



Desert Sky Observer

Volume 30

Antelope Valley Astronomy Club Newsletter

August 2010

Up-Coming Events

- August 7: Mt. Wilson Trip
- August 11: SAGE Observations with Jeremy
- August 13: Club Meeting*
- August 14: Dark Sky Star Party @ [Two Goats Observatory](#)
- August 16: Board meeting @ [Don's house](#)

* 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

It was a fine month for observing. I hope you took advantage of the trip to Mt. Pinos or the club picnic. We had a nice turnout at Mt. Pinos with many of us staying for more than just one day and night. In fact with everyone up there on Sunday afternoon we decided to hold our monthly executive board meeting there.

After a brief shower on Saturday night the skies cleared up and the views were fantastic. At some point around 1am, Frank noticed that Duane's scope was keeled over and bottomed out against the dec. housing, still trying to slew to some object. I thought, "Well there goes Duane on his southern hemisphere search for the Coal Sack or Southern Cross" but Duane, who had a good alignment earlier, was scratching his head, trying to figure out what was going on. After playing around with the mount (a fairly new Celestron CGEM), we decided that the hand pad had a short or loose connection.

The next morning Frank and I took it apart and decided it must be the cable. Unfortunately, Celestron used a proprietary 6-pin d-shell connector inside the hand pad so we couldn't just plug a new one in. We stripped the wires above the break and were about to wire in a new cable but thought that given the delicate nature of the wiring, we'd go to the local Frazier Park ACE Hardware and get a small soldering iron to complete the task. While on route, Darrell mentioned that Don Rothman (AstroPartsOutlet.com – check it out!) lived nearby. I had been up to Don's house on two previous occasions digging around for parts and agreed if anyone had a Celestron hand pad, Don Rothman would!

If you've been to RTMC you would see Don set up with table after table of every part you could think of strewn about. I found his phone number and set up a meeting. Sure enough, within minutes Frank pulls a nearly identical hand pad from one of Don's bins. The display was bad but all we needed was the cable. An hour later Duane had a working mount! One cool thing was we got to see Don Rothman's Meade 16" Classical Cassegrain on an equatorial mount. He asked about the conditions up on the mountain and said he might lug it up there as he had just finished restoring it but he never made it. Can't blame him as his backyard is nearly as dark and clear!

I'd like to thank our new treasurer, Virginia Reed, who has graciously offered to take over the duties for the remainder of the year. If you haven't had the chance to meet her, stop by and say hello at the meeting next week, she'll be working the door ready to take payments or hand out information. Give her some words of encouragement!

Those of you going to Mt. Wilson start putting together your observing list requests. Although our scope operator will have a ton of objects that look good in the 60", he'll be glad to slew it to just about anything we want – Sorry Duane, no tour of the Southern Skies though...



Vice President Doug Drake

Luisa Rebull shall be our guest speaker for our next meeting, Friday, August 13. Luisa is a Research Scientist for the Spitzer Science Center at JPL. Her primary job is to run the proposal calls in which astronomers from all over the world submit ideas for the Spitzer to look at. She has a Ph. D. in Astronomy and Astrophysics from the University of Chicago.

What is the SPITZER space telescope? Well, the Spitzer Space Telescope, formerly known as the "Space Infrared Telescope Facility," is an infrared telescope that studies the early universe, young galaxies and forming stars, and is used to detect dust disks around stars, considered an important signpost of planetary formation.

This should be a good presentation for all of us, be there or be square. ☺ Doug



Director of Community Development Rose Moore

Many, many thanks to all the members who attended our picnic on July 17th! Thanks for braving the extremely hot weather, hot wind, and the Mojave Green warnings from the camp ground 'host'. Glad we didn't see any!! Also thank you to all for bringing food, drinks, condiments, utensils, etc., and donation and raffle items for our members. And special thanks to Tom K. for all his donations for the raffle and auction! Thanks to Matt Jr., Shane, Lee, and 'Chef' Darrell for making and cooking the burgers and hot dogs! Congratulations to all who won at the raffle table and the auction tables! Despite the heat, a good time was had by all during the picnic and by those who stayed for observing that evening!

August 7th, Saturday, is our club trip to Mt. Wilson! Members attending this event need to check their emails for information regarding car pooling, driving directions, where to meet and time, etc.

Don will be heading this expedition!

Wednesday, August 11th is Jeremy's 'SAGE Observations' at the Planetarium. 'Two Small Pieces of Glass' starts at 6:30pm, followed by a lecture on the Solar System at 7:15pm. If weather permits, there will be observing after class in front of the Planetarium.

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Our club meeting for Friday, August 13th, will have Luisa Rebull, research scientist, from the Spitzer Space Telescope. Luisa has been with the Spitzer Science Center since 2003. Come on out to the meeting to hear her speak! Further information on the exact topic will be posted on the website.

Our trip to Mt. Palomar for August 14th has been canceled at this time due to the fact that we do not have enough members that can make the trip at this time. We needed to have a minimum of 10.

Coming up on September 18 & 19, Saturday and Sunday, is PATS at the Pasadena Convention Center. The Pacific Astronomy and Telescope Show will have vendors, exhibits, presentations and workshops. Geoff Marcy and Alex Filippenko are among the speakers scheduled this year. We will be having a booth there for our club. We need volunteers to help man the booth, and speak to the visitors who may have questions on our club or astronomy in general. We are in the process of getting info on pre-sale tickets.

Clear, cool skies!
Rose

Roswell's Report by Roswell

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

Recently, I paid a visit to the Home for Retired Apollo Astronauts. While there, I had the opportunity to talk to some of the humanoids who walked on the Moon. They were proud of their accomplishments until I told them of all of the places I have been in the Universe.

Anyway, I got a pretty good laugh when one of them was telling me about the helmets that they wore on the moon. He was saying that the helmet actually had two visors, one of which was like a pair of sunglasses to cut down on the glare from the sun (or Earthshine) while on the surface. The other visor had a one-way mirror constructed of gold electroplate. This plate would reflect the worse of the Sun's blinding rays.

Check this out! It was also designed that should the astronaut experience a hostile encounter with another being, the other being would not be able to see the astronauts face through this visor!

Silly earthlings! Don't you realize that we can still read you mind!



Roswell

Space Place

The Sun Can Still Remind Us Who's Boss

by Dr. Tony Phillips

Grab your cell phone and take a good long look. It's indispensable, right? It tells time, surfs the web, keeps track of your appointments and, by the way, also makes phone calls. Modern people can hardly live without one.

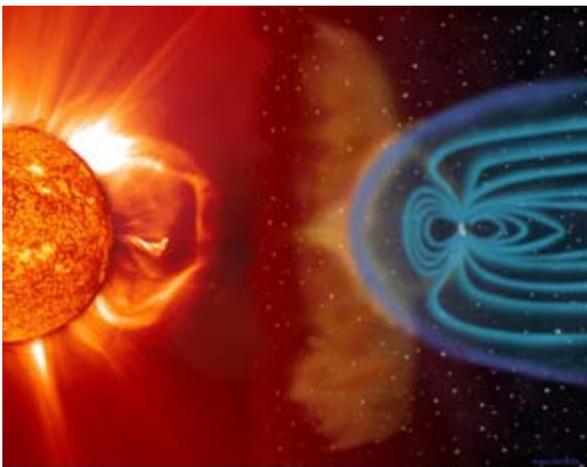
One good solar flare could knock it all out.

"In the 21st century, we're increasingly dependent on technology," points out Tom Bogdan, director of NOAA's Space Weather Prediction Center in Boulder, Colorado. "This makes solar activity an important part of our daily lives."

Indeed, bad space weather can knock out power systems, telecommunications, financial and emergency services—basically, anything that needs electronics to work. That's why NOAA is building a new fleet of "space weather stations," the GOES-R satellites.

"GOES-R will bring our existing fleet of weather satellites into the 21st century," says Bogdan. "They're designed to monitor not only Earth weather, but space weather as well."

NOAA's existing fleet of Geostationary Operational Environmental Satellites (GOES) already includes some space weather capabilities: solar ultraviolet and X-ray telescopes, a magnetometer and energetic particle sensors. GOES-R will improve upon these instruments and add important new sensors to the mix.



In spite of Earth's protective magnetosphere, solar storms can wreak havoc with Earth satellites and other expensive electronics on the ground.

One of Bogdan's favorites is a particle detector named "MPS-Low," which specializes in sensing low-energy (30 eV – 30 keV) particles from the sun.

Who cares about low-energy particles? It turns out they can be as troublesome as their high-energy counterparts. Protons and other atomic nuclei accelerated to the highest energies by solar flares can penetrate a satellite's exterior surface, causing all kinds of problems when they reach internal electronics. Low-energy particles, particularly electrons, can't penetrate so deeply. Instead, they do their damage on the outside.

As Bogdan explains, "Low-energy particles can build up on the surfaces of spacecraft, creating a mist of charge. As voltages increase, sparks and arcs can zap electronics—or emit radio pulses that can be misinterpreted by onboard computers as a command."

The Galaxy 15 communications satellite stopped working during a solar wind storm in April 2010, and many researchers believe low-energy particles are to blame. GOES-R will be able to monitor this population of particles and alert operators when it's time to shut down sensitive systems.

"This is something new GOES-R will do for us," says Bogdan.

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The GOES-R magnetometer is also a step ahead. It will sample our planet's magnetic field four times faster than its predecessors, sensing vibrations that previous GOES satellites might have missed. Among other things, this will help forecasters anticipate the buildup of geomagnetic storms.

And then there are the pictures. GOES-R will beam back striking images of the sun at X-ray and extreme UV wavelengths. These are parts of the electromagnetic spectrum where solar flares and other eruptions make themselves known with bright flashes of high-energy radiation. GOES-R will pinpoint the flashes and identify their sources, allowing forecasters to quickly assess whether or not Earth is in the "line of fire."

They might also be able to answer the question, Is my cell phone about to stop working?

The first GOES-R satellite is scheduled for launch in 2015. Check www.goes-r.gov for updates. Space weather comes down to Earth in the clear and fun explanation for young people on SciJinks, <http://scijinks.gov/space-weather-and-us>.

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

Extraterrestrial Tidbits (ET) by Jeff Riechmann

Echo, Echo, Echo!

Forty years ago, on 12 August 1960, NASA launched Echo-1 a radio-reflector satellite. Scientists figured that a large satellite orbiting the earth could act as a reflector for radio signals. They also figured out that this large satellite could broadcast a pre-recorded signal across a wide area. And along came Echo.

This contraption was not really a satellite in the regard that most of us picture a satellite as being. Instead, it was a satelloon. After launch, Echo would inflate into a sphere one hundred feet across. As long as it was visible in the sky, it could transmit signals. Once it dropped below the curvature of the earth, the signal would be lost.

Gives a whole new meaning to "can you hear me now?"

Astrophoto of The Month



The Whirlpool Galaxy (NGC 5194, star chart) is an interacting, grand-design, spiral galaxy located at a distance of approximately 23 million light-years in the constellation Canes Venatici. (see wiki) Taken by Don Bryden at Two Goats Observatory, April 7th, 2008. Sixty 25" stacked exposures with a SBIG ST2000XCM and a Stellarvur SV-105.

News Headlines

NASA Telescope Finds Elusive Buckyballs in Space

Astronomers using NASA's Spitzer Space Telescope have discovered carbon molecules, known as "buckyballs," in space for the first time. Buckyballs are soccer-ball-shaped molecules that were first observed in a laboratory 25 years ago.

http://www.nasa.gov/mission_pages/spitzer/news/spitzer20100722.html

Hyperfast Star Was Booted from Milky Way

A hundred million years ago, a triple-star system was traveling through the bustling center of our Milky Way galaxy when it made a life-changing misstep. The trio wandered too close to the galaxy's giant black hole, which captured one of the stars and hurled the other two out of the Milky Way. Adding to the stellar game of musical chairs, the two outbound stars merged to form a super-hot, blue star.

<http://www.spaceref.com/news/viewpr.html?pid=31300>

New Technique Could Track Down Dark Energy

Dark energy is the label scientists have given to what is causing the Universe to expand at an accelerating rate, and is believed to make up nearly three-fourths of the mass and energy of the Universe. While the acceleration was discovered in 1998, its cause remains unknown. Physicists have advanced competing theories to explain the acceleration, and believe the best way to test those theories is to precisely measure large-scale cosmic structures. A new technique developed for the Robert C. Byrd Green Bank Telescope (GBT) have given astronomers a new way to map large cosmic structures such as dark energy.

<http://www.universetoday.com/2010/07/21/new-technique-could-track-down-dark-energy/#more-69218>

Origin of Key Cosmic Explosions Still a Mystery

When a star explodes as a supernova, it shines so brightly that it can be seen from millions of light-years away. One particular supernova variety -- Type Ia -- brightens and dims so predictably that astronomers use them to measure the universe's expansion. The resulting discovery of dark energy and the accelerating universe rewrote our understanding of the cosmos. Yet the origin of these supernovae, which have proved so useful, remains unknown.

<http://www.sciencedaily.com/releases/2010/07/100712133131.htm>

New Trove of Iron Meteorites

Landsat spacecraft made orbital imagery of Earth readily accessible to the public in the 1970s, and ever since then space-age prospectors have pored over satellite photos in the hope of identifying new impact craters on our planet's surface. Usually these "discoveries" prove to be false alarms — Mother Nature has lots of ways of making circular holes in the ground.

<http://www.skyandtelescope.com/news/home/99103414.html>

Astronomers discover an unusual cosmic lens

Astronomers at the California Institute of Technology (Caltech) and Ecole Polytechnique Federale de Lausanne (EPFL) in Switzerland have discovered the first known case of a distant galaxy being magnified by a quasar acting as a gravitational lens. The discovery is based in part on observations done at the W. M. Keck Observatory on Hawaii's Mauna Kea.

<http://www.astronomy.com/asy/default.aspx?c=a&id=10050>

August Sky Data

**Best time for deep sky observing this month:
August 5 through August 13**

Mercury is at its greatest elongation east of the Sun on August 24th, so in theory it should be visible in the west after sunset. But in practice it sets only minutes after the Sun. We're unlikely to see this elusive little planet this month.

Venus is low in the western sky as soon as it starts to get dark; it sets before the sky is properly dark, and will get increasingly difficult to see as the weeks go by. But the "Evening Star" is so brilliant, it can be seen even in bright twilight, if the sky is clear. Venus is moving rapidly south-eastwards, across the constellation of Virgo.

Mars is low in the western sky at dusk. It looks like a moderately-bright star, with an orange tint. At the start of August, Mars is 2 degrees to the lower left of slightly-brighter Saturn, and 7 degrees to the upper left of brilliant Venus. Mars sets earlier every evening, and by the end of August we will lose sight of it altogether.

This month, **Jupiter** is the only planet visible in the night-time sky. The giant planet is rising in the east in the late evening, and it's well up in the south by dawn. Relative to the stars, Jupiter is moving slowly south-westwards in Pisces.

Saturn is yet another planet which is low in the west immediately after sunset; it looks like a bright star, though it won't be easy to find in the twilight. Saturn sets earlier every night, and by the end of the month we will lose sight of it completely.

August brings the well-known Perseid **meteor-shower**. They all seem to radiate from a point in the constellation of Perseus, which is well up in north-east during the evening, and high in the east by dawn. Perseid meteors may be seen any time from late July to late August, but the peak this year is expected on the evening of Thursday August 12th. Good numbers of Perseids should be visible throughout the night of the 12th-13th; we could hope to see one every minute or so, if the sky is clear – and there will be no interference from moonlight.

Last Qtr Aug 2 New Aug 9 First Qtr Aug 16 Full Aug 24



Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
8/1/2010	23:07	12:09	06:04	19:55
8/5/2010	01:11	16:11	06:07	19:51
8/10/2010	06:51	20:06	06:10	19:46
8/15/2010	12:42	23:07	06:14	19:41
8/20/2010	17:15	02:32	06:18	19:35
8/25/2010	19:47	07:16	06:21	19:29
8/31/2010	23:04	12:59	06:25	19:21

Planet Data

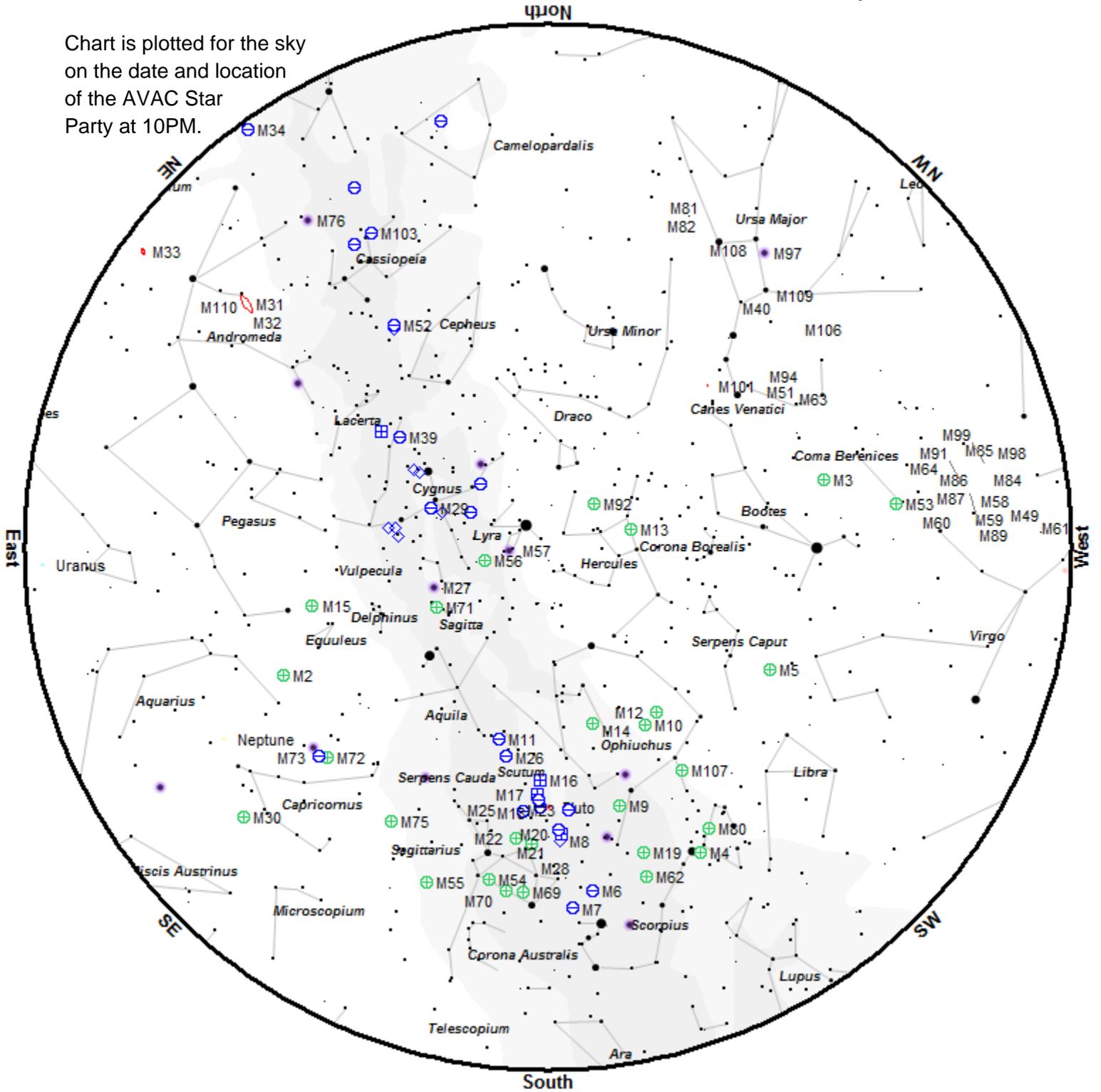
	Aug 1			
	Rise	Transit	Set	Mag
Mercury	08:15	14:43	21:11	0.2
Venus	09:41	15:51	22:02	-4.2
Mars	10:14	16:18	22:22	1.5
Jupiter	22:19	04:23	10:27	-2.8
Saturn	10:06	16:18	22:26	1.1

	Aug 15			
	Rise	Transit	Set	Mag
Mercury	08:16	14:27	20:36	0.8
Venus	09:55	15:47	21:38	-4.3
Mars	10:00	15:55	21:48	1.5
Jupiter	21:23	03:25	09:28	-2.8
Saturn	09:18	15:28	21:35	1.1

	Aug 31			
	Rise	Transit	Set	Mag
Mercury	06:48	13:06	19:16	4.1
Venus	10:05	15:36	21:07	-4.4
Mars	09:46	15:30	21:12	1.5
Jupiter	20:16	02:17	08:18	-2.9
Saturn	08:23	14:32	20:36	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.



<p>Star Magnitudes</p> <p>● ● ● ● ●</p> <p>0 1 2 3 4 5</p>	<p>Galaxy</p> <p>Open Cluster</p> <p>Globular Cluster</p> <p>Cluster+Nebosity</p>	<p>Nebula</p> <p>Bright Nebula</p> <p>Planetary Nebula</p>
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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 6193	Open	5.4	Ara	16h41m20.0s	-48°45'48"	20:38	21:01	21:56	detectable
NGC 6178	Open	7.2	Sco	16h35m47.0s	-45°38'36"	20:48	21:02	21:33	detectable
M 64	Gal	9.3	Com	12h56m43.8s	+21°41'00"	20:48	21:08	21:15	detectable
M 80	Glob	7.3	Sco	16h17m02.0s	-22°58'30"	20:53	21:11	21:17	difficult
M 94	Gal	8.7	CVn	12h50m53.1s	+41°07'12"	20:57	21:11	21:44	detectable
M 3	Glob	6.3	CVn	13h42m11.0s	+28°22'42"	20:56	21:12	21:54	detectable
M 5	Glob	5.7	Ser	15h18m34.0s	+02°05'00"	20:54	21:12	22:15	detectable
M 51	Gal	8.7	CVn	13h29m52.3s	+47°11'40"	20:57	21:13	22:07	detectable
NGC 6322	Open	6.5	Sco	17h18m25.0s	-42°56'00"	20:44	21:13	22:27	easy
M 62	Glob	6.4	Oph	17h01m13.0s	-30°06'48"	20:53	21:14	22:19	difficult
M 19	Glob	6.8	Oph	17h02m38.0s	-26°16'06"	20:56	21:16	22:08	challenging
M 12	Glob	6.1	Oph	16h47m14.0s	-01°56'48"	20:51	21:18	23:21	detectable
M 10	Glob	6.6	Oph	16h57m09.0s	-04°06'00"	20:55	21:18	22:49	difficult
M 13	Glob	5.8	Her	16h41m41.0s	+36°27'36"	20:51	21:20	00:10	detectable
NGC 6383	Open	5.4	Sco	17h34m48.0s	-32°34'00"	20:51	21:26	22:57	detectable
M 92	Glob	6.5	Her	17h17m07.0s	+43°08'12"	20:52	21:26	00:46	detectable
M 14	Glob	7.6	Oph	17h37m36.0s	-03°14'48"	20:55	21:30	23:29	difficult
M 6	Open	4.6	Sco	17h40m20.0s	-32°15'12"	20:48	21:30	23:23	easy
IC 4665	Open	5.3	Oph	17h46m18.0s	+05°43'00"	21:01	21:36	23:03	difficult
M 7	Open	3.3	Sco	17h53m51.0s	-34°47'36"	20:55	21:41	22:59	detectable
M 23	Open	5.9	Sgr	17h57m04.0s	-18°59'06"	20:58	21:44	23:15	detectable
NGC 6543	PNe	8.3	Dra	17h58m33.4s	+66°37'59"	20:44	21:47	03:57	obvious
M 20	Open	5.2	Sgr	18h02m42.0s	-22°58'18"	20:54	21:49	23:03	detectable
M 8	Neb	5.0	Sgr	18h04m02.0s	-24°23'14"	21:01	21:51	22:41	detectable
M 21	Open	7.2	Sgr	18h04m13.0s	-22°29'24"	21:00	21:52	23:11	difficult
NGC 6572	PNe	8.0	Oph	18h12m06.4s	+06°51'12"	20:39	21:59	01:50	obvious
M 16	Open	6.5	Ser	18h18m48.0s	-13°48'24"	20:48	22:06	00:35	easy
M 18	Open	7.5	Sgr	18h19m58.0s	-17°06'06"	20:49	22:07	00:15	easy
M 28	Glob	6.9	Sgr	18h24m33.0s	-24°52'12"	21:33	22:12	22:50	difficult
NGC 6633	Open	5.6	Oph	18h27m15.0s	+06°30'30"	20:51	22:15	01:14	easy
M 25	Open	6.2	Sgr	18h31m47.0s	-19°07'00"	21:09	22:19	23:35	difficult
M 22	Glob	5.2	Sgr	18h36m24.0s	-23°54'12"	21:24	22:23	23:22	difficult
IC 4756	Open	5.4	Ser	18h39m00.0s	+05°27'00"	20:57	22:26	00:46	detectable
M 70	Glob	7.8	Sgr	18h43m13.0s	-32°17'30"	21:24	22:31	23:37	challenging
M 11	Open	6.1	Sct	18h51m05.0s	-06°16'12"	21:05	22:38	00:24	difficult
M 57	PNe	9.4	Lyr	18h53m35.1s	+33°01'45"	20:51	22:40	02:40	detectable
NGC 6716	Open	7.5	Sgr	18h54m34.0s	-19°54'06"	21:06	22:41	00:23	detectable
M 56	Glob	8.4	Lyr	19h16m36.0s	+30°11'06"	21:04	23:03	01:25	challenging

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 55	Glob	6.3	Sgr	19h40m00.0s	-30°57'42"	22:20	23:27	00:34	challenging
NGC 6818	PNe	10.0	Sgr	19h43m57.8s	-14°09'12"	21:03	23:31	01:58	easy
M 71	Glob	8.4	Sge	19h53m46.0s	+18°46'42"	20:56	23:40	02:58	detectable
M 27	PNe	7.3	Vul	19h59m36.3s	+22°43'16"	20:58	23:46	03:06	detectable
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	21:05	23:52	02:59	detectable
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	21:03	00:10	03:37	detectable
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	21:08	00:10	03:23	detectable
NGC 7009	PNe	8.3	Aqr	21h04m10.9s	-11°21'48"	22:08	00:50	03:34	obvious
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	22:29	01:16	04:04	detectable
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	21:30	01:18	04:53	detectable
M 2	Glob	6.6	Aqr	21h33m27.0s	-00°49'24"	22:55	01:20	03:44	detectable
M 30	Glob	6.9	Cap	21h40m22.0s	-23°10'42"	00:17	01:27	02:37	difficult
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	20:54	01:40	05:07	easy
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	23:44	02:01	04:19	difficult
NGC 7293	PNe	6.3	Aqr	22h29m38.5s	-20°50'14"	00:38	02:16	03:55	detectable
NGC 7790	Open	7.2	Cas	23h58m24.0s	+61°12'30"	22:30	03:44	05:08	easy
M 110	Gal	8.9	And	00h40m22.3s	+41°41'09"	02:24	04:22	04:56	challenging
M 31	Gal	4.3	And	00h42m44.3s	+41°16'07"	01:12	04:22	05:03	detectable
M 32	Gal	8.9	And	00h42m41.8s	+40°51'58"	01:07	04:23	05:05	detectable
NGC 253	Gal	7.9	Scl	00h47m33.1s	-25°17'20"	04:06	04:24	05:01	difficult
NGC 457	Open	5.1	Cas	01h19m35.0s	+58°17'12"	00:17	04:31	05:06	easy
NGC 559	Open	7.4	Cas	01h29m31.0s	+63°18'24"	00:18	04:32	05:05	easy
NGC 637	Open	7.3	Cas	01h43m04.0s	+64°02'24"	23:36	04:33	05:08	easy
M 103	Open	6.9	Cas	01h33m23.0s	+60°39'00"	23:49	04:33	05:08	easy
NGC 663	Open	6.4	Cas	01h46m09.0s	+61°14'06"	01:07	04:34	05:05	detectable
M 76	PNe	10.1	Per	01h42m19.9s	+51°34'31"	02:28	04:35	05:00	difficult
NGC 884	Open	4.4	Per	02h22m18.0s	+57°08'12"	00:39	04:37	05:08	easy
NGC 869	Open	4.3	Per	02h19m00.0s	+57°07'42"	00:34	04:37	05:09	obvious
M 33	Gal	6.4	Tri	01h33m50.9s	+30°39'36"	02:47	04:36	05:02	difficult
NGC 1027	Open	7.4	Cas	02h42m40.0s	+61°35'42"	00:50	04:38	05:07	challenging
NGC 957	Open	7.2	Per	02h33m21.0s	+57°33'36"	02:03	04:38	05:03	detectable
M 34	Open	5.8	Per	02h42m05.0s	+42°45'42"	03:05	04:40	05:01	detectable
NGC 1502	Open	4.1	Cam	04h07m50.0s	+62°19'54"	01:55	04:41	05:12	obvious
NGC 1444	Open	6.4	Per	03h49m25.0s	+52°39'30"	01:59	04:42	05:09	obvious
NGC 1528	Open	6.4	Per	04h15m23.0s	+51°12'54"	03:17	04:42	05:02	detectable
NGC 1342	Open	7.2	Per	03h31m38.0s	+37°22'36"	03:40	04:42	05:00	detectable
NGC 1664	Open	7.2	Aur	04h51m06.0s	+43°40'30"	03:37	04:44	05:03	detectable
M 45	Open	1.5	Tau	03h47m00.0s	+24°07'00"	03:04	04:44	05:07	easy
M 77	Gal	9.7	Cet	02h42m40.8s	-00°00'48"	03:53	04:45	05:01	difficult
M 38	Open	6.8	Aur	05h28m40.0s	+35°50'54"	04:25	04:47	04:57	detectable
M 36	Open	6.5	Aur	05h36m18.0s	+34°08'24"	04:25	04:47	05:04	easy
Hyades	Open	0.8	Tau	04h26m54.0s	+15°52'00"	03:59	04:47	05:03	easy
M 37	Open	6.2	Aur	05h52m18.0s	+32°33'12"	04:43	04:48	05:02	easy

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.

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