



Desert Sky Observer

Volume 36

Antelope Valley Astronomy Club Newsletter

February 2016

Up-Coming Events

February 6: [Dark Sky Star Party](#)

February 12: Club Meeting*

February 13: [Science Olympiad](#)

February Xx: [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

Welcome to February of 2016 folks. This is a leap year so we have an extra day tacked on at the end of the month. With that extra day added on, how will you spend yours? How about coming out and helping at one or more of our public outreach events?

Now, for anyone who didn't know and in case you were wondering, why do we add a leap year? Leap Years are needed to keep our modern day Gregorian calendar in alignment with the Earth's revolutions around the sun. It takes the Earth approximately 365.242199 days – or 365 days, 5 hours, 48 minutes, and 46 seconds – to circle once around the Sun. This is called a tropical year.

However, the Gregorian calendar has only 365 days in a year, so if we didn't add a day on February 29 nearly every 4 years, we would lose almost six hours off our calendar every year. After only 100 years, our calendar would be off by approximately 24 days! This happened in the Julian calendar, which was in use until the Gregorian calendar was introduced.

Early in the month, on Saturday February 13 we will be participating in the 30th Annual Los Angeles County Science Olympiad at Antelope Valley College. This is a wonderful event where we will be able to show the sun, the moon, and at least several planets to the eager “STEM” oriented students and their families. The kids are always bright, eager, and curious and it's one of my favorite events of the year. Setup will begin at approximately 7:30 AM with the actual event starting at 9:00. We are usually through by 3:00 PM when the teams attend their awards presentation. Bring a telescope or just show up to help out and answer the kid's questions. I'll be sending out an email with a map of our location.

Saturday February 20, and for those with proper GoTo telescopes (as you may recall, primarily SCTs or other scopes with relatively long focal lengths) and wanting to participate, there is a training session for telescope operators who want to help out with the Vanguard Double Star Workshop on March 4, 5 and 6. The exact time and location of the training session is still being finalized and I will be sending details by email.

As Sean Gillette noted at our meeting, the actual workshop and observing session is being held March 4 (Friday: 6-10pm), March 5 (Saturday: 6-10pm), and March 6 (Sunday: 9am-3pm). Based on the sky conditions we expect to run the bulk of the measurements on the night Friday March 4 and leave Saturday

March 5 as a back-up. If all goes well on Friday night, and we get the bulk of the measurements done, Saturday will be a bonus night with a Star Party. If conditions aren't good on Friday, Saturday will also be used for measurements but we will still have our March Star Party that night and all types of telescopes, and also members without them, will be welcome. The more the merrier. On Sunday the students will reduce the data, write the articles, and present to the group. Attendance by telescope operators will not be mandatory on Sunday. The event is at Vanguard Preparatory School (12951 Mesquite Rd, Apple Valley CA 92308). Again, details will be sent out via email.

We have our monthly "Moon Walk" at the Prime Desert Woodland Preserve at 6:00 PM on Saturday February 27. Come out and help Jeremy Amarant share the wonders of the night sky with the public, young and old, who come out to these events.

The board is working on the 2016 Calendar and we are adding events from other groups and organizations as they trickle in. I'm monitoring long term weather forecasts in planning locations for star parties and with the current El Nino weather patterns all events will be "Weather Permitting". Remember to mark your calendars for the Messier Marathon which will be held on Saturday April 2 at the Chuchupate Observing site near Frazier Park. This is wonderful dark sky site, with wide open horizons, and weather permitting everyone should be able to bag a good number of Messier Objects (if not all of them).

If you haven't done so already, remember that membership renewals are due in January and you want to get it done before the system drops you off the mailing list and miss announcements.

Also, remember to get out there and see this wonderful procession of planets we currently have visible in the early morning hours. Share it with your family, friends and neighbors as well so they don't miss the solar system bounty.

Vice President

Bill Schebeck

We have had some good skies and can observe 5 planets Mercury, Venus, Saturn, Mars, and Jupiter in a night's observation. Speaking of planets, the folks at Caltech, Mike Brown and Konstantin Batygn, have evidence of "Planet Nine". The popular press is somewhat confused. No one has found a planet yet, they have compelling evidence it exists.

At the heart of the discussion to drop Pluto as a planet, was the discovery of many similar bodies, 'dwarf planets' and some of those cluster in an odd way that need another body to explain their orbits. The Caltech work had discovered this cluster has an orbit 30 degrees off the orbital plane we travel. Think of a round table and hold a plate on a 30 degree angle on edge of the table. There are many unusual features to this region.

The Brazilian astronomer, Rodney Gomes observed 6 objects with orbital irregularities, in 2012 and calculated there may be a Mars size planet at a distance of 8.5 million km, or a Neptune size planet at a distance of 225 billion km. If we knew the distance, we could calculate the size and conversely, if we knew the size, we could figure distance. The other part of the puzzle is the time it takes to go around the sun. Best estimates go from 10,000 year to 20,000 year. In spite of the lack of some important info, the models work to explain the orbits of clustered objects. Much more work still needs to be done. Batygn and Brown published a paper in the current issue of Astronomy Journal. There is an article on line "Gravitational Perturbations and the Prediction of New Planets" that shows the math and a general description of how it is done.

See you at the meeting.



Secretary Rose Moore

I have been in touch with Shelly at Mt. Wilson, and a new schedule will be coming out within a few weeks for the 2016 season.

I have been back east visiting my mom, so when I return I'll be getting donation letters from the Christmas party out to everyone.

Stay warm!
Rose

Space Place

The Loneliest Galaxy In The Universe

By Ethan Siegel

Our greatest, largest-scale surveys of the universe have given us an unprecedented view of cosmic structure extending for tens of billions of light years. With the combined effects of normal matter, dark matter, dark energy, neutrinos and radiation all affecting how matter clumps, collapses and separates over time, the great cosmic web we see is in tremendous agreement with our best theories: the Big Bang and General Relativity. Yet this understanding was only possible because of the pioneering work of Edwin Hubble, who identified a large number of galaxies outside of our own, correctly measured their distance (following the work of Vesto Slipher's work measuring their redshifts), and discovered the expanding universe.

But what if the Milky Way weren't located in one of the "strands" of the great cosmic web, where galaxies are plentiful and ubiquitous in many different directions? What if, instead, we were located in one of the great "voids" separating the vast majority of galaxies? It would've taken telescopes and imaging technology far more advanced than Hubble had at his disposal to even detect a single galaxy beyond our own, much less dozens, hundreds or millions, like we have today. While the nearest galaxies to us are only a few million light years distant, there are voids so large that a galaxy located at the center of one might not see another for a hundred times that distance.

While we've readily learned about our place in the universe from observing what's around us, not everyone is as fortunate. In particular, the galaxy MCG+01-02-015 has not a single known galaxy around it for a hundred million light years in all directions. Were you to draw a sphere around the Milky Way with a radius of 100 million light years, we'd find hundreds of thousands of galaxies. But not MCG+01-02-015; it's the loneliest galaxy ever discovered. Our Milky Way, like most galaxies, has been built up by mergers and accretions of many other galaxies over billions of years, having acquired stars and gas from a slew of our former neighbors. But an isolated galaxy like this one has only the matter it was born with to call its own.



Image credit: ESA/Hubble & NASA and N. Gorin (STScI); Acknowledgement: Judy Schmidt, of the loneliest void galaxy in the known: MCG+01-02-015.

Edwin Hubble made his universe-changing discovery using telescope technology from 1917, yet he would have found absolutely zero other galaxies at all were we situated at MCG+01-02-015's location. The first visible galaxy wouldn't have shown up until we had 1960s-level technology, and who knows if we'd have continued looking? If we were such a lonely galaxy, would we have given up the search, and concluded that our galaxy encompassed all of existence? Or would we have continued peering deeper into the void, eventually discovering our unusual location in a vast, expanding universe? For the inhabitants of the loneliest galaxy, we can only hope that they didn't give up the search, and discovered the entire universe.

News Headlines

See 5 bright planets at once!

Get out there and see them. All five bright planets – Mercury, Venus, Mars, Jupiter and Saturn – will appear together in the morning sky from about January 20 to February 20, 2016. That hasn't happened since 2005. The moon is sweeping past the planets, beginning with Jupiter on the night of January 27, 2016. Then Mars on the morning of February 1. Then Saturn, Venus, Mercury!

<http://earthsky.org/science-wire/when-will-all-five-visible-planets-appear-simultaneously>

On the one hand: Caltech Researchers Find Evidence of a Real Ninth Planet

Caltech researchers have found evidence of a giant planet tracing a bizarre, highly elongated orbit in the outer solar system. The object, which the researchers have nicknamed Planet Nine, has a mass about 10 times that of Earth and orbits about 20 times farther from the sun on average than does Neptune (which orbits the sun at an average distance of 2.8 billion miles). In fact, it would take this new planet between 10,000 and 20,000 years to make just one full orbit around the sun.

<https://www.caltech.edu/news/caltech-researchers-find-evidence-real-ninth-planet-49523>

On the other hand: Is there really a mysterious new planet out there? NASA is still skeptical.

Yesterday, a team of Caltech astronomers published evidence suggesting there's a massive undiscovered planet floating in the solar system beyond Neptune. The astronomers didn't claim to have observed the planet directly. Instead, they've found evidence of its gravitational pull.

But today NASA has stepped in to say, in effect, "Cool your jets."

<http://www.vox.com/science-and-health/2016/1/21/10806662/nasa-new-planet-nine-response>

The Voyage of a Lifetime: New Horizons Marks 10 Years Since Launch

Ten years ago today one of the great robotic explorers of our age – NASA's New Horizons spacecraft – rocketed into the sky above the Florida coastline. The tiny probe – weighing barely 1,000 pounds – sped from Earth faster than any spacecraft before it, embarking on a 9.5-year voyage across more than 3 billion miles that culminated last summer in the historic first reconnaissance of Pluto and its family of small moons.

<http://pluto.jhuapl.edu/News-Center/News-Article.php?page=20160119>

Upcoming launches from Vandenberg Air Force Base

Wednesday Feb 10, A United Launch Alliance Delta 4 rocket will launch a classified payload for the National Reconnaissance Office from Vandenberg AFB. The launch window is between 3:00AM and 5:00AM PST and should be visible from the AV or better from the coast.

<http://goo.gl/I4e5ol>

SpaceX Tests Crew Dragon Parachutes

Four red-and-white parachutes unfurled high above the desert near Coolidge, Arizona, recently during a test of the system that initially will be used to safely land SpaceX's Crew Dragon spacecraft carrying astronauts back from the International Space Station. The test used a mass simulator as the weight of the spacecraft connected to the parachute system. The mass simulator and parachutes were released thousands of feet above the ground from a C-130 cargo aircraft. This test evaluated the four main parachutes, but did not include the drogue chutes that a full landing system would utilize.

<https://blogs.nasa.gov/commercialcrew/2016/01/27/spacex-tests-crew-dragon-parachutes/>

February Sky Data

First Qtr Feb 8 Full Feb 14 Last Qtr Feb 22 New Mar 1

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



Mercury lies fairly near Venus during February and reaches greatest elongation from the Sun on the 7th. It should be visible low in the East for the first half of the month. It lies closest to Venus on the 13th when it is 4 degrees down to its lower left.

Venus rises at the start of the month as twilight begins but only an hour before sunrise by month's end. Venus is especially low above the horizon, but even so, shining at a magnitude of -3.9 it is still easily visible given a good eastern horizon.

Mars lies in Libra during the month moving eastwards relative to the stars. Its brightness increases slightly from magnitude +0.8 to +0.3 as the angular size of its disk grows from 6.8 to 8.6 arc seconds towards the end of February. It is highest in the morning twilight and then it might be possible to spot the north polar cap and possibly Syrtis Major. Mars is moving towards opposition on May 22nd and its closest approach to Earth on the 30th when it will have an angular diameter of 18.6 arc seconds and shine almost as brightly as Jupiter.

Jupiter starts the month in the extreme south of Leo close to the boarder of Virgo and during the month moves slowly northwards and westwards in retrograde motion across the heavens. Jupiter's disk increases slightly from 42 to 44 arc seconds as February progresses with its magnitude increasing very slightly from -2.4 to -2.5.

Saturn is now a morning object, rising at 02:48 as the month begins but by about 01:05 at its end. Its diameter increases from 15.8 to 16.5 arc seconds during the month as it shines at magnitude +0.5. It will be high enough in the south-east before dawn to make out the beautiful ring system which has now opened out to ~26 degrees - virtually as open as they ever become.

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
2/1/2016	00:34	11:41	06:50	17:21
2/5/2016	04:11	14:47	06:47	17:25
2/10/2016	08:02	20:11	06:42	17:30
2/15/2016	11:33	00:35	06:37	17:34
2/20/2016	16:03	05:03	06:32	17:39
2/25/2016	20:39	07:59	06:26	17:44
2/29/2016	-----	10:16	06:21	17:47

Planet Data

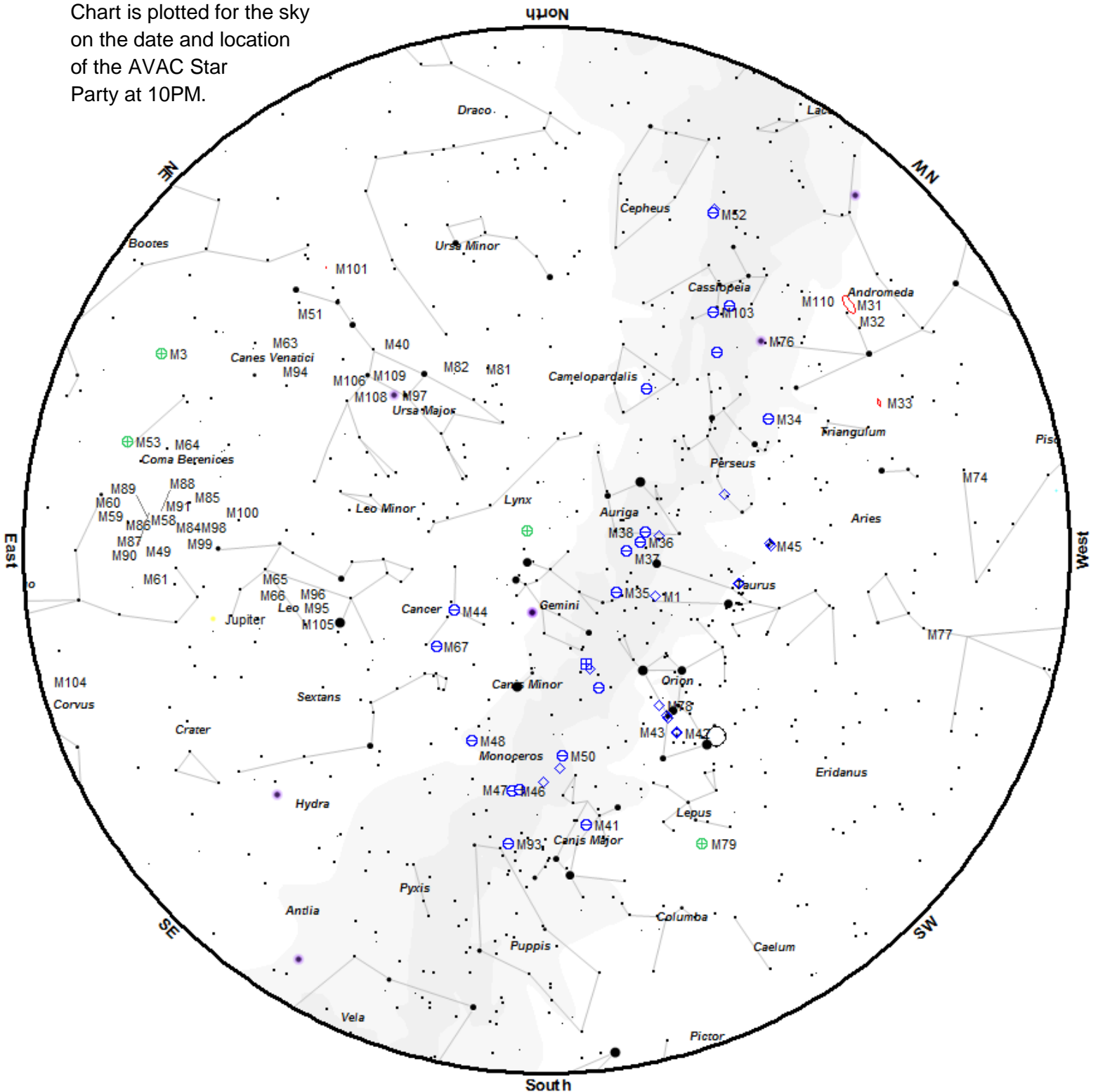
	Feb 1			
	Rise	Transit	Set	Mag
Mercury	05:12	10:20	15:29	0.1
Venus	04:51	09:55	14:56	-4.0
Mars	00:33	05:57	11:22	0.8
Jupiter	20:18	02:37	08:56	-2.4
Saturn	02:48	07:55	13:05	0.6

	Feb 15			
	Rise	Transit	Set	Mag
Mercury	05:21	10:31	15:39	-0.1
Venus	05:04	10:13	15:21	-3.9
Mars	00:09	05:29	10:48	0.6
Jupiter	19:16	01:37	07:57	-2.5
Saturn	01:57	07:04	12:14	0.5

	Feb 29			
	Rise	Transit	Set	Mag
Mercury	05:35	11:00	16:21	-0.3
Venus	05:08	10:29	15:49	-3.9
Mars	23:43	04:58	10:12	0.3
Jupiter	18:13	00:36	06:58	-2.5
Saturn	01:05	06:12	11:18	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	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
NGC 1851	Glob	Col	05h14m06.0s	-40°02'48"	7.1	18:57	19:11	19:51	difficult
M 110	Gal	And	00h40m22.3s	+41°41'09"	8.9	19:00	19:12	19:45	detectable
M 32	Gal	And	00h42m41.8s	+40°51'58"	8.9	18:56	19:12	20:04	easy
NGC 7790	Open	Cas	23h58m24.0s	+61°12'30"	7.2	18:52	19:13	19:14	easy
NGC 7789	Open	Cas	23h57m24.0s	+56°42'30"	7.5	19:01	19:13	19:46	detectable
M 31	Gal	And	00h42m44.3s	+41°16'07"	4.3	18:56	19:13	20:09	easy
M 77	Gal	Cet	02h42m40.8s	-00°00'48"	9.7	18:57	19:13	19:29	detectable
M 33	Gal	Tri	01h33m50.9s	+30°39'36"	6.4	18:58	19:14	19:41	detectable
NGC 457	Open	Cas	01h19m35.0s	+58°17'12"	5.1	18:54	19:16	20:28	obvious
M 76	PNe	Per	01h42m19.9s	+51°34'31"	10.1	18:58	19:16	20:31	detectable
NGC 752	Open	And	01h57m41.0s	+37°47'06"	6.6	18:54	19:16	20:20	challenging
NGC 637	Open	Cas	01h43m04.0s	+64°02'24"	7.3	18:51	19:17	21:06	obvious
NGC 559	Open	Cas	01h29m31.0s	+63°18'24"	7.4	18:53	19:17	20:51	easy
NGC 663	Open	Cas	01h46m09.0s	+61°14'06"	6.4	18:53	19:17	21:01	easy
M 103	Open	Cas	01h33m23.0s	+60°39'00"	6.9	18:51	19:17	20:48	obvious
M 34	Open	Per	02h42m05.0s	+42°45'42"	5.8	18:56	19:17	21:05	easy
NGC 957	Open	Per	02h33m21.0s	+57°33'36"	7.2	18:54	19:18	21:39	easy
NGC 884	Open	Per	02h22m18.0s	+57°08'12"	4.4	18:50	19:18	21:26	obvious
NGC 869	Open	Per	02h19m00.0s	+57°07'42"	4.3	18:50	19:18	21:24	obvious
NGC 1342	Open	Per	03h31m38.0s	+37°22'36"	7.2	18:56	19:18	21:28	detectable
M 45	Open	Tau	03h47m00.0s	+24°07'00"	1.5	18:51	19:18	21:38	obvious
NGC 1027	Open	Cas	02h42m40.0s	+61°35'42"	7.4	18:57	19:19	21:25	detectable
Heart Neb	Neb	Cas	02h33m52.0s	+61°26'50"	6.5	19:05	19:19	20:10	challenging
NGC 1444	Open	Per	03h49m25.0s	+52°39'30"	6.4	18:50	19:19	22:42	obvious
NGC 1245	Open	Per	03h14m42.0s	+47°14'12"	7.7	18:54	19:19	21:55	challenging
NGC 1528	Open	Per	04h15m23.0s	+51°12'54"	6.4	18:53	19:20	22:53	easy
NGC 1647	Open	Tau	04h45m55.0s	+19°06'54"	6.2	18:57	19:20	21:32	detectable
Hyades	Open	Tau	04h26m54.0s	+15°52'00"	0.8	18:53	19:20	21:58	obvious
NGC 1502	Open	Cam	04h07m50.0s	+62°19'54"	4.1	18:48	19:21	23:26	obvious
NGC 1664	Open	Aur	04h51m06.0s	+43°40'30"	7.2	18:52	19:21	23:11	easy
NGC 1746	Open	Tau	05h03m50.0s	+23°46'12"	6.1	18:56	19:21	21:52	detectable
M 43	Neb	Ori	05h35m30.0s	-05°16'00"	9.0	19:01	19:23	21:03	difficult
M 42	Neb	Ori	05h35m18.0s	-05°23'00"	4.0	18:54	19:23	22:01	easy
IC 434	Neb	Ori	05h41m00.0s	-02°27'00"	11.0	18:53	19:24	22:17	challenging
M 38	Open	Aur	05h28m40.0s	+35°50'54"	6.8	18:55	19:24	23:01	detectable
M 1	Neb	Tau	05h34m30.0s	+22°01'00"	8.4	19:01	19:24	21:34	difficult
M 78	Neb	Ori	05h46m48.0s	+00°05'00"	8.0	19:01	19:24	21:14	difficult
M 36	Open	Aur	05h36m18.0s	+34°08'24"	6.5	18:50	19:25	23:46	easy

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 37	Open	Aur	05h52m18.0s	+32°33'12"	6.2	18:51	19:28	23:51	easy
NGC 2129	Open	Gem	06h01m07.0s	+23°19'20"	7.0	18:50	19:29	23:50	obvious
NGC 2169	Open	Ori	06h08m24.0s	+13°57'54"	7.0	18:51	19:31	23:36	obvious
M 35	Open	Gem	06h09m00.0s	+24°21'00"	5.6	18:53	19:32	23:46	easy
NGC 2175	Open	Ori	06h09m39.0s	+20°29'12"	6.8	18:55	19:32	23:08	detectable
NGC 2237	Neb	Mon	06h32m02.0s	+04°59'10"	5.5	19:03	19:47	21:46	challenging
NGC 2264	Open	Mon	06h40m58.0s	+09°53'42"	4.1	18:51	19:56	23:57	easy
M 41	Open	CMa	06h46m01.0s	-20°45'24"	5.0	18:54	20:00	21:39	easy
NGC 2301	Open	Mon	06h51m45.0s	+00°27'36"	6.3	18:52	20:06	23:39	easy
M 50	Open	Mon	07h02m42.0s	-08°23'00"	7.2	18:55	20:17	23:14	detectable
NGC 2353	Open	Mon	07h14m30.0s	-10°16'00"	5.2	18:52	20:29	23:17	easy
NGC 2355	Open	Gem	07h16m59.0s	+13°45'00"	9.7	19:00	20:31	23:15	difficult
NGC 2360	Open	CMa	07h17m43.0s	-15°38'30"	9.1	19:12	20:32	21:59	challenging
NGC 2392	PNe	Gem	07h29m10.8s	+20°54'42"	8.6	18:48	20:44	00:07	obvious
NGC 2423	Open	Pup	07h37m06.0s	-13°52'18"	7.0	18:56	20:52	23:21	easy
M 47	Open	Pup	07h36m35.0s	-14°29'00"	4.3	18:52	20:51	23:17	obvious
NGC 2439	Open	Pup	07h40m45.0s	-31°41'36"	7.1	19:00	20:55	23:05	detectable
M 46	Open	Pup	07h41m46.0s	-14°48'36"	6.6	18:57	20:56	23:20	detectable
NGC 2440	PNe	Pup	07h41m55.4s	-18°12'31"	11.5	19:03	20:56	22:55	detectable
M 93	Open	Pup	07h44m30.0s	-23°51'24"	6.5	20:01	20:59	21:56	easy
NGC 2451	Open	Pup	07h45m23.0s	-37°57'21"	3.7	19:06	20:59	22:56	easy
NGC 2477	Open	Pup	07h52m10.0s	-38°31'48"	5.7	19:17	21:06	22:56	easy
NGC 2506	Open	Mon	08h00m01.0s	-10°46'12"	8.9	19:19	21:14	23:11	difficult
NGC 2547	Open	Vel	08h10m09.0s	-49°12'54"	5.0	20:54	21:25	21:56	challenging
NGC 2546	Open	Pup	08h12m15.0s	-37°35'42"	5.2	20:14	21:27	22:39	difficult
NGC 2571	Open	Pup	08h18m56.0s	-29°45'00"	7.4	19:17	21:33	23:49	detectable
M 44	Open	Cnc	08h40m24.0s	+19°40'00"	3.9	18:56	21:55	00:07	easy
IC 2395	Open	Vel	08h42m30.0s	-48°06'48"	4.6	21:03	21:57	22:50	detectable
M 67	Open	Cnc	08h51m18.0s	+11°48'00"	7.4	19:12	22:05	00:08	detectable
M 82	Gal	UMa	09h55m52.4s	+69°40'47"	9.0	18:58	23:10	00:07	detectable
M 81	Gal	UMa	09h55m33.1s	+69°03'56"	7.8	18:58	23:10	00:07	detectable
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	21:33	23:20	00:08	easy
NGC 3132	PNe	Vel	10h07m01.8s	-40°26'11"	8.2	21:33	23:20	00:08	easy
NGC 3228	Open	Vel	10h21m22.0s	-51°43'42"	6.4	23:14	23:35	23:57	challenging
NGC 3227	Gal	Leo	10h23m30.6s	+19°51'54"	11.5	20:29	23:38	00:07	difficult
NGC 3242	PNe	Hya	10h24m46.1s	-18°38'32"	8.6	21:43	23:39	01:34	obvious
M 97	PNe	UMa	11h14m47.7s	+55°01'09"	9.7	20:04	00:07	00:08	detectable
M 101	Gal	UMa	14h03m12.4s	+54°20'53"	8.4	22:26	00:07	00:08	detectable
NGC 5195	Gal	CVn	13h29m59.6s	+47°15'58"	10.5	22:11	00:07	00:08	detectable
NGC 4565	Gal	Com	12h36m20.8s	+25°59'15"	10.1	22:19	00:07	00:07	difficult
M 49	Gal	Vir	12h29m46.8s	+08°00'01"	9.3	22:15	00:07	00:07	detectable
M 106	Gal	CVn	12h18m57.6s	+47°18'13"	9.1	21:21	00:07	00:08	detectable
M 51	Gal	CVn	13h29m52.3s	+47°11'40"	8.7	21:38	00:07	00:08	easy
Coll 256	Open	Com	12h25m06.0s	+26°06'00"	2.9	21:14	00:07	00:08	easy
M 64	Gal	Com	12h56m43.8s	+21°41'00"	9.3	22:08	00:07	00:08	detectable

ID	Cls	Con	RA 2000	Dec 2000	Mag	Begin	Best	End	Difficulty
M 66	Gal	Leo	11h20m14.9s	+12°59'30"	9.7	21:08	00:07	00:08	detectable
M 86	Gal	Vir	12h26m12.2s	+12°56'44"	9.8	22:27	00:07	00:08	detectable
M 87	Gal	Vir	12h30m49.2s	+12°23'29"	9.6	22:14	00:07	00:08	detectable
M 94	Gal	CVn	12h50m53.1s	+41°07'12"	8.7	21:25	00:08	00:09	detectable
M 3	Glob	CVn	13h42m11.0s	+28°22'42"	6.3	22:20	00:08	00:08	easy
M 65	Gal	Leo	11h18m55.7s	+13°05'32"	10.1	21:07	00:08	00:09	detectable
M 84	Gal	Vir	12h25m03.9s	+12°53'12"	10.1	22:10	00:07	00:08	detectable
M 104	Gal	Vir	12h39m59.3s	-11°37'22"	9.1	23:12	00:07	00:08	detectable
M 68	Glob	Hya	12h39m28.0s	-26°44'36"	7.3	23:23	00:07	00:08	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.

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

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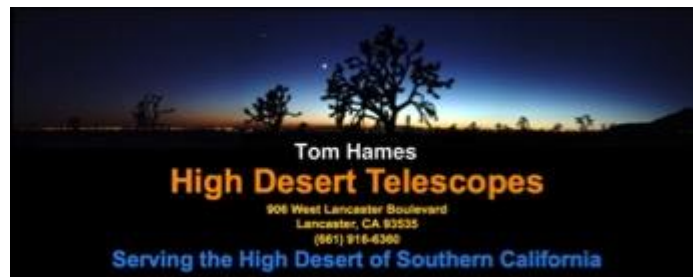


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