ANTELOPE VALLEY ASTRONOMY CLUB, INC.

Desert Sky Observer

Volume 35 *Antelope Valley Astronomy Club Newsletter* **February 2015**

Up-Coming Events

February 7: Prime Desert Moon Walk
February 13: Club Meeting*
February 21: Dark Sky Star Party @ TBA

* 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

Frank Moore

Headline January 26, 2015. Giant asteroid makes close pass of earth. Visible to amateur astronomers with modest sized telescopes. Clouds move in to cover the view in Southern California….of course. President of Antelope Valley Astronomy Club fields questions from people asking if the asteroid is causing the "historic blizzard" on the East Coast. President says, in a word, "NO!!" though many callers are still skeptical.

There you have it fellow AVAC members, today's current events in a nutshell.

In other recent news of astronomical interest, on January 23 we had three moons of Jupiter transit across the face of the giant planet. Weather permitting, this should have been visible to amateur astronomers with mid-sized telescopes. I set up our C-11 in the afternoon and got ready for what, we expected, would be a great night of observing not just Jupiter, but also other celestial wonders. Once it got dark enough I did a polar alignment, a three star alignment, and threw in a few calibration stars to boot. The Go-Top's were spot on and we thought it would be great night but, when I went to Jupiter, something was amiss. I at first thought it was just atmospheric distortion, since Jupiter was still low in the sky, but then realized the distortion had a rhythmic pattern. I went to the moon, which was higher in the sky and which had looked good earlier before sunset. There it was, the same rhythmic distortion. Along the edge of the moon, it actually looked like a "saw tooth wave" on an oscilloscope.

The realization was shattering. Our venerable hyper tuned, upgraded and customized Orion Atlas mount had developed a vibration in the right ascension drive. While trying to troubleshoot it, slewing it around and taking off the cover plate to check out the motors and gears, it stopped tracking. When I went to park it, the RA drive was dead. No slewing and no motor sound. The night was over, though we really didn't miss much since the clouds soon rolled in.

We'd been shopping for a new mount. Do you think it heard us and took offense? I've since taken the motors out, lubed the gears, and put it back together. It's running again, aligning, slewing, and tracking, but the weather is too bad to see if the vibration is gone. The worms are tough to get to on this mount, requiring a complete disassembly, and I'm not ready to undertake that yet. I'll try adjusting them first and, if that doesn't worth, consider whether to work on it myself or ship it off for repairs. In the meantime, we may have to find things the old fashioned way with Rose's 12" Lightbridge.

Though the club's activities slow down a bit in the winter, we've still got events coming up so check the calendar on the AVAC website and the Facebook page for announcements. Our next "Moonwalk" at Prime Desert Woodland Preserve is on Saturday February 7 at 6:00 pm. It's not far, and we don't stay out too late, so come out and support Jeremy and the club by sharing your knowledge and enthusiasm for astronomy with the public. On Saturday February 14, we have the Aerospace Valley Science Olympiad at Antelope Valley College. This is a daytime event where we'll have solar scopes, literature, and displays. Again, we can always use your help with a telescope or just to answer the questions of the eager young minds.

The February Dark Sky Star Party will be on Saturday February 21. Watch for announcements about the location. Since it will likely still be pretty cold, we'll stay somewhere close to town and lower in elevation. We'll also have a waxing crescent moon, 13% illuminated, that goes down at 9:13 pm. This should give a nice target, easy to find and satisfying to observe, for beginners and those with smaller telescopes as well as for the old hands. We can get out the moon charts and figure out what we're looking at. Comet Lovejoy should also still be visible, predicted to be a Magnitude 6.2 about then, and up till after 1:00 am. If you haven't seen it yet, we'll show you how to find it in your telescope or you can see it through one of the "big guns".

"If people sat outside and looked at the stars each night, I'll bet they'd live a lot differently." Bill Waterson – Calvin & Hobbes

Vice President

Don Bryden

Kung Hei Fat Choy! If your Cantonese is rusty that's "Happy New Year" in Chinese. This last year was a "leap year" that had thirteen lunar months so the first new moon for the New Year occurs on February 18th (though the New Year actually starts at midnight after the new moon so it's the 19th).

The Chinese don't really use this calendar for time-keeping any longer. It is referred to as the "Rural Calendar" and, much like our seasons and moons are referenced in the Farmer's Almanac, the rural calendar indicates planting and harvest seasons too.

I've found that I too plan my activities around the lunar calendar. I always seem to know what the current phase of the moon is at least. Not that I am planning which crop to plant or when to begin the harvest but simply when to take some astrophotos or what Saturday night is best for a star party. We always shoot for a weekend from about last quarter to a day or so after new moon.

This month is a bit of a dilemma. The best Saturday would be the 14th but there's something about that date… hmmm, February 14th … oh well I'm sure it'll come to me. Of course! Valentine's Day! Well the next Saturday, the 21st is only three days after the new moon so that'll probably be the better choice for a star party! Though, I'm not sure if Frank has even picked out a spot yet (probably Red Cliffs or Devil's Punchbowl). The winter months have not been kind and with our luck it'll be more clouds!

Oh well, the meeting is always a good bet. While we don't have a speaker for February we will have some nice raffles and then a nice dome show followed by a star talk by Jeremy. And, of course, the moon won't interfere at all (unless Jeremy puts it up in the dome)!

Some other dates to pencil in on your calendar include March 21st (Messier Marathon), April 3rd – 4th (Lunar Eclipse), April 18th – 19th (Poppy Festival), July 21st (Star-B-Que), September 27th (Lunar Eclipse & Cosmic university), October 10th (Mt. Wilson 100" scope night) and December 12th (Christmas Party).

Well I'm sure with all these dates we're bound to have a few cloudless nights so I hope to see you all out under the stars!

Astrophoto of The Month

Comet C/2014 Q2 Lovejoy By Don Bryden

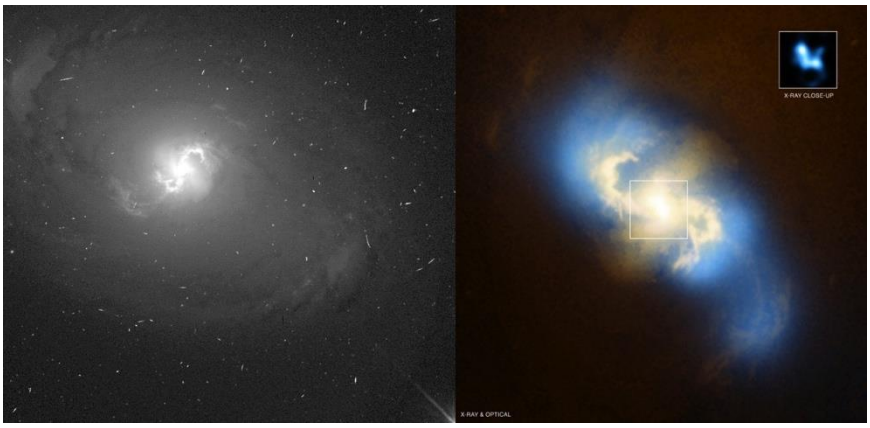
450 seconds of luminance, 300 seconds of color, then combined twice. Once with the stars aligned and once with just the comet aligned. Scope: Stellarvue SV-105 Camera: SBIG ST10-XME

Space Place

Minor mergers have massive consequences for black holes

By Dr. Ethan Siegel

When you think of our sun, the nearest star to our world, you think of an isolated entity, with more than four light years separating it from its next nearest neighbor. But it wasn't always so: billions of years ago, when our sun was first created, it very likely formed in concert with thousands of other stars, when a giant molecular cloud containing perhaps a million times the mass of our solar system collapsed. While the vast majority of stars that the universe forms—some ninety-five percent—are the mass of our sun or smaller, a rare but significant fraction are ultra-massive, containing tens or even hundreds of times the mass our star contains. When these stars run out of fuel in their cores, they explode in a fantastic Type II supernova, where the star's core collapses. In the most massive cases, this forms a black hole.



NGC 3393 in the optical (L) by M. Malkan (UCLA), HST, NASA (L); NGC 3393 in the X-ray and optical (R), composite by NASA / CXC / SAO / G. Fabbiano et al. (X-ray) and NASA/STScI (optical).

Over time, many generations of stars—and hence, many black holes—form, with the majority eventually migrating towards the centers of their host galaxies and merging together. Our own galaxy, the Milky Way, houses a supermassive black hole that weighs in at about four million solar masses, while our big sister, Andromeda, has one nearly twenty times as massive. But even relatively isolated galaxies didn't simply form from the monolithic collapse of an isolated clump of matter, but by hierarchical mergers of smaller galaxies over tremendous timescales. If galaxies with large amounts of stars all have black holes at their centers, then we should be able to see some fraction of Milky Way-sized galaxies with not just one, but multiple supermassive black holes at their center!

It was only in the early 2000s that NASA's Chandra X-ray Observatory was able to find the first binary supermassive black hole in a galaxy, and that was in an ultra-luminous galaxy with a double core. Many other examples were discovered since, but for a decade they were all in ultra-massive, active galaxies. That all changed in 2011, with the discovery of two active, massive black holes at the center of the regular spiral galaxy NGC 3393, a galaxy that must have undergone only minor mergers no less than a billion years ago, where the black hole pair is separated by only 490 light years! It's only in the cores of active, X-ray emitting galaxies that we can detect binary black holes like this. Examples like NGC 3393 and IC 4970 are not only confirming our picture of galaxy growth and formation, but are teaching us that supermassive relics from ancient, minor mergers might persist as standalone entities for longer than we ever thought!

Check out some cool images and artist reconstructions of black holes from Chandra: http://chandra.harvard.edu/photo/category/blackholes.html

Kids can learn all about Black Holes from this cool animation at NASA’s Space Place: http://spaceplace.nasa.gov/black-holes.

News Headlines

Stars' Spins Reveal Their Ages
When you're a kid every birthday is cause for celebration, but as you get older they become a little less exciting. You might not want to admit just how old you are. And you might notice yourself slowing down over the years. You're not alone - the same is true of stars. They slow down as they age, and their ages are well-kept secrets. Astronomers are taking advantage of the first fact to tackle the second and tease out stellar ages.
http://www.cfa.harvard.edu/news/2015-01

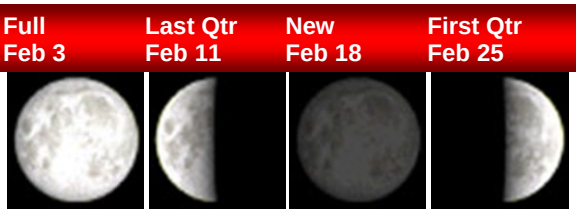
Dawn has dwarf planet Ceres in its sight
The mission of NASA's Dawn spacecraft to the asteroid belt has entered into its second phase: after a more than year-long stay at the asteroid Vesta and an onward journey through space lasting almost two and a half years, Dawn is now quickly approaching the dwarf planet Ceres. Current images already reach an image contrast surpassing all previously known images of Ceres and show first surface features such as craters. The camera system on board was developed under the lead of the Max Planck Institute for Solar System Research.
http://www.mpg.de/8874295/dawn-ceres-surface?filter_order=LT&research_topic=PA-A_PA-AP

Researchers succeed in measuring the temperature at the heart of stars
Researchers from the Université libre de Bruxelles and the Université de Montpellier have succeeded, for the first time, in measuring the temperature at the heart of certain stars, as well as dating them. Their study is published in the January 8 issue of Nature. In 1926, astrophysicist Sir Arthur Eddington wrote in his work The internal constitution of the stars: "At first sight it would seem that the deep interior of the Sun and stars is less accessible to scientific investigation than any other region of the universe. What appliance can pierce through the outer layers of a star and test the conditions within?"
http://phys.org/news/2015-01-temperature-heart-stars.html - jCp

Black Hole Chokes on a Swallowed Star
A five-year analysis of an event captured by a tiny telescope at McDonald Observatory and followed up by telescopes on the ground and in space has led astronomers to believe they witnessed a giant black hole tear apart a star. On January 21, 2009, the ROTSE IIIb telescope at McDonald caught the flash of an extremely bright event. The telescope's wide field of view takes pictures of large swathes of sky every night, looking for newly exploding stars as part of the ROTSE Supernova Verification Project (RSVP). Software then compares successive photos to find bright "new" objects in the sky -- transient events like the explosion of a star or a gamma-ray burst.
http://spaceref.com/astronomy/black-hole-chokes-on-a-swallowed-star.html

Could a new proposed particle help to detect dark matter?
Researchers at the University of Southampton have proposed a new fundamental particle which could explain why no one has managed to detect 'Dark Matter', the elusive missing 85 per cent of the Universe's mass. Dark Matter is thought to exist because of its gravitational effects on stars and galaxies, gravitational lensing (the bending of light rays) around these, and through its imprint on the Cosmic Microwave Background (the afterglow of the Big Bang).
http://www.spacedaily.com/reports/Could_a_new_proposed_particle_help_to_detect_dark_matter_999.html

February Sky Data



Best time for deep sky observing this month:
February 6 through February 23

Mercury is our solar system's innermost planet and always stays near the sun in our sky, but we can always rely on a pair of binoculars to view the innermost planet before sunrise this month. Look for Mercury beneath the moon about 60 to 70 minutes before sunrise on February 16. The moon will rise first, before dawn's first light, and then Mercury will follow the moon above the horizon as darkness begins to give way to daybreak.

Venus – brightest of all planets, and third-brightest object in the sky after the sun and moon – climbs out of the glare of evening twilight all through February 2015. It puts on a spectacular show with Mars this month! You won't want to miss these two worlds as they edge closer on our sky's dome for the first three weeks of February.

Mars continues to fade in brightness, especially in contrast to its glory when Earth passed between the Red Planet and the sun last April. But you can easily see Mars still, as it comes into view as darkness falls throughout February, 2015. Venus will help guide your eye to Mars throughout the month. Look for them on February 20 and February 21.

At opposition to the sun on February 6, **Jupiter** enjoys its month of glory in February 2015. Jupiter shines at its brightest and best in the nighttime sky – brighter than it will again until June 2019. Watch the moon pass close to Jupiter on the evenings of February 2, February 3 and February 4.

Saturn rises in the southeast about two hours after midnight in early February and roughly one-half hour after midnight by the month's end. Watch for the rather wide waning crescent moon to couple up with Saturn in the predawn hours on February 12 and February 13. Saturn's rings are inclined at about 25o from edge-on in February 2015, exhibiting their northern face.

There are no significant **meteor-showers** in February, and it is generally a quiet time for sporadic meteors too.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
2/1/2015	15:43	05:00	06:50	17:21
2/5/2015	19:19	07:31	06:46	17:25
2/10/2015	23:49	10:13	06:42	17:30
2/15/2015	03:36	14:17	06:37	17:35
2/20/2015	07:33	20:02	06:31	17:39
2/25/2015	11:08	00:21	06:25	17:44
2/28/2015	13:40	02:58	06:22	17:46

Planet Data

Feb 1

	Rise	Transit	Set	Mag
Mercury	06:09	11:32	17:04	3.3
Venus	08:01	13:40	19:19	-3.9
Mars	08:22	14:14	20:04	1.2
Jupiter	17:32	00:26	07:20	-2.6
Saturn	01:56	07:09	12:26	0.5

Feb 15

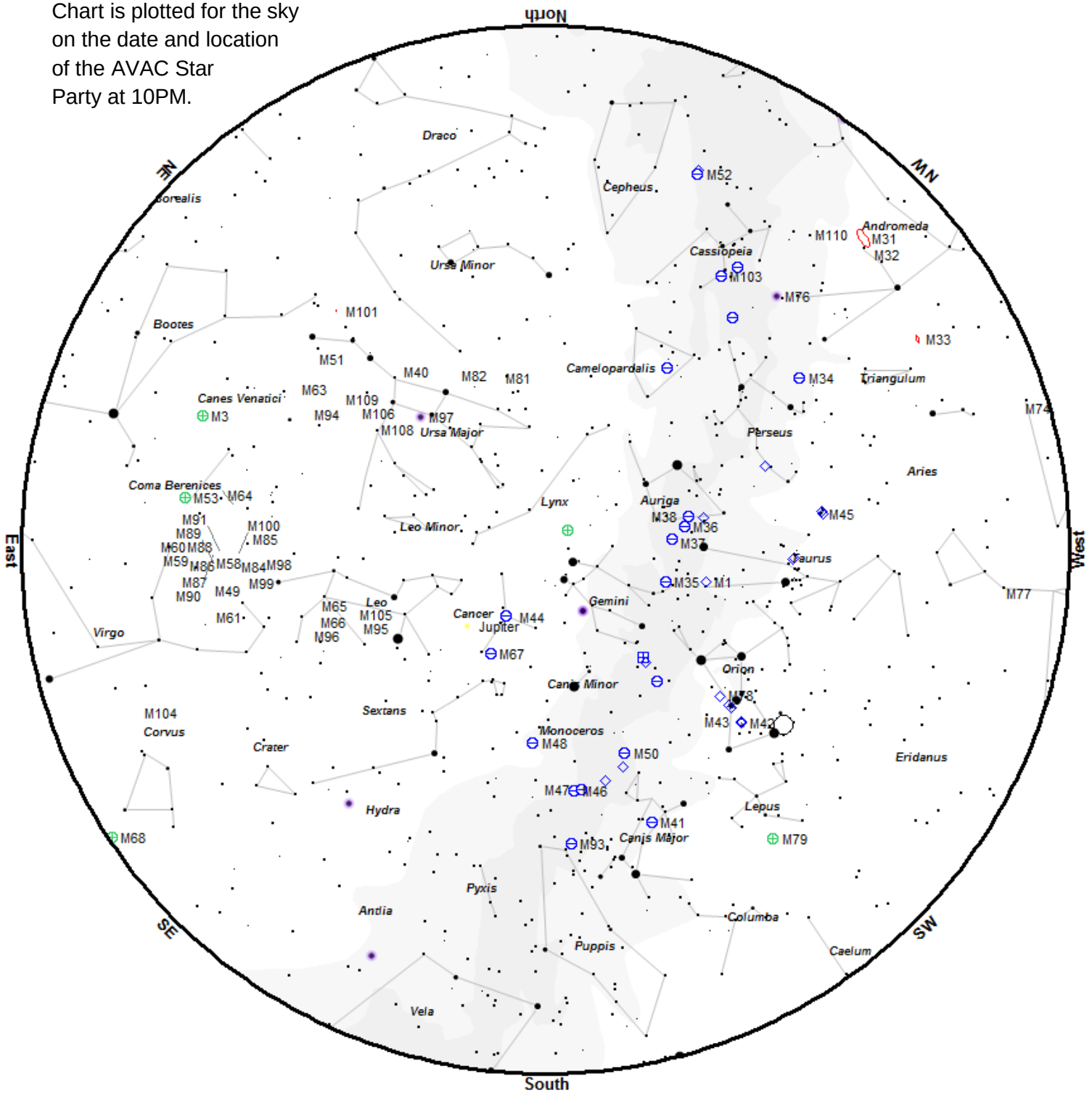
	Rise	Transit	Set	Mag
Mercury	05:08	10:24	15:42	0.3
Venus	07:50	13:49	19:47	-3.9
Mars	07:54	13:58	20:01	1.2
Jupiter	16:28	23:24	06:20	-2.6
Saturn	01:05	06:17	11:30	0.5

Feb 31

	Rise	Transit	Set	Mag
Mercury	05:05	10:24	15:41	0.0
Venus	07:38	13:55	20:13	-4.0
Mars	07:28	13:44	19:58	1.3
Jupiter	15:30	22:27	05:24	-2.5
Saturn	00:16	05:28	10:41	0.5

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							Galaxy	Nebula
0	1	2	3	4	5		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	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 52	Open	Cas	23h24m48.0s	+61°35'36"	8.2	18:53	19:07	19:11	detectable
M 110	Gal	And	00h40m22.3s	+41°41'09"	8.9	18:53	19:07	19:41	detectable
M 32	Gal	And	00h42m41.8s	+40°51'58"	8.9	18:49	19:07	19:41	easy
NGC 7789	Open	Cas	23h57m24.0s	+56°42'30"	7.5	18:53	19:07	19:31	detectable
M 31	Gal	And	00h42m44.3s	+41°16'07"	4.3	18:50	19:07	19:42	easy
NGC 7790	Open	Cas	23h58m24.0s	+61°12'30"	7.2	18:46	19:08	19:44	easy
M 77	Gal	Cet	02h42m40.8s	-00°00'48"	9.7	18:50	19:08	20:00	detectable
M 33	Gal	Tri	01h33m50.9s	+30°39'36"	6.4	18:51	19:08	20:11	detectable
NGC 559	Open	Cas	01h29m31.0s	+63°18'24"	7.4	18:47	19:10	21:22	easy
M 103	Open	Cas	01h33m23.0s	+60°39'00"	6.9	18:45	19:10	21:18	obvious
NGC 457	Open	Cas	01h19m35.0s	+58°17'12"	5.1	18:47	19:10	20:58	obvious
M 76	PNe	Per	01h42m19.9s	+51°34'31"	10.1	18:50	19:10	20:41	detectable
NGC 752	Open	And	01h57m41.0s	+37°47'06"	6.6	18:48	19:10	20:50	challenging
NGC 637	Open	Cas	01h43m04.0s	+64°02'24"	7.3	18:43	19:11	21:38	obvious
NGC 663	Open	Cas	01h46m09.0s	+61°14'06"	6.4	18:48	19:11	21:33	easy
NGC 884	Open	Per	02h22m18.0s	+57°08'12"	4.4	18:44	19:11	21:57	obvious
NGC 869	Open	Per	02h19m00.0s	+57°07'42"	4.3	18:44	19:11	21:54	obvious
M 34	Open	Per	02h42m05.0s	+42°45'42"	5.8	18:50	19:11	21:29	easy
NGC 1851	Glob	Col	05h14m06.0s	-40°02'48"	7.1	18:52	19:12	20:13	difficult
NGC 1027	Open	Cas	02h42m40.0s	+61°35'42"	7.4	18:51	19:12	21:47	detectable
Heart Neb	Neb	Cas	02h33m52.0s	+61°26'50"	6.5	18:56	19:12	20:13	challenging
NGC 957	Open	Per	02h33m21.0s	+57°33'36"	7.2	18:47	19:12	22:09	easy
NGC 1245	Open	Per	03h14m42.0s	+47°14'12"	7.7	18:47	19:12	22:24	challenging
NGC 1342	Open	Per	03h31m38.0s	+37°22'36"	7.2	18:49	19:12	21:54	detectable
M 45	Open	Tau	03h47m00.0s	+24°07'00"	1.5	18:43	19:12	22:09	obvious
NGC 1444	Open	Per	03h49m25.0s	+52°39'30"	6.4	18:42	19:13	23:14	obvious
Hyades	Open	Tau	04h26m54.0s	+15°52'00"	0.8	18:45	19:14	22:28	obvious
NGC 1502	Open	Cam	04h07m50.0s	+62°19'54"	4.1	18:41	19:16	23:56	obvious
NGC 1528	Open	Per	04h15m23.0s	+51°12'54"	6.4	18:46	19:16	23:24	easy
NGC 1647	Open	Tau	04h45m55.0s	+19°06'54"	6.2	18:50	19:16	22:00	detectable
NGC 1664	Open	Aur	04h51m06.0s	+43°40'30"	7.2	18:46	19:17	23:42	easy
NGC 1746	Open	Tau	05h03m50.0s	+23°46'12"	6.1	18:49	19:18	22:25	detectable
M 38	Open	Aur	05h28m40.0s	+35°50'54"	6.8	18:47	19:23	23:34	detectable
M 42	Neb	Ori	05h35m18.0s	-05°23'00"	4.0	18:47	19:24	22:30	easy
M 1	Neb	Tau	05h34m30.0s	+22°01'00"	8.4	18:54	19:25	22:09	difficult
M 43	Neb	Ori	05h35m30.0s	-05°16'00"	9.0	18:54	19:25	21:33	difficult
M 36	Open	Aur	05h36m18.0s	+34°08'24"	6.5	18:44	19:27	00:20	easy
IC 434	Neb	Ori	05h41m00.0s	-02°27'00"	11.0	18:45	19:27	22:47	challenging

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 78	Neb	Ori	05h46m48.0s	+00°05'00"	8.0	18:55	19:31	21:47	difficult
M 37	Open	Aur	05h52m18.0s	+32°33'12"	6.2	18:46	19:33	00:25	easy
NGC 2129	Open	Gem	06h01m07.0s	+23°19'20"	7.0	18:43	19:42	00:21	obvious
M 35	Open	Gem	06h09m00.0s	+24°21'00"	5.6	18:45	19:50	00:19	easy
NGC 2169	Open	Ori	06h08m24.0s	+13°57'54"	7.0	18:44	19:50	00:06	obvious
NGC 2175	Open	Ori	06h09m39.0s	+20°29'12"	6.8	18:48	19:51	23:42	detectable
NGC 2237	Neb	Mon	06h32m02.0s	+04°59'10"	5.5	19:00	20:12	22:24	challenging
M 41	Open	CMa	06h46m01.0s	-20°45'24"	5.0	18:53	20:27	22:09	easy
NGC 2392	PNe	Gem	07h29m10.8s	+20°54'42"	8.6	18:42	21:15	01:44	obvious
NGC 2264	Open	Mon	06h40m58.0s	+09°53'42"	4.1	18:46	21:15	00:27	easy
NGC 2393	Gal	Gem	07h30m04.6s	+34°01'40"	14.6	18:44	21:15	02:12	not visible
NGC 2301	Open	Mon	06h51m45.0s	+00°27'36"	6.3	18:46	21:15	00:09	easy
M 50	Open	Mon	07h02m42.0s	-08°23'00"	7.2	18:50	21:15	23:44	detectable
NGC 2353	Open	Mon	07h14m30.0s	-10°16'00"	5.2	18:46	21:15	23:48	easy
NGC 2360	Open	CMa	07h17m43.0s	-15°38'30"	9.1	19:44	21:15	22:31	challenging
NGC 2355	Open	Gem	07h16m59.0s	+13°45'00"	9.7	18:56	21:16	23:45	difficult
NGC 2423	Open	Pup	07h37m06.0s	-13°52'18"	7.0	18:53	21:22	23:51	easy
M 47	Open	Pup	07h36m35.0s	-14°29'00"	4.3	18:57	21:22	23:47	obvious
NGC 2439	Open	Pup	07h40m45.0s	-31°41'36"	7.1	19:17	21:25	23:36	detectable
M 46	Open	Pup	07h41m46.0s	-14°48'36"	6.6	19:04	21:27	23:50	detectable
NGC 2440	PNe	Pup	07h41m55.4s	-18°12'31"	11.5	19:28	21:27	23:26	detectable
M 93	Open	Pup	07h44m30.0s	-23°51'24"	6.5	20:32	21:29	22:26	easy
NGC 2451	Open	Pup	07h45m23.0s	-37°57'21"	3.7	19:36	21:30	23:27	easy
NGC 2477	Open	Pup	07h52m10.0s	-38°31'48"	5.7	19:49	21:37	23:26	easy
NGC 2506	Open	Mon	08h00m01.0s	-10°46'12"	8.9	19:55	21:45	23:42	difficult
NGC 2547	Open	Vel	08h10m09.0s	-49°12'54"	5.0	21:24	21:55	22:26	challenging
NGC 2546	Open	Pup	08h12m15.0s	-37°35'42"	5.2	20:50	21:57	23:09	difficult
NGC 2571	Open	Pup	08h18m56.0s	-29°45'00"	7.4	19:49	22:03	00:19	detectable
M 44	Open	Cnc	08h40m24.0s	+19°40'00"	3.9	18:52	22:25	02:32	easy
IC 2391	Open	Vel	08h40m32.0s	-53°02'00"	2.6	21:45	22:25	23:05	not visible
IC 2395	Open	Vel	08h42m30.0s	-48°06'48"	4.6	21:34	22:27	23:21	detectable
M 67	Open	Cnc	08h51m18.0s	+11°48'00"	7.4	19:44	22:36	01:33	detectable
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	18:54	23:40	05:09	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	18:53	23:41	05:14	detectable
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	22:03	23:51	01:41	easy
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	22:03	23:51	01:41	easy
NGC 3228	Open	Vel	10h21m22.0s	-51°43'42"	6.4	23:44	00:06	00:27	challenging
NGC 3227	Gal	Leo	10h23m30.6s	+19°51'54"	11.5	21:07	00:08	03:17	difficult
NGC 3242	PNe	Hya	10h24m46.1s	-18°38'32"	8.6	22:14	00:09	02:04	obvious
M 97	PNe	UMa	11h14m47.7s	+55°01'09"	9.7	20:41	00:59	05:09	detectable
M 65	Gal	Leo	11h18m55.7s	+13°05'32"	10.1	21:36	01:03	04:30	detectable
M 66	Gal	Leo	11h20m14.9s	+12°59'30"	9.7	21:37	01:04	04:31	detectable
M 106	Gal	CVn	12h18m57.6s	+47°18'13"	9.1	21:58	02:03	05:15	detectable
Col 256	Open	Com	12h25m06.0s	+26°06'00"	2.9	21:49	02:09	05:21	easy
M 84	Gal	Vir	12h25m03.9s	+12°53'12"	10.1	22:51	02:09	05:12	detectable

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 86	Gal	Vir	12h26m12.2s	+12°56'44"	9.8	23:09	02:10	05:05	detectable
3C 273.0	QSO	Vir	12h29m06.7s	+02°03'08"	12.8	22:44	02:13	05:18	difficult
3C 273.0	QSO	Vir	12h29m06.7s	+02°03'08"	12.8	22:44	02:13	05:18	difficult
M 49	Gal	Vir	12h29m46.8s	+08°00'01"	9.3	22:58	02:14	05:13	detectable
M 87	Gal	Vir	12h30m49.2s	+12°23'29"	9.6	22:56	02:15	05:12	detectable
NGC 4565	Gal	Com	12h36m20.8s	+25°59'15"	10.1	23:02	02:20	05:12	difficult
M 68	Glob	Hya	12h39m28.0s	-26°44'36"	7.3	00:17	02:23	04:30	detectable
M 104	Gal	Vir	12h39m59.3s	-11°37'22"	9.1	23:44	02:24	05:04	detectable
M 94	Gal	CVn	12h50m53.1s	+41°07'12"	8.7	22:06	02:35	05:21	detectable
M 64	Gal	Com	12h56m43.8s	+21°41'00"	9.3	22:55	02:41	05:19	detectable
M 51	Gal	CVn	13h29m52.3s	+47°11'40"	8.7	22:29	03:13	05:22	easy
NGC 5195	Gal	CVn	13h29m59.6s	+47°15'58"	10.5	23:09	03:14	05:18	detectable
M 83	Gal	Hya	13h37m00.8s	-29°51'56"	7.8	01:13	03:21	05:15	detectable
M 3	Glob	CVn	13h42m11.0s	+28°22'42"	6.3	23:15	03:25	05:21	easy
M 101	Gal	UMa	14h03m12.4s	+54°20'53"	8.4	23:40	03:47	05:18	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.
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- The A.V.A.C. Membership Manual.
- To borrow club equipment, books, videos and other items.

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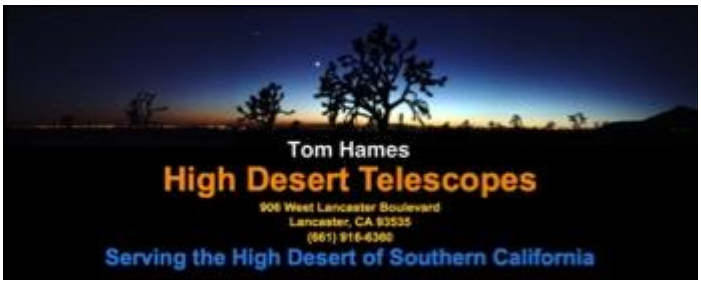

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