



Desert Sky Observer

Volume 36

Antelope Valley Astronomy Club Newsletter

January 2016

Up-Coming Events

- January 6: [Quarterly Board Meeting](#)
- January 8: Club Meeting*
- January 9: Dark Sky Star Party @ TBD
- January 30: [Prime Desert Moon Walk](#)

* Monthly meetings are held at the S.A.G.E. Planetarium 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 Frank Moore

Hello AVAC friends and members. I hope you all had a wonderful holiday and may you all be blessed in the New Year.

As I assume you're all aware we had a last minute change of venue for our Christmas party when the venue we had reserved since March, Julianni's Italian Ristorante, suddenly went out of business. We were very fortunate that we were able to find another venue, on short notice, that had the same night available. The event was held at the Embassy Suites in Palmdale and it was a rousing success. The room was beautifully prepared, the food was great, and the service was fantastic. I couldn't be more pleased.

The Christmas party is also our annual awards ceremony where we recognize those who have participated in our various public outreach events. In addition to certificates recognizing our outreach participants we also recognized several exceptional members whose service to the club went above and beyond.

Bill Schebeck received the Keith Lawson Award, as our "MVP", for his service to the club and support of our activities. In addition to serving the club by faithfully helping out at our public outreach and educational events, Bill took over as the Chairman of our Financial Audit Committee when Millie (and Lee) Busch moved out of state. He also attended most of our board meetings throughout the year and has actively participated in the governance of the club and planning of our activities. In the coming year, Bill will also be our Vice President.

Our other major award recipient is Bob Ayres who received the Holland Fountain Award. This award is given for "Infectious Enthusiasm in Astronomy and the Related Sciences". Bob has shown this enthusiasm by his participation at star parties where he always seems to have a list of "more obscure" objects for which he is looking as well as his participation at public outreach events. When we started considering the various candidates for this award, all of them well qualified, and Rose reported that Bob had participated in 16 outreach events, he stood out beyond the others.

Our thanks to both of these deserving award recipients.

Our final Prime Desert Woodland Moonwalk of 2015 was held on Saturday December 12. We had a great turnout of members with telescopes including Darrell Bennett, Rose & Frank Moore, Don Bryden, Bill Schebeck, Tom Hames, Kevin Reilly and Ellen Mahler. 36 hearty members of the public braved the cold to go on Jeremy Amaranant's moonwalk and to observe through our telescopes. Our first Prime Desert Woodland Moonwalk of 2016 is scheduled for Saturday January 30 at 6:00 PM (weather permitting).

Throughout most of 2016 the new moon weekends occur early in the month, some even before our monthly meeting at the SAGE. The new moon weekend in January of 2016, and the scheduled date for our January Dark Sky Star Party is Saturday January 9. We'll be watching the weather patterns to decide if, and where, we can have one.

Finally, and as Rose has mentioned in this newsletter, January is the renewal month for AVAC memberships. Of course you can renew at any time, but you need to make sure you renew before January 30 to make sure you don't drop off the email list (even temporarily) and miss out on any news and announcements. We previously had some website problems that may have affected your ability to renew online but they are now resolved.

I look forward to seeing everyone at meetings and events in the coming year.

Vice President

Bill Schebeck

Happy New Year

The Christmas Party was a smashing success thanks to Frank and Rose for their work in getting an alternate location. Ellen was the grand prizewinner of a new telescope.

We finished the year with a Prime Desert Woodlands gathering. It was one of the better nights for observation at that location and through a pair of binoculars, we saw the 'Coat Hanger' group of stars. A good lesson in observation; wider field of view may show things that magnification alone can not.

Get a copy of the January 2016 Astronomy magazine and keep the centerfold "2016 Astronomy's Guide to the Night Sky". It's a handy review of what can be seen in the night sky all this year.

Those of you that get up in the predawn hours are rewarded by views of Saturn and Venus. This should be a good month to study the moon, and it passes in front of Aldebaran on the 19th.

The predicted El Nino weather pattern may affect our calendar this winter.

This promises to be an exciting year. See you at the next meeting.



Secretary

Rose Moore

I would like to thank all those who attended the Christmas Party in December! And a special thank you to those who helped with setting up the raffle and auction items! Bill Schebeck was our Keith Lawson Award Winner and Bob Ayres was our Holland Fountain Award Winner, congratulations to both!

Please remember it's time to renew your AVAC membership! You may pay by PayPal or by bringing the payment to our next meeting, Friday January 8th. You may also pay by mailing your payment in January to the club's post office box: AVAC, P.O. Box 8545, Lancaster, CA 93539.

After I receive the silent auction sheets from Virginia, I will be sending out the donation letters (by email) for those who want them at tax time.

Steve has had problems with our AVAC calendar, and has been updating the software and working on the problems. It's up now, but we still need to restore events to the calendar, so stay tuned!

Clear skies and stay warm!

Space Place

How will we finally image the event horizon of a black hole?

By Ethan Siegel

One hundred years ago, Albert Einstein first put forth his theory of General Relativity, which laid out the relationship between spacetime and the matter and energy present within it. While it successfully recovered Newtonian gravity and predicted the additional precession of Mercury's orbit, the only exact solution that Einstein himself discovered was the trivial one: that for completely empty space. Less than two months after releasing his theory, however, the German scientist Karl Schwarzschild provided a true exact solution, that of a massive, infinitely dense object, a black hole.

One of the curious things that popped out of Schwarzschild's solution was the existence of an event horizon, or a region of space that was so severely curved that nothing, not even light, could escape from it. The size of this event horizon would be directly proportional to the mass of the black hole. A black hole the mass of Earth would have an event horizon less than a centimeter in radius; a black hole the mass of the sun would have an event horizon just a few kilometers in radius; and a supermassive black hole would have an event horizon the size of a planetary orbit.

Our galaxy has since been discovered to house a black hole about four million solar masses in size, with an event horizon about 23.6 million kilometers across, or about 40 percent the size of Mercury's orbit around the sun. At a distance of 26,000 light years, it's the largest event horizon in angular size visible from Earth, but at just 19 micro-arc-seconds, it would take a telescope the size of Earth to resolve it – a practical impossibility.

But all hope isn't lost! If instead of a single telescope, we built an array of telescopes located all over Earth, we could simultaneously image the galactic center, and use the technique of VLBI (very long-baseline interferometry) to resolve the black hole's event horizon. The array would only have the light-

gathering power of the individual telescopes, meaning the black hole (in the radio) will appear very faint, but they can obtain the resolution of a telescope that's the distance between the farthest telescopes in the array! The planned Event Horizon Telescope, spanning four different continents (including Antarctica), should be able to resolve under 10 micro-arc-seconds, imaging a black hole directly for the first time and answering the question of whether or not they truly contain an event horizon. What began as a mere mathematical solution is now just a few years away from being observed and known for certain!

Note: This month's article describes a project that is not related to NASA and does not suggest any relationship or endorsement. Its coverage is for general interest and educational purposes.

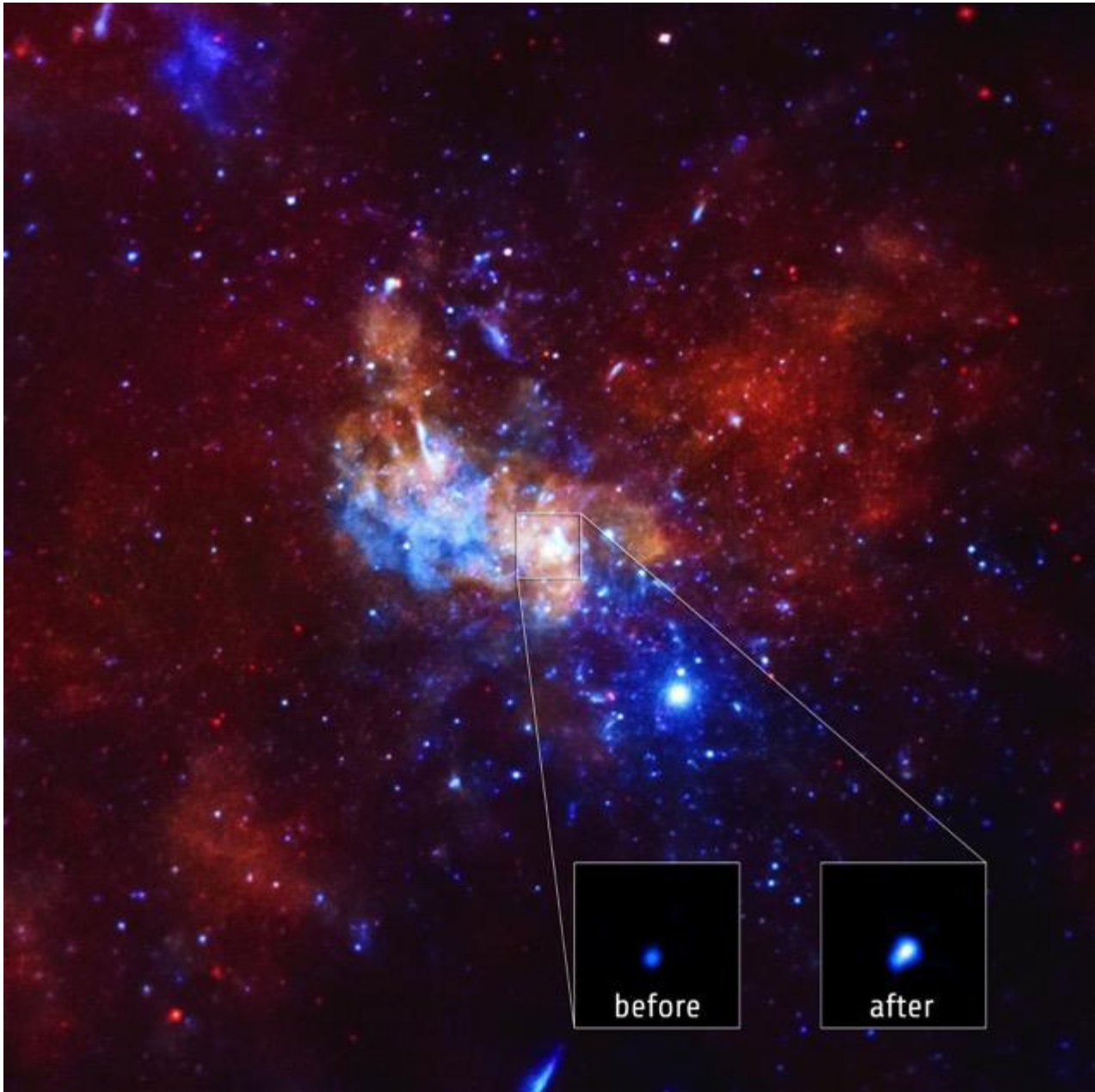


Image credit: NASA/CXC/Amherst College/D.Haggard et al., of the galactic center in X-rays. Sagittarius A is the supermassive black hole at our Milky Way's center, which normally emits X-ray light of a particular brightness. However, 2013 saw a flare increase its luminosity by a factor of many hundreds, as the black hole devoured matter. The event horizon has yet to be revealed.*

News Headlines

Galaxy Grows Monstrous X-Ray Tail

In a galactic cluster far, far away, a galaxy has grown an unprecedented tail of super-heated gases, providing astronomers with a unique glimpse of an extreme intragalactic environment. Using the X-ray vision of NASA's Chandra space telescope, the ghostly glow of a 250,000 light-year long tail has been seen streaming from a galaxy called CGCG254-021 deep inside the Zwicky 8338 cluster nearly 700 million light-years from Earth.

<http://www.space.com/31454-galaxy-grows-monstrous-x-ray-tail.html>

JPL: Lowdown on Ceres: Images From Dawn's Closest Orbit

NASA's Dawn spacecraft, cruising in its lowest and final orbit at dwarf planet Ceres, has delivered the first images from its best-ever viewpoint. The new images showcase details of the cratered and fractured surface. 3-D versions of two of these views are also available. Dawn took these images of the southern hemisphere of Ceres on Dec. 10, at an approximate altitude of 240 miles (385 kilometers), which is its lowest-ever orbital altitude.

<http://www.jpl.nasa.gov/news/news.php?feature=4802>

JPL: NASA Suspends 2016 Launch of InSight Mission to Mars

After thorough examination, NASA managers have decided to suspend the planned March 2016 launch of the Interior Exploration using Seismic Investigations Geodesy and Heat Transport (InSight) mission. The decision follows unsuccessful attempts to repair a leak in a section of the prime instrument in the science payload. The instrument involved is the Seismic Experiment for Interior Structure (SEIS), a seismometer provided by France's Centre National d'Études Spatiales (CNES). Designed to measure ground movements as small as the diameter of an atom, the instrument requires a vacuum seal around its three main sensors to withstand the harsh conditions of the Martian environment.

<http://www.jpl.nasa.gov/news/news.php?feature=4805>

James Webb Space Telescope (JWST) NASA

The billion-dollar James Webb Space Telescope has reach the halfway point in constructing the giant mirrors that will be used on the observatory. You can see a webcam of the current work or find out more details by visiting the web site below..

<http://www.jwst.nasa.gov/>

Researchers Come Closer Than Ever to Defining Our Place in Space

The biggest structure in the universe has been mapped, offering a whole new way to think about "you are here." Chances are, you've never met Brent Tully, and yet he knows exactly where you live. Better than you do, in fact — and probably better than anybody else in the world. Working at the University of Hawaii's Institute for Astronomy, he has spent decades researching the locations and distributions of galaxies across deep space. Oh sure, if you just want your location in a city, your phone's GPS can do that. But if you want to find your address in the universe as a whole, Tully is your go-to guy.

<http://discovermagazine.com/2015/may/21-your-place-in-space>

January Sky Data

**Best time for deep sky observing this month:
January 1 through January 13**

On New Years Day **Mercury** shines at magnitude -0.4 about 7 degrees above the south-western horizon 30 minutes after sunset. Over the next week it falls back towards the horizon with a much reducing magnitude and will be increasingly difficult to spot.

Venus rises around three hours before the Sun as January begins but only 2 hours at month's end. Its angular size reduces from 14.3 to 12.4 arc seconds during the month but, as it does so, the percentage of the disk which is illuminated increases from 77 to 85% and the brightness hardly changes, staying at magnitude -4 for much of the month.

Mars starts the month in Virgo, 6 degrees from Spica, but moves into Libra mid month. Its brightness increases slightly from magnitude +1.3 to +0.8 during the month as the angular size of its disk increases from 5.6 to 6.8 arc seconds.

Jupiter shining at magnitude -2.2, rises at around 22:30 at the beginning of the month lying low in south-eastern Leo. By the end of the month it rises at around 20:30 with a slight increase in magnitude to -2.4. It will then be due south and so highest in the sky at an elevation of 45 degrees around 02:30.

Saturn is now a morning object, rising at 04:30 as the month begins but by about 02:50 at its end. Its diameter increases from 15.3 to 15.8 arc seconds during the month with its ring system spanning some 35 arc seconds. It will be shining at magnitude +0.5 and be high enough in the south-east before dawn to make out the beautiful ring system which has now opened out to ~25 degrees.

The Quadrantids is the first major **meteor shower** of the year. It is usually active between the end of December and the second week of January, and peaks around January 3 or January 4. Unlike other meteor showers that tend to stay at their peak for about two days, the peak period of the Quadrantids is only for a few hours.

Last Qtr Jan 1 New Jan 9 First Qtr Jan 16 Full Jan 23



Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
1/1/2016	-----	11:28	06:58	16:52
1/5/2016	02:46	13:45	06:59	16:54
1/10/2016	07:14	18:04	06:59	16:59
1/15/2016	10:43	23:29	06:58	17:03
1/20/2016	14:24	03:43	06:57	17:08
1/25/2016	19:10	07:46	06:54	17:13
1/31/2016	-----	11:05	06:50	17:20

Planet Data

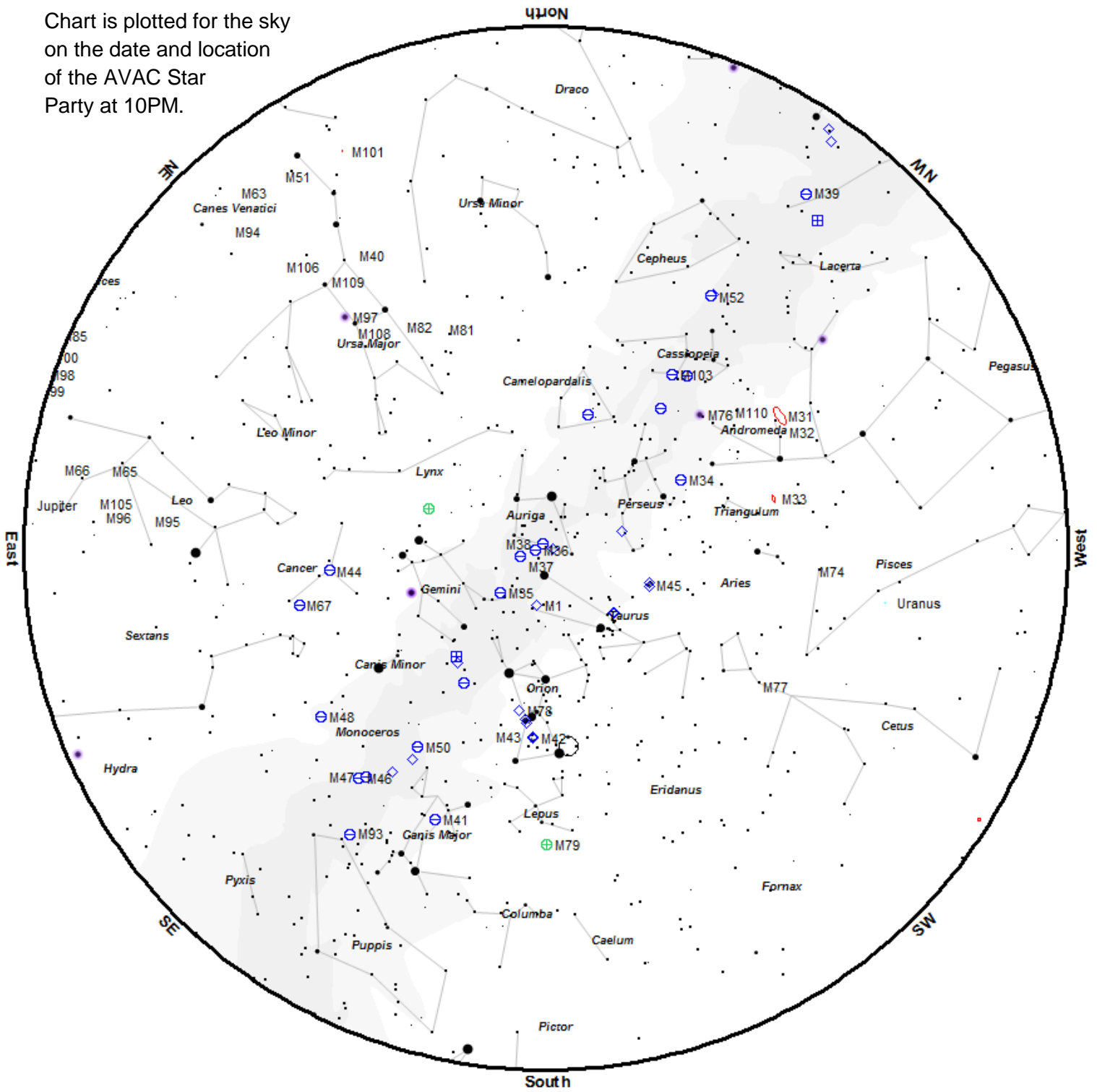
	Jan 1			
	Rise	Transit	Set	Mag
Mercury	08:06	13:16	18:24	-0.2
Venus	04:01	09:14	14:27	-4.1
Mars	01:16	06:56	12:39	1.2
Jupiter	22:24	04:42	10:59	-2.2
Saturn	04:36	09:44	14:56	0.5

	Jan 15			
	Rise	Transit	Set	Mag
Mercury	06:24	11:37	16:59	3.7
Venus	04:26	09:31	14:35	-4.0
Mars	00:57	06:30	12:05	1.1
Jupiter	21:29	03:47	10:05	-2.3
Saturn	03:48	08:55	14:06	0.6

	Jan 31			
	Rise	Transit	Set	Mag
Mercury	05:13	10:21	15:30	0.1
Venus	04:50	09:53	14:55	-4.0
Mars	00:34	05:59	11:24	0.8
Jupiter	20:22	02:41	09:00	-2.4
Saturn	02:51	07:58	13:09	0.6

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+Nebulosity</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	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
NGC 55	Gal	Scl	00h15m08.4s	-39°13'13"	8.5	18:16	18:24	18:40	challenging
NGC 7293	PNe	Aqr	22h29m38.5s	-20°50'14"	6.3	18:13	18:26	18:47	detectable
M 39	Open	Cyg	21h31m48.0s	+48°26'00"	5.3	18:10	18:31	19:36	easy
IC 5146	Neb	Cyg	21h53m24.0s	+47°16'00"	10.0	18:11	18:32	19:56	challenging
NGC 253	Gal	Scl	00h47m33.1s	-25°17'20"	7.9	18:13	18:33	19:50	detectable
NGC 7160	Open	Cep	21h53m40.0s	+62°36'12"	6.4	18:06	18:33	20:34	obvious
IC 1396	Neb	Cep	21h39m06.0s	+57°30'00"		18:10	18:33	20:04	challenging
NGC 7243	Open	Lac	22h15m08.0s	+49°53'54"	6.7	18:14	18:33	20:08	detectable
NGC 288	Glob	Scl	00h52m45.0s	-26°35'00"	8.1	18:17	18:33	19:17	challenging
M 52	Open	Cas	23h24m48.0s	+61°35'36"	8.2	18:14	18:36	20:46	detectable
NGC 7790	Open	Cas	23h58m24.0s	+61°12'30"	7.2	18:06	18:37	22:34	easy
NGC 7789	Open	Cas	23h57m24.0s	+56°42'30"	7.5	18:15	18:37	20:56	detectable
M 32	Gal	And	00h42m41.8s	+40°51'58"	8.9	18:10	18:37	22:05	easy
M 110	Gal	And	00h40m22.3s	+41°41'09"	8.9	18:12	18:38	21:18	detectable
M 31	Gal	And	00h42m44.3s	+41°16'07"	4.3	18:09	18:38	22:01	easy
NGC 457	Open	Cas	01h19m35.0s	+58°17'12"	5.1	18:07	18:42	23:48	obvious
M 33	Gal	Tri	01h33m50.9s	+30°39'36"	6.4	18:11	18:42	22:02	detectable
NGC 559	Open	Cas	01h29m31.0s	+63°18'24"	7.4	18:07	18:43	00:11	easy
M 103	Open	Cas	01h33m23.0s	+60°39'00"	6.9	18:05	18:43	00:07	obvious
M 76	PNe	Per	01h42m19.9s	+51°34'31"	10.1	18:12	18:43	22:41	detectable
NGC 637	Open	Cas	01h43m04.0s	+64°02'24"	7.3	18:05	18:45	00:27	obvious
NGC 663	Open	Cas	01h46m09.0s	+61°14'06"	6.4	18:09	18:46	00:20	easy
NGC 752	Open	And	01h57m41.0s	+37°47'06"	6.6	18:19	18:47	20:59	challenging
NGC 869	Open	Per	02h19m00.0s	+57°07'42"	4.3	18:04	18:57	00:43	obvious
NGC 884	Open	Per	02h22m18.0s	+57°08'12"	4.4	18:05	19:00	00:48	obvious
Heart Neb	Neb	Cas	02h33m52.0s	+61°26'50"	6.5	18:18	19:10	22:11	challenging
NGC 957	Open	Per	02h33m21.0s	+57°33'36"	7.2	18:09	19:10	00:43	easy
M 77	Gal	Cet	02h42m40.8s	-00°00'48"	9.7	18:11	19:18	22:28	detectable
M 34	Open	Per	02h42m05.0s	+42°45'42"	5.8	18:10	19:18	23:41	easy
NGC 1027	Open	Cas	02h42m40.0s	+61°35'42"	7.4	18:12	19:19	00:01	detectable
NGC 1245	Open	Per	03h14m42.0s	+47°14'12"	7.7	18:22	19:51	22:12	challenging
NGC 1342	Open	Per	03h31m38.0s	+37°22'36"	7.2	18:10	20:07	00:25	detectable
M 45	Open	Tau	03h47m00.0s	+24°07'00"	1.5	18:06	20:22	00:59	obvious
NGC 1444	Open	Per	03h49m25.0s	+52°39'30"	6.4	18:04	20:26	02:04	obvious
NGC 1502	Open	Cam	04h07m50.0s	+62°19'54"	4.1	18:02	20:44	02:47	obvious
NGC 1528	Open	Per	04h15m23.0s	+51°12'54"	6.4	18:09	20:51	02:05	easy
Hyades	Open	Tau	04h26m54.0s	+15°52'00"	0.8	18:11	21:03	01:13	obvious
NGC 1647	Open	Tau	04h45m55.0s	+19°06'54"	6.2	18:21	21:22	00:43	detectable

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
NGC 1664	Open	Aur	04h51m06.0s	+43°40'30"	7.2	18:11	21:27	02:29	easy
NGC 1746	Open	Tau	05h03m50.0s	+23°46'12"	6.1	18:23	21:39	01:08	detectable
NGC 1851	Glob	Col	05h14m06.0s	-40°02'48"	7.1	20:35	21:49	23:03	difficult
M 38	Open	Aur	05h28m40.0s	+35°50'54"	6.8	18:16	22:04	02:22	detectable
M 36	Open	Aur	05h36m18.0s	+34°08'24"	6.5	18:12	22:09	03:08	easy
M 43	Neb	Ori	05h35m30.0s	-05°16'00"	9.0	20:00	22:11	00:21	difficult
M 1	Neb	Tau	05h34m30.0s	+22°01'00"	8.4	19:26	22:10	00:55	difficult
M 42	Neb	Ori	05h35m18.0s	-05°23'00"	4.0	19:00	22:11	01:21	easy
IC 434	Neb	Ori	05h41m00.0s	-02°27'00"	11.0	18:54	22:16	01:38	challenging
M 78	Neb	Ori	05h46m48.0s	+00°05'00"	8.0	20:11	22:22	00:34	difficult
M 37	Open	Aur	05h52m18.0s	+32°33'12"	6.2	18:14	22:28	03:14	easy
NGC 2129	Open	Gem	06h01m07.0s	+23°19'20"	7.0	18:13	22:36	03:11	obvious
NGC 2169	Open	Ori	06h08m24.0s	+13°57'54"	7.0	18:31	22:44	02:56	obvious
M 35	Open	Gem	06h09m00.0s	+24°21'00"	5.6	18:25	22:44	03:08	easy
NGC 2175	Open	Ori	06h09m39.0s	+20°29'12"	6.8	18:59	22:45	02:31	detectable
NGC 2237	Neb	Mon	06h32m02.0s	+04°59'10"	5.5	21:08	23:07	01:08	challenging
NGC 2264	Open	Mon	06h40m58.0s	+09°53'42"	4.1	19:15	23:16	03:17	easy
M 41	Open	CMa	06h46m01.0s	-20°45'24"	5.0	21:44	23:21	00:59	easy
NGC 2301	Open	Mon	06h51m45.0s	+00°27'36"	6.3	19:56	23:27	03:00	easy
M 50	Open	Mon	07h02m42.0s	-08°23'00"	7.2	20:40	23:37	02:35	detectable
NGC 2353	Open	Mon	07h14m30.0s	-10°16'00"	5.2	21:02	23:50	02:37	easy
NGC 2355	Open	Gem	07h16m59.0s	+13°45'00"	9.7	21:06	23:52	02:37	difficult
NGC 2360	Open	CMa	07h17m43.0s	-15°38'30"	9.1	22:23	23:52	01:23	challenging
NGC 2392	PNe	Gem	07h29m10.8s	+20°54'42"	8.6	19:35	00:04	04:33	obvious
NGC 2423	Open	Pup	07h37m06.0s	-13°52'18"	7.0	21:43	00:12	02:41	easy
M 47	Open	Pup	07h36m35.0s	-14°29'00"	4.3	21:47	00:12	02:37	obvious
NGC 2439	Open	Pup	07h40m45.0s	-31°41'36"	7.1	22:03	00:15	02:28	detectable
M 46	Open	Pup	07h41m46.0s	-14°48'36"	6.6	21:54	00:17	02:40	detectable
NGC 2440	PNe	Pup	07h41m55.4s	-18°12'31"	11.5	22:18	00:17	02:16	detectable
M 93	Open	Pup	07h44m30.0s	-23°51'24"	6.5	23:22	00:19	01:16	easy
NGC 2451	Open	Pup	07h45m23.0s	-37°57'21"	3.7	22:23	00:20	02:19	easy
NGC 2477	Open	Pup	07h52m10.0s	-38°31'48"	5.7	22:35	00:27	02:18	easy
NGC 2506	Open	Mon	08h00m01.0s	-10°46'12"	8.9	22:36	00:35	02:34	difficult
NGC 2547	Open	Vel	08h10m09.0s	-49°12'54"	5.0	00:10	00:45	01:18	challenging
NGC 2546	Open	Pup	08h12m15.0s	-37°35'42"	5.2	23:33	00:47	02:01	difficult
NGC 2571	Open	Pup	08h18m56.0s	-29°45'00"	7.4	22:36	00:53	03:11	detectable
M 44	Open	Cnc	08h40m24.0s	+19°40'00"	3.9	21:09	01:15	05:22	easy
IC 2395	Open	Vel	08h42m30.0s	-48°06'48"	4.6	00:22	01:17	02:12	detectable
M 67	Open	Cnc	08h51m18.0s	+11°48'00"	7.4	22:27	01:26	04:27	detectable
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	20:35	02:31	05:45	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	20:17	02:31	05:45	detectable
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	00:51	02:41	04:33	easy
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	00:51	02:41	04:33	easy
NGC 3227	Gal	Leo	10h23m30.6s	+19°51'54"	11.5	23:48	02:58	05:39	difficult
NGC 3242	PNe	Hya	10h24m46.1s	-18°38'32"	8.6	01:04	02:59	04:54	obvious

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 97	PNe	UMa	11h14m47.7s	+55°01'09"	9.7	23:20	03:49	05:44	detectable
M 65	Gal	Leo	11h18m55.7s	+13°05'32"	10.1	00:24	03:53	05:45	detectable
M 66	Gal	Leo	11h20m14.9s	+12°59'30"	9.7	00:25	03:54	05:44	detectable
M 106	Gal	CVn	12h18m57.6s	+47°18'13"	9.1	00:46	04:53	05:44	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...

- 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

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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.

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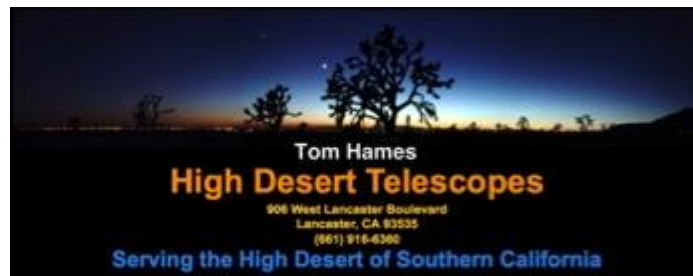
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