in order to compare the "absolute" brightness of many stars, so they decided to determine what a star's magnitude would be if it were placed 32.6 light-years (10 parsecs) away from Earth. After placing the stars (mathematically!) at this distance we find a star's **absolute magnitude.**

Temperature and Spectrum

In 1905, Ejnar Hertsprung discovered that the widths of the dark lines in a star's spectrum are related to its luminosity in a particular way.

Some stars are extremely hot, while others are cool. You can tell by the color of light that the stars give off. If you look at the coals in a charcoal grill, you know that the red glowing coals are cooler than the white hot ones. The same is true for stars. A blue or white star is hotter than a yellow star, which is hotter than a red star. A star's spectrum can also tell you the chemical elements that are in that star because different elements (for example, hydrogen, helium, carbon, calcium) absorb light at different wavelengths.

Spectra Examples



Procyon is a mid- temperature star like our Sun. Its spectrum has fairly balanced colors of the rainbow.

Rigel is a star twice the temperature of our Sun and so its spectrum is brighter in blue.

Hertsprung independently found distances to groups of stars of the same spectral class (color) using a method called "**statistical parallaxes**." In general, he found that stars of the same spectral type with narrow, dark spectral lines are more luminous than those with broad lines. This discovery led to a way of distinguishing between large and small stars by using their spectra. To recap – Astronomers are able to look at a star's light and figure out what the stars are made of and how luminous they really are. They were also able to look at the strongest color, or wavelengths, of light emitted by the star, and calculate its temperature. This by itself is pretty neat. But wait – there's more.

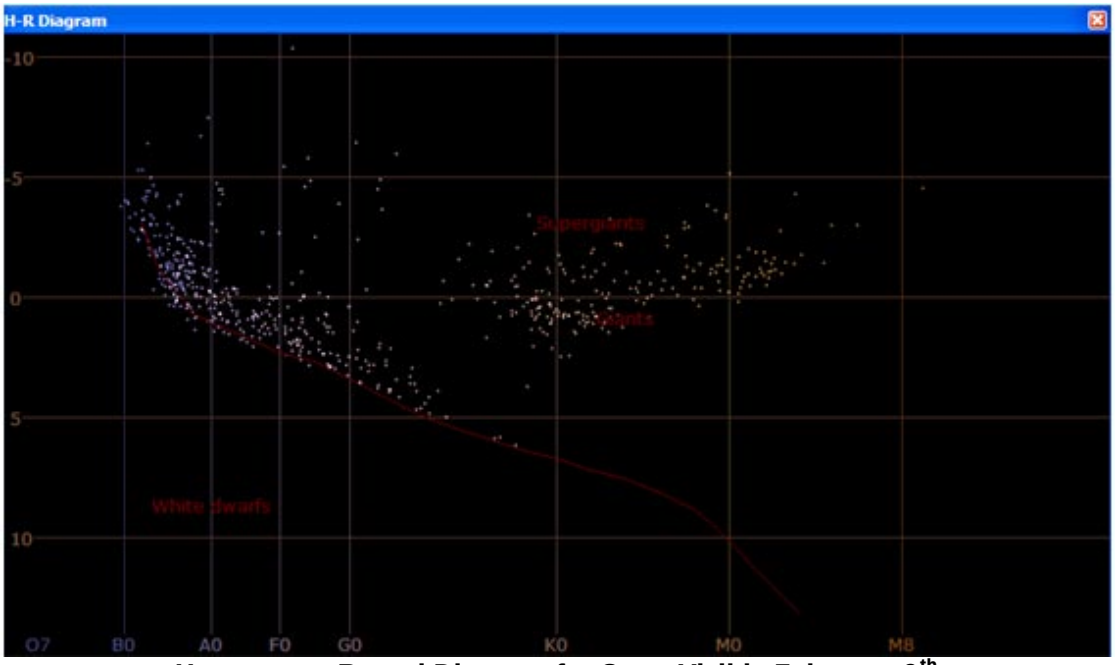
Spectral Classes of Stars

Spectral Class	Color	Ave.Temp. (K)	Familiar Examples
O	Blue-violet	30,000	Mintaka (delta Orionis)
B	Blue-white	20,000	Rigel, Spica
A	White	10,000	Vega, Sirius
F	Yellow-white	8,000	Canopus, procyon
G	Yellow	6,000	Sun, Capella
K	Orange	4,000	Arcturus, Aldebaran
M	Red-orange	3,000	Antares, Betelgeuse

The Breakthrough!

The Hertsprung-Russel Diagram (Luminosity – Temperature Diagram)

Henry Russel used stellar parallaxes and determined stellar distances. He then used the distances and how bright the stars appear from Earth (called apparent magnitude) to calculate their absolute magnitudes then plotted them with respect to their spectral class. Hertsprung and Russel realized that, together, they had created an amazing tool that astronomers could use to find the distances to most of the stars in the sky! Plotting absolute magnitude versus spectral class for a group of stars is called a Hertsprung-Russel Diagram and today the H-R Diagram guides astronomers to the physical properties of stars.



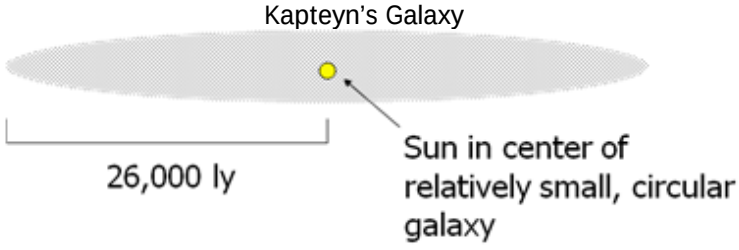
Hertsprung-Russel Diagram for Stars Visible February 9th

A Powerful New Distance Indicator

While studying variable stars in the Magellanic Cloud, **Henrietta Leavitt** discovered that when the apparent magnitudes of a certain type of variable star were plotted against their periods, a definite relationship existed. The longer the period, the greater their luminosity.

Hertsprung determined from Leavitt's data that a unique relationship existed between the luminosity of a "Cepheid Variable" star and its period. To find the distance to Cepheid's, we first find a Cepheid variable star, then measure its period (a relatively easy task that doesn't depend on any knowledge of the star's distance or spectral class.) Next we find the star's absolute magnitude from the period-luminosity relationship, and knowing the star's apparent magnitude, calculate its distance.

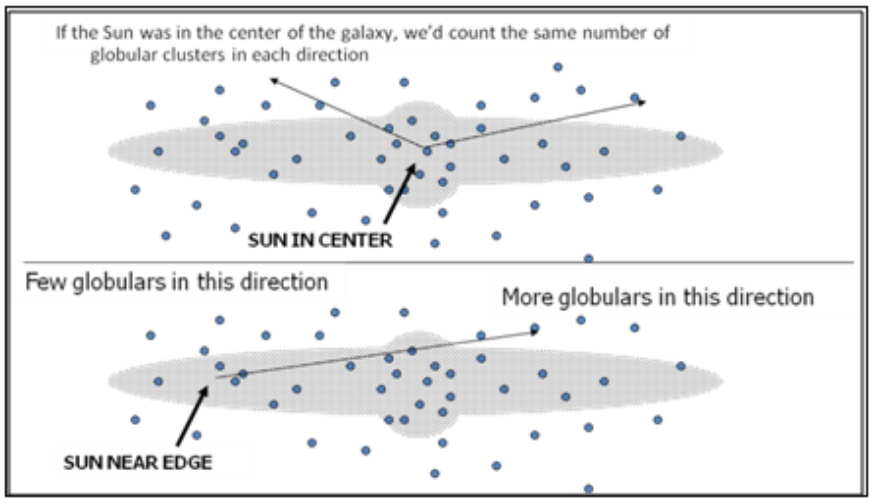
In 1922, **Jacobus Kapteyn** used statistical methods and the H-R Diagram and determined a galaxy structure like this:



In the 1920's, **Harlow Shapley** proposed a radical idea about the size of the Milky Way and the sun's position within it. The observational foundation rested on using the period-luminosity relationship of Cepheid's. His model evicted the sun from its central status in the Milky Way, the second significant move of humankind away from 'special' status in the universe. When Shapley realized that the variable stars he had observed in ***globular clusters*** had the properties of Cepheid's, he used the period-luminosity method to determine their distance. What he determined shocked the astronomical community.

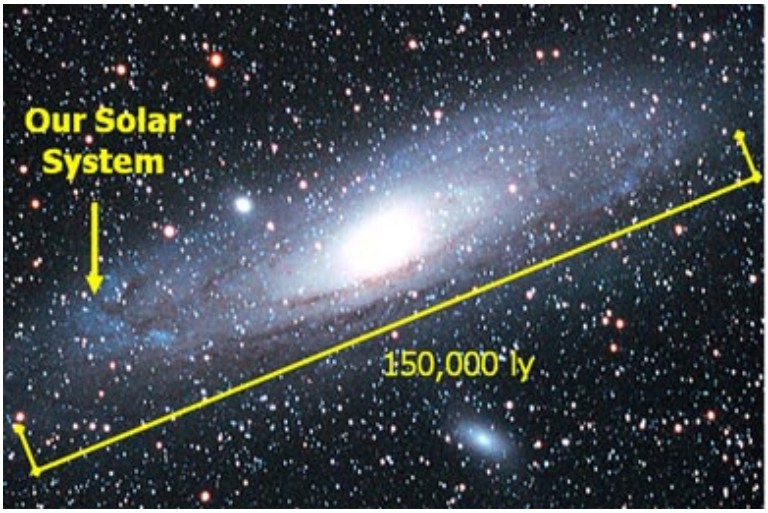
Globular clusters do not follow the distribution of stars in the galaxy by sticking along the plane. They are widely distributed with an odd concentration in the direction of Sagittarius. Using a period-luminosity scale that he had personally calibrated, Shapley determined the globular cluster M13 to be 100,000 ly distant. The number was staggering. It placed the globular clusters outside the boundaries of the Milky Way as mapped by Kapteyn.

The non-uniform distribution of globular clusters in the sky was a nagging problem. If they were gravitationally allied with the Milky Way, they should be in a uniform distribution throughout the galaxy. But the observed non-uniformity indicated that the Sun was NOT in the Milky Way's center, but much further out along the edge



The puzzle has come together over the course of two centuries; astronomers have pieced together the construction of the Milky Way. The fitting together of the celestial map depended on the measurement of distances, which is in turn based on the fundamental scientific properties of stars themselves and electromagnetic radiation.

By the 1920's, our galaxy was a much bigger, but better defined place, and our place within it was far less centralized. The rough survey of the local structure had been completed, but many, many details remained unexplored, but it was known that we really did live within a "Shapley" Galaxy!



The Milky Way Galaxy Might Look Like The Andromeda Galaxy With Our Sun Out Towards Its Edge

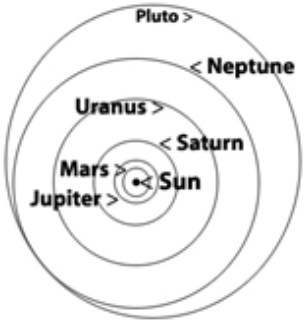
International Year of Astronomy

Galaxies and the Distant Universe

When Galileo first recorded his telescopic observations of the heavens, he started us on the road to better understanding the structure of the universe. The subsequent discoveries included the sizes and distances of the planets in our Solar System, the stars of our Galaxy, and the rest of the galaxies in our universe.

Many people are still not clear about the difference between our Solar System, our Galaxy, and the Universe. This month's theme and activity will help clarify this. Let's start with some basics.

Our **Solar System** consists of our star, the Sun, and its orbiting planets, along with numerous moons, asteroids, comet material, rocks, and dust.



Our Sun is just one star among the hundreds of billions of stars in our Milky Way Galaxy. If we shrink the Sun down to smaller than a grain of sand, we can imagine our Solar System to be small enough to fit onto the palm of your hand. The diagram at the left is about the right size.

On that scale with our Solar System in your hand, the **Milky Way Galaxy**, with its 200 billion stars, would span North America (see the illustration on the right). Galaxies come in many sizes. The Milky Way is big, but some galaxies are much larger.

The **universe** is all of the galaxies – billions of them! NASA's telescopes allow to study galaxies beyond our own in exquisite detail, and to explore the most distant reaches of the observable universe. The Hubble Space Telescope and made the deepest image of the universe called the Hubble Ultra Deep Field. Soon the James Webb Space Telescope will also be exploring the most distant edge of the universe, and how galaxies form and evolve.

News Headlines

Kepler Mission Rockets to Space in Search of Other Earths
NASA's Kepler mission successfully launched into space from Cape Canaveral Air Force Station, Fla., aboard a United Launch Alliance Delta II at 10:49 p.m. EST, Friday. Kepler is designed to find the first Earth-size planets orbiting stars at distances where water could pool on the planet's surface.
http://science.nasa.gov/headlines/y2009/06mar_keplerlaunch.htm

Three Galaxies Locked In Gravitational Tug-of-war: May Result In Eventual Demise Of One Of Them
About 100 million light-years away, in the constellation of Piscis Austrinus (the Southern Fish), three galaxies are playing a game of gravitational give-and-take that might ultimately lead to their merger into one enormous entity.
http://www.sciencedaily.com/releases/2009/03/090303084329.htm

Are You the Astronomy Photographer of the Year?
Calling all astro-photo geeks! (as well as those of us that just like to look). The Royal Observatory in Greenwich, England is offering a brand new, free competition and exhibition for everyone who loves the night sky. It's open to anyone, from anywhere, including a special category for astro-photo buffs under the age of 16.
http://www.universetoday.com/2009/03/20/are-you-the-astronomy-photographer-of-the-year/

Mars Express zeroes in on erosion features
Mars Express has uncovered geological evidence suggesting that some depositional process, revealed by erosion, has been at work in the equatorial regions of the planet. If so, this would provide another jigsaw piece to be fitted into the emerging picture of Mars' past climate.
http://www.astronomy.com/asy/default.aspx?c=a&id=8052

NASA's Multi-Robot Planetary Exploration Plans
Multi-robot planetary exploration would be a complex affair, with humans working with a diverse team of mobile robots operating in a variety of control modes. Aurora Flight Sciences, MIT's Manned Vehicle Laboratory (MVL), and MIT Humans and Automation Laboratory (HAL) have just won a NASA Small-Business Technology Transfer Research proposal to develop a software system that performs command and control.
http://www.space.com/businesstechnology/090320-technovel-multi-robot.html

Ares Super-chute
NASA and U.S. Air Force test pilots have just dropped a 50,000-pound "dummy" rocket booster on the Arizona desert--and stopped it before it crashed. It's all part of NASA's plan to return to the Moon.
http://science.nasa.gov/headlines/y2009/13mar_superchute.htm

Two Dying Red Supergiant Stars Produced Supernovae
Where do supernovae come from? Astronomers have long believed they were exploding stars, but by analyzing a series of images, researchers from the Dark Cosmology Centre at the Niels Bohr Institute, University of Copenhagen and from Queens University, Belfast have proven that two dying red supergiant stars produced supernovae. The results are published in the journal Science.
http://www.sciencedaily.com/releases/2009/03/090319142405.htm

Club Events

On March 7 the AVAC Lunar club held a meeting at the Sage Planetarium. We had a great turnout with too many members to mention. Here are some photos from the event, you can see more in the club photo album.

On March 18, AVAC members Robert Lynch, Tom Koonce, Lee and Millie Bush, Wes Thomas, Duane Lewis, and Don Bryden supported the Leona Valley School Science Fair. Our club supported the judging of the exhibits and a solar observation session for 60 school children from kindergarten through 8th grade, their parents and teachers. We observed the Sun through the club's Hydrogen Alpha telescope, 4 White light solar scopes, and we had the "Galileo" telescope we won from Night Sky Network on display. Representatives from NASA Dryden Aero Institute were also in attendance: Tibby Marin, Shawn Smith and Debora Rosenquist. The children also observed through the Galileo telescope after hearing about Galileo, the 400th anniversary of the invention of the telescope and the International Year of Astronomy.

On Monday, March 16, at the Executive Board Meeting, Dick Hague announced that there was going to be a shuttle/space station pass at 7:15 pm directly over Don Bryden's house. The board members went outside and within a minute of the predicted time Don spotted the approach of a bright object in the southern sky climbing towards zenith. As it got to within 20 degrees of zenith, 5 of us were amazed to notice that we could clearly make out the distinct delta shape of the space shuttle Discovery and the thin rectangular shape of the International Space Station next to it, NAKED EYE! It was very, very cool! We were able to distinguish these clearly until the pair was about 20 degrees past zenith heading north. Don had his binoculars and the view was better through these as expected, but to clearly see the space shuttle in orbit naked eye was an awesome observational moment!! In attendance were Dick Hague, Don Bryden, Karole Barker, Rose and Frank Moore, Duane Lewis, and Tom Koonce.

April Sky Data

Best time for deep sky observing this month:
April 16 through April 28

Mercury is at it greatest elongation east of the Sun on April 26th. So this month we have an unusually good chance to spot this elusive little planet, in the western sky after sunset. For about a week from Saturday 18th, it will be a little to the north of due west, and not very far above the horizon. Against the glow of sunset, Mercury will look like a tiny spark of light.

Venus was at inferior conjunction on March 27th. Throughout April it is rising in the east about an hour before sunrise. Although the "Morning Star" is very bright indeed, it will be hard to see it, very low on the eastern horizon at dawn.

This month, **Mars** is still rising only a few minutes before sunrise. We won't be getting good views of the "Red Planet" until after the summer.

At the start of April, **Jupiter** is rising about the same time as Venus; so it's very low down at dawn, though Jupiter is further to the right, and not so bright as Venus. The giant planet won't be well placed for observing, until after the summer. Jupiter is in the constellation of Capricornus. If you're familiar with the three bright stars of the "Summer Triangle", you will find Jupiter far below Vega.

Saturn was at opposition to the Sun on March 8th; this month it's very slightly further away from us, but rather more conveniently placed for evening viewing. It rises in the middle of the afternoon, and it reaches its highest point in the sky, due south, in the late evening. Saturn is in Leo, well to the lower left of the bright star Regulus.

The **Lyrid** meteor-shower is active during the third week of April, peaking probably in the late morning of Wednesday April 22nd. The meteors seem to radiate outwards from a point in the constellation of Lyra. The best time to look is in the early hours, before the sky grows bright towards dawn; near the peak we might expect to see one Lyrid every 10 minutes or so, and there will be little interference from the waning Moon.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
4/1/2009	10:54	01:11	06:38	19:13
4/5/2009	15:32	04:10	06:32	19:16
4/10/2009	20:54	06:39	06:26	19:20
4/15/2009	00:42	10:22	06:19	19:24
4/20/2009	03:35	15:14	06:13	19:28
4/25/2009	06:06	20:42	06:07	19:32
4/30/2009	11:05	00:53	06:02	19:36

Planet Data

Apr 1

	Rise	Transit	Set	Mag
Mercury	06:42	13:03	19:26	-2.0
Venus	05:38	12:14	18:44	-4.1
Mars	05:24	11:12	17:00	1.2
Jupiter	04:11	09:35	15:02	-2.1
Saturn	16:55	23:22	05:50	0.6

Apr 15

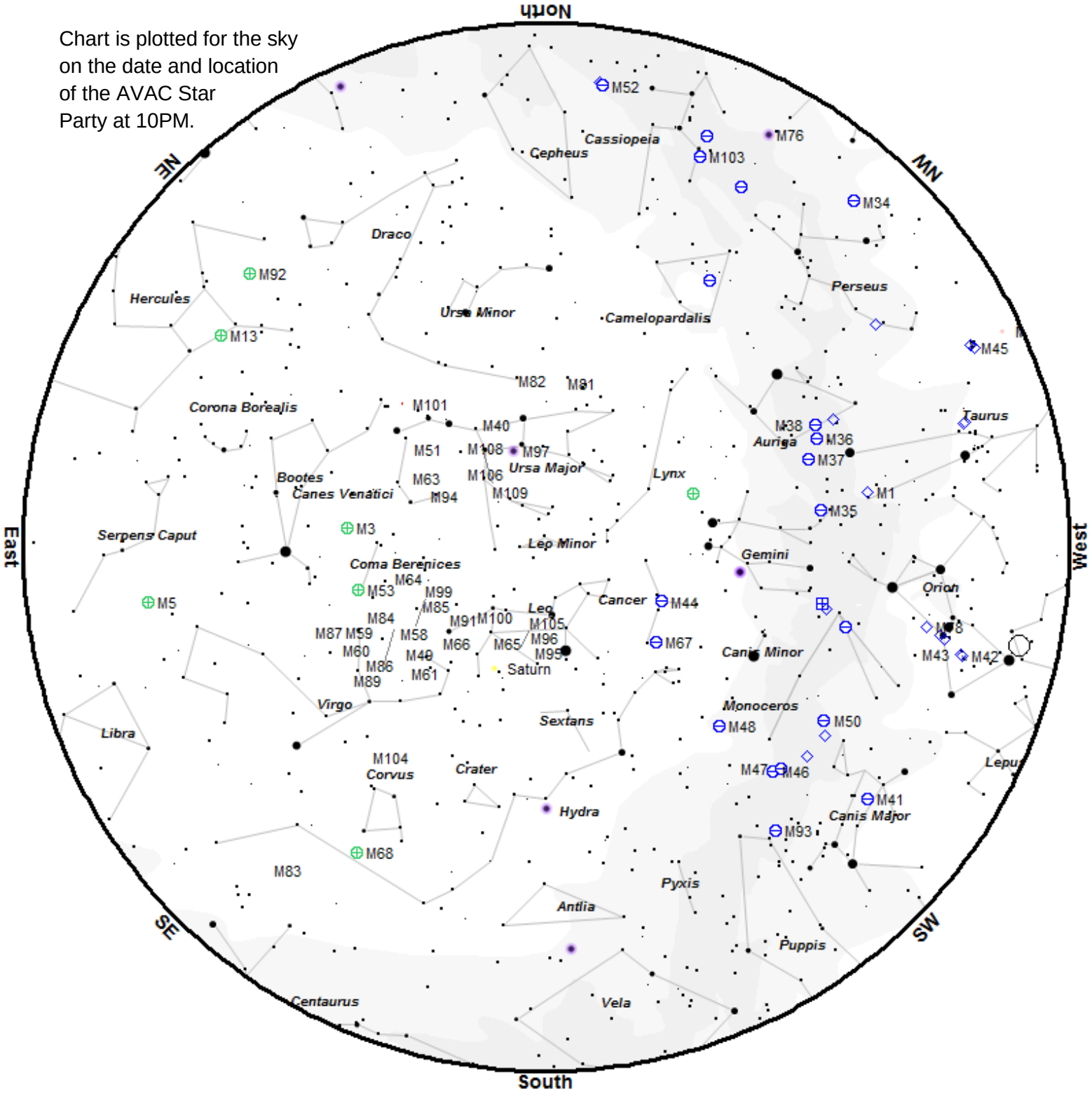
	Rise	Transit	Set	Mag
Mercury	06:54	13:51	20:49	-0.9
Venus	04:44	11:01	17:23	-4.5
Mars	04:57	10:57	16:57	1.2
Jupiter	03:24	08:49	14:19	-2.2
Saturn	15:56	22:24	04:53	0.6

Apr 31

	Rise	Transit	Set	Mag
Mercury	06:47	14:04	21:20	1.0
Venus	04:06	10:20	16:36	-4.5
Mars	04:28	10:40	16:53	1.2
Jupiter	02:31	07:59	13:30	-2.3
Saturn	14:54	21:23	03:52	0.7

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.



Star Magnitudes		
0 1 2 3 4 5	Galaxy	Nebula
	Open Cluster	Bright Nebula
	Globular Cluster	Planetary Nebula
	Cluster+Nebulosity	

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	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
NGC 2571	7.4	Pup	08h18m56.0s	-29°45'00"	20:38	20:54	21:38	easy
M 38	6.8	Aur	05h28m40.0s	+35°50'54"	20:44	21:00	21:05	detectable
M 36	6.5	Aur	05h36m18.0s	+34°08'24"	20:40	21:00	21:08	easy
M 37	6.2	Aur	05h52m18.0s	+32°33'12"	20:40	21:00	21:22	easy
M 35	5.6	Gem	06h09m00.0s	+24°21'00"	20:40	21:00	21:22	easy
NGC 2129	7.0	Gem	06h01m07.0s	+23°19'20"	20:38	21:00	21:10	obvious
NGC 2175	6.8	Ori	06h09m39.0s	+20°29'12"	20:43	20:59	21:12	detectable
NGC 2506	8.9	Mon	08h00m01.0s	-10°46'12"	20:47	20:59	21:20	difficult
NGC 2264	4.1	Mon	06h40m58.0s	+09°53'42"	20:40	21:00	21:18	obvious
NGC 2355	9.7	Gem	07h16m59.0s	+13°45'00"	20:47	21:01	21:41	difficult
NGC 3132	8.2	Vel	10h07m01.8s	-40°26'11"	20:33	21:01	22:30	easy
NGC 3132	8.2	Vel	10h07m01.8s	-40°26'11"	20:33	21:01	22:30	easy
NGC 3228	6.4	Vel	10h21m22.0s	-51°43'42"	20:40	21:00	21:37	easy
NGC 2392	8.6	Gem	07h29m10.8s	+20°54'42"	20:35	21:02	22:33	obvious
M 44	3.9	Cnc	08h40m24.0s	+19°40'00"	20:40	21:06	23:29	easy
M 67	7.4	Cnc	08h51m18.0s	+11°48'00"	20:43	21:05	22:36	detectable
NGC 3242	8.6	Hya	10h24m46.1s	-18°38'32"	20:32	21:12	22:56	obvious
NGC 3227	11.5	Leo	10h23m30.6s	+19°51'54"	20:43	21:15	23:56	difficult
M 82	9.0	UMa	09h55m52.4s	+69°40'47"	20:40	21:17	02:27	easy
M 81	7.8	UMa	09h55m33.1s	+69°03'56"	20:42	21:17	02:12	detectable
M 97	11.0	UMa	11h14m47.7s	+55°01'09"	20:51	21:52	00:25	challenging
M 65	10.1	Leo	11h18m55.7s	+13°05'32"	20:41	21:54	01:09	detectable
M 66	9.7	Leo	11h20m14.9s	+12°59'30"	20:40	21:54	01:14	detectable
M 106	9.1	CVn	12h18m57.6s	+47°18'13"	20:45	22:53	02:50	detectable
M 86	9.8	Vir	12h26m12.2s	+12°56'44"	20:46	23:00	01:58	detectable
M 84	10.1	Vir	12h25m03.9s	+12°53'12"	20:45	22:59	02:12	detectable
M 49	9.3	Vir	12h29m46.8s	+08°00'01"	20:44	23:04	02:16	detectable
3C 273.0	12.8	Vir	12h29m06.7s	+02°03'08"	20:51	23:03	01:27	challenging
3C 273.0	12.8	Vir	12h29m06.7s	+02°03'08"	20:51	23:03	01:27	challenging
M 87	9.6	Vir	12h30m49.2s	+12°23'29"	20:44	23:06	02:20	detectable
NGC 4565	10.1	Com	12h36m20.8s	+25°59'15"	20:47	23:11	02:16	difficult
M 104	9.1	Vir	12h39m59.3s	-11°37'22"	20:47	23:14	01:56	detectable
M 68	7.3	Hya	12h39m28.0s	-26°44'36"	21:13	23:14	01:15	detectable
M 94	8.7	CVn	12h50m53.1s	+41°07'12"	20:42	23:26	03:45	easy
M 64	9.3	Com	12h56m43.8s	+21°41'00"	20:45	23:31	03:10	detectable
NGC 5139	3.9	Cen	13h26m46.0s	-47°28'36"	23:13	00:01	00:49	detectable
NGC 5195	10.5	CVn	13h29m59.6s	+47°15'58"	20:48	00:04	03:58	detectable
M 51	8.7	CVn	13h29m52.3s	+47°11'40"	20:44	00:04	04:37	easy

ID	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 83	7.8	Hya	13h37m00.8s	-29°51'56"	22:09	00:12	02:14	detectable
M 3	6.3	CVn	13h42m11.0s	+28°22'42"	20:47	00:16	04:15	easy
M 101	8.4	UMa	14h03m12.4s	+54°20'53"	20:57	00:33	04:31	detectable
NGC 5897	8.4	Lib	15h17m24.0s	-21°00'36"	00:17	01:51	03:28	difficult
M 5	5.7	Ser	15h18m34.0s	+02°05'00"	22:33	01:53	04:52	easy
NGC 5986	7.6	Lup	15h46m03.0s	-37°47'12"	01:04	02:20	03:36	detectable
M 80	7.3	Sco	16h17m02.0s	-22°58'30"	01:39	02:51	04:03	detectable
NGC 6167	6.6	Nor	16h34m34.0s	-49°46'18"	02:18	03:08	04:00	easy
NGC 6178	7.2	Sco	16h35m47.0s	-45°38'36"	01:46	03:10	04:33	easy
M 13	5.8	Her	16h41m41.0s	+36°27'36"	22:52	03:15	04:59	easy
NGC 6193	5.4	Ara	16h41m20.0s	-48°45'48"	02:15	03:16	04:16	easy
M 12	6.1	Oph	16h47m14.0s	-01°56'48"	00:04	03:21	04:58	easy
M 10	6.6	Oph	16h57m09.0s	-04°06'00"	00:43	03:31	04:56	detectable
M 62	6.4	Oph	17h01m13.0s	-30°06'48"	01:36	03:35	04:55	detectable
M 19	6.8	Oph	17h02m38.0s	-26°16'06"	01:40	03:37	04:55	detectable
M 92	6.5	Her	17h17m07.0s	+43°08'12"	23:19	03:50	04:59	easy
M 9	7.8	Oph	17h19m12.0s	-18°31'00"	01:56	03:53	04:54	detectable
NGC 6322	6.5	Sco	17h18m25.0s	-42°56'00"	02:12	03:52	05:01	easy
NGC 6383	5.4	Sco	17h34m48.0s	-32°34'00"	02:00	04:08	05:00	easy
M 14	7.6	Oph	17h37m36.0s	-03°14'48"	01:22	04:10	04:57	detectable
NGC 6388	6.8	Sco	17h36m17.0s	-44°44'06"	03:13	04:10	04:52	detectable
M 6	4.6	Sco	17h40m20.0s	-32°15'12"	01:52	04:14	05:03	easy
NGC 6543	8.3	Dra	17h58m33.4s	+66°37'59"	22:19	04:15	05:08	obvious
IC 4665	5.3	Oph	17h46m18.0s	+05°43'00"	01:22	04:15	04:56	detectable
M 23	5.9	Sgr	17h57m04.0s	-18°59'06"	02:37	04:23	04:58	detectable
M 7	3.3	Sco	17h53m51.0s	-34°47'36"	02:32	04:23	05:00	easy
NGC 6572	8.0	Oph	18h12m06.4s	+06°51'12"	00:53	04:26	05:12	obvious
M 21	7.2	Sgr	18h04m13.0s	-22°29'24"	03:19	04:26	04:58	detectable
M 20	5.2	Sgr	18h02m42.0s	-22°58'18"	03:23	04:26	05:00	easy
M 8	5.0	Sgr	18h04m02.0s	-24°23'14"	03:48	04:26	05:01	easy
NGC 6633	5.6	Oph	18h27m15.0s	+06°30'30"	01:12	04:28	05:01	easy
M 57	9.4	Lyr	18h53m35.1s	+33°01'45"	00:45	04:29	05:02	easy
M 16	6.5	Ser	18h18m48.0s	-13°48'24"	02:24	04:28	05:03	obvious
M 56	8.4	Lyr	19h16m36.0s	+30°11'06"	02:14	04:30	04:55	detectable
IC 4756	5.4	Ser	18h39m00.0s	+05°27'00"	01:47	04:29	04:58	easy
M 17	7.3	Sgr	18h20m47.0s	-16°10'18"	02:49	04:29	04:54	detectable
M 18	7.5	Sgr	18h19m58.0s	-17°06'06"	02:45	04:29	05:02	easy
NGC 7160	6.4	Cep	21h53m40.0s	+62°36'12"	02:26	04:31	05:02	obvious
NGC 6910	7.3	Cyg	20h23m12.0s	+40°46'42"	01:59	04:32	04:59	easy
M 29	7.5	Cyg	20h23m57.0s	+38°30'30"	02:10	04:32	04:57	easy
NGC 6871	5.8	Cyg	20h05m59.0s	+35°46'36"	02:03	04:32	04:57	easy
M 11	6.1	Sct	18h51m05.0s	-06°16'12"	02:28	04:31	04:56	detectable
M 25	6.2	Sgr	18h31m47.0s	-19°07'00"	03:12	04:31	04:57	detectable
M 28	6.9	Sgr	18h24m33.0s	-24°52'12"	04:21	04:31	04:57	detectable
M 52	8.2	Cas	23h24m48.0s	+61°35'36"	03:59	04:33	04:51	detectable

ID	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 39	5.3	Cyg	21h31m48.0s	+48°26'00"	02:38	04:33	04:57	easy
M 27	7.3	Vul	19h59m36.3s	+22°43'16"	02:15	04:33	04:59	easy
M 71	8.4	Sge	19h53m46.0s	+18°46'42"	02:17	04:33	04:58	easy
M 22	5.2	Sgr	18h36m24.0s	-23°54'12"	04:11	04:32	04:58	detectable
NGC 7790	7.2	Cas	23h58m24.0s	+61°12'30"	04:34	04:35	05:00	obvious
NGC 7243	6.7	Lac	22h15m08.0s	+49°53'54"	03:24	04:34	04:54	detectable
NGC 6716	7.5	Sgr	18h54m34.0s	-19°54'06"	03:41	04:34	04:59	detectable
NGC 6541	6.3	CrA	18h08m02.0s	-43°42'54"	03:44	04:34	04:58	detectable
NGC 7789	7.5	Cas	23h57m24.0s	+56°42'30"	04:06	04:36	04:50	detectable
M 70	7.8	Sgr	18h43m13.0s	-32°17'30"	03:28	04:36	04:58	detectable
M 54	7.7	Sgr	18h55m03.0s	-30°28'42"	03:44	04:38	04:55	detectable
M 15	6.3	Peg	21h29m58.0s	+12°10'00"	03:56	04:38	04:56	easy
NGC 6818	10.0	Sgr	19h43m57.8s	-14°09'12"	03:50	04:39	05:05	easy
M 2	6.6	Aqr	21h33m27.0s	-00°49'24"	04:39	04:40	04:56	detectable
NGC 6723	6.8	Sgr	18h59m33.0s	-36°37'54"	03:53	04:40	04:58	detectable
M 55	6.3	Sgr	19h40m00.0s	-30°57'42"	03:58	04:42	04:58	detectable
NGC 7009	8.3	Aqr	21h04m10.9s	-11°21'48"	03:21	04:43	05:08	obvious

Aerospace Committee Report Jeff Riechmann and Roswell – Co-Chairbeings

Vandenberg Launch Schedule (as of 14 February 2009)**:**

Date	Launch Time/Window (PST/PDT)	Vehicle	Pad/Silo
MAY 5	To be announced	Delta II	SLC-2W
Payload is the Missile Defense Agency's STSS ATRR			
JUL	~09:12	Atlas V	SLC-3
Payload is the DMSP F18 military weather satellite.			
JUL	To be announced	Delta II	SLC-2W
Payload is the WorldView 2 commercial reconnaissance satellite			

Humor

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…

- Desert Sky Observer–monthly newsletter.
- The Reflector – the publication of the Astronomical League.
- The A.V.A.C. Membership Manual.
- To borrow club equipment, books, videos and other items.

AVAC
P.O. BOX 8545,
LANCASTER, CA 93539-8545

Visit the Antelope Valley Astronomy Club website at www.avastronomyclub.org/

The Antelope Valley Astronomy Club, Inc. is a 501(c)(3) Non-Profit Corporation.

The A.V.A.C. is a Sustaining Member of The Astronomical League and the International Dark-Sky Association.

Board Members

President:
Don Bryden (661) 270-0627
president@avastronomyclub.org

Vice-President:
Rose Moore (661) 972-1953
vice-president@avastronomyclub.org

Secretary:
Debra Basham (661) 256-3492
secretary@avastronomyclub.org

Treasurer:
Tom Koonce (661) 943-8200
treasurer@avastronomyclub.org

Director of Community Development:
Karole Barker (661) 940-3312
community@avastronomyclub.org

Appointed Positions

Newsletter Editors:
Steve Trotta (661) 269-5428
Errol Van Horne (661) 273-7646
newsletter@avastronomyclub.org

Equipment & Library:
Karol Barker (661) 940-3312
library@avastronomyclub.org

Club Historian:
Tom Koonce (661) 943-8200
history@avastronomyclub.org

Webmaster:
Steve Trotta (661) 269-5428
webmaster@avastronomyclub.org

Astronomical League Coordinator:
Steve Trotta (661) 269-5428
al@avastronomyclub.org

Our Sponsors

Thank you to our sponsors for your generous support!