



# Desert Sky Observer

Volume 34

Antelope Valley Astronomy Club Newsletter

March 2014

## Up-Coming Events

- March 6: [Miller School Star Party](#)
- March 7: [Public Night at the SAGE](#)
- March 8: Science Olympiad @ [Antelope Valley College](#)
- March 8: [Prime Desert Moon Walk](#)
- March 14: Club Meeting\*
- March 21: [Public Night at the SAGE](#)
- March 26: [Acton Library 'Celestial Exploration' Event](#)
- March 29: [Messier Marathon](#)

\* 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 20<sup>th</sup> 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

I never know how to start these articles. Should I just say, "Greetings" while extending the Vulcan salute? A number of years ago the SETI institute had a contest for the best greetings should we ever make contact with extraterrestrials. Among the highest ranked submissions were, "This is Earth speaking. We would like to know you. Please reply." Another was, "Down here we are all confused." A common thread seemed to be, "If you do come for a visit, please don't kidnap us and poke us. We hate that."

So, I'll just say, "Hello friends," and nonchalantly talk about the weather. I don't want to wish bad weather on any of our upcoming activities but I certainly hope that March, in classic fashion, "Comes in like a lion and goes out like a lamb." California is parched and we need as much precipitation as we can get. I noted in recent news posts by the Poppy Reserve that they have a decent little crop of sprouts coming up, but fear that if we don't get some rain to sustain them they will just shrivel up leaving nothing to display later in the season.

We have two new moons in March, having not really had one in February, so we're having two Dark Sky events. The first is on Saturday, March 1st, near the Chuchupate Ranger Station near Mount Pinos and off Lockwood Valley Road. Since we plan on using this site for more of our Dark Sky Star Parties in the future a map with directions follows my article. Save it or print it for future use.

We have several reasons for giving this new venue a try. First, is that it's not as far away as the Nordic Base parking lot at the top of Mount Pinos and eliminates some of the steepest and curviest sections of roadway. At 5,300 feet in elevation it's also lower in elevation than the 8,400 feet at Mt. Pinos which may allow some of our members with medical conditions, which precluded them from going to the top of the mountain, to attend more of our events. It also won't be quite as cold and should be open both earlier and later in the season when snow might close the road to Mt. Pinos. We're also hoping the shorter travel distance will encourage some of you, who might have been reluctant to drive all the way to Mt. Pinos, to

come on up for at least a few hours without spending the night. Remember, you don't have to bring a telescope. There's always plenty of eyepieces to go around so come up and view through some of ours.

Our second event of the year at Chuchupate will be held on the weekend of June 28 and I know several members who are going to make a long weekend of it and camp out in their for two or three days. As the date approaches, ask around to see who is going when and for how long.

In between we'll stay busy throughout March, April, and May. Don will cover some of these in his column so I'm just going to mention the major ones here. Remember, our Prime Desert Woodland event on March 8th is "International Sidewalk Astronomy Night", in honor of the late John Dobson, and we'd really like to have nice turnout.

On Saturday March 29th we'll be having our annual Messier Marathon at the group campground at Saddleback Butte State Park. As usual, we'll have a member's only picnic beforehand followed by the Messier Marathon and Star Party. This year, we'll be inviting the public out for public viewing under the auspices of the Save Saddleback Butte organization. Even if you don't intend to work on your Messier list, come out to share the wonders of the night sky with our friends and neighbors. More details will follow but we expect to have our picnic around 4:00 pm with public viewing starting around 7:00 pm.

Don't forget. Mark your calendars. The California Poppy Festival is April 26 and 27 at Lancaster City Park. We'll have our informational booth and solar telescopes there and can always use all the help we can get.

As always, I leave you with this, SOS...help Save Our Skies. Turn off unnecessary outside lighting. Replace bad light fixtures with those that put light only where it's needed. Reduce the wattage or lumens of outside lights where you can. Let's all help to preserve Dark Skies.



## **Vice President Rose Moore**

Our speaker for the month of March is Al Bowers from NASA-Dryden. Al Bowers has been to our meetings in the past and always gives a wonderful presentation. The topic will be announced as soon as I get the information from him. We also have speakers for May and July's meetings. In May, Chris Estrada will be speaking on double star measurements, and in July we'll have Diana Darus from JPL, topic to be announced.

We're starting to plan our club summer picnic, and will be having it at Brite Lake in Tehachapi again this year. We're working with the dates in July or August, and info will be posted soon. As for the Christmas party, Frank and I stopped by Julianni's in Lancaster, which look like a great place. We'll be looking at a couple of other places over the next few weeks. Anyone having Christmas Party suggestions, please contact me!

There are a lot of public outreach events coming up in the next month or two. Please come out to support your club! If you can't bring a telescope, maybe you can bring another astronomy item to show the public, or hand out club and astronomy info, or just talk to the public. See you there!



## Director of Community Development

### Don Bryden

March already and we have so much to do! The night of the 6th we'll be out at the Miller School in Lancaster (address) for a star party for the kids. If you can help out please let me know, we can always use more scopes. It will be a star party after school hours so arrive by sunset to set up.

Just a few days later, on Saturday the 8th we have two outreach events. First, come out to AV College and help out as we show off our views of the Sun, Venus and Jupiter for the participants in the annual Science Olympiad. For those who recall the Joe Walker Super Science Saturday, well this has combined all schools and school districts into one of two big Olympiads. At least we don't have the bottle rockets right next to us any longer. Later that night we have another Prime Desert Moonwalk. Last month we had a hundred folks come out and expect even more this month. Also, Jeremy and Darrell are running a beginner's class at the SAGE Planetarium in between both events. See Jeremy for the details but I believe its afternoon. Also you can join Jeremy at the Acton Library at 7:30pm on the 26th for a public star party. See the Calendar for all details ([www.avastronomyclub.org/calendar.html](http://www.avastronomyclub.org/calendar.html)).

By the end of March let's take a break and treat ourselves to a nice star party. Yes it's time for the annual Messier Marathon. See Frank's article above for more info – I'm just going to talk about what to look for. This year the new moon falls on just about the best weekend we could hope for as there's only a small window when you can really hope to bag all 109 Messier Objects. To be successful, you must hit the ground running right at sundown. M31, M32, M33 and M110 as well as M52 and M76 will not linger for long. Low in the West and while the twilight wanes it can be hard to find these otherwise easy targets.

After the first handful of targets there's time to breathe. Now you can stroll your way through Taurus, Orion, Gemini, Auriga and the other "winter" constellations. Gradually they give way to the "spring" groups of Cancer and Leo. Brace yourself – you'll notice more and more galaxies and then you come to Virgo and Coma Berenices and the difficult Virgo Supercluster of galaxies. Faint, fuzzy and hard to tell apart, the Virgo cluster is a real challenge. I like to make use of Frank and his GoTo to check my work!

The nice thing about finishing the Virgo cluster is you can take a little break – maybe a nap or some fresh coffee. Then you are rewarded with Scorpius, Ophiuchus, Sagittarius and all those nice globular clusters! And, if you're really lucky, BACON! (are you reading this, Matt?) If you can cat nap or just stay up until dawn you get to your last challenge. The late risers are Aquarius, Pegasus and Capricorn with my personal nemesis M30, a little globular in Capricorn.

Well, now its 6:30am and the sun is rising. A nice treat for those who made it till the morning: Venus and Mercury are up just before the sun. Also, as a challenge, the moon is just hours before new and a possible last sliver of the old moon is visible. Maybe you'll get to see all 109 objects – maybe Matt will have more bacon!

## Space Place

## A Two-Toned Wonder from the Saturnian Outskirts

By Dr. Ethan Siegel

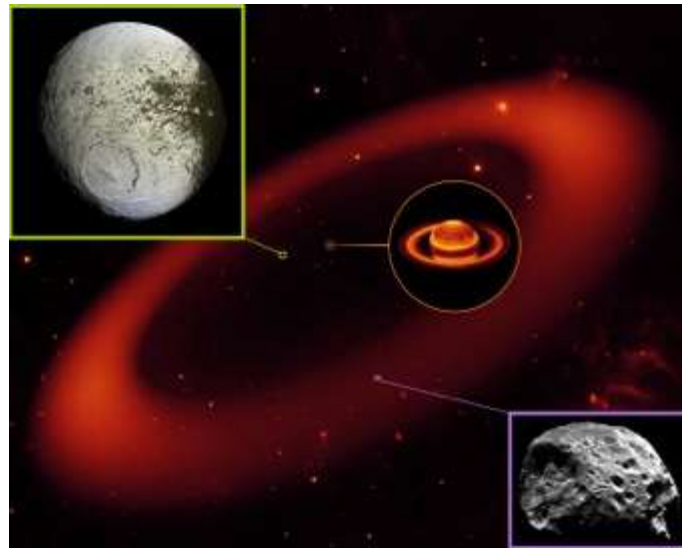
Although Saturn has been known as long as humans have been watching the night sky, it's only since the invention of the telescope that we've learned about the rings and moons of this giant, gaseous world. You might know that the largest of Saturn's moons is Titan, the second largest moon in the entire Solar System, discovered by Christiaan Huygens in 1655. It was just 16 years later, in 1671, that Giovanni Cassini (for whom the famed division in Saturn's rings—and the NASA mission now in orbit there—is named) discovered the second of Saturn's moons: Iapetus. Unlike Titan, Iapetus could only be seen when it was on the west side of Saturn, leading Cassini to correctly conclude that not only was Iapetus tidally locked to Saturn, but that its trailing hemisphere was intrinsically brighter than its darker, leading hemisphere. This has very much been confirmed in modern times!

In fact, the darkness of the leading side is comparable to coal, while the rest of Iapetus is as white as thick sea ice. Iapetus is the most distant of all of Saturn's large moons, with an average orbital distance of 3.5 million km, but the culprit of the mysterious dark side is four times as distant: Saturn's remote, captured moon, the dark, heavily cratered Phoebe!

Orbiting Saturn in retrograde, or the opposite direction to Saturn's rotation and most of its other Moons, Phoebe most probably originated in the Kuiper Belt, migrating inwards and eventually succumbing to gravitational capture. Due to its orbit, Phoebe is constantly bombarded by micrometeoroid-sized (and larger) objects, responsible for not only its dented and cavity-riddled surface, but also for a huge, diffuse ring of dust grains spanning quadrillions of cubic kilometers! The presence of the "Phoebe Ring" was only discovered in 2009, by NASA's infrared-sensitive Spitzer Space Telescope. As the Phoebe Ring's dust grains absorb and re-emit solar radiation, they spiral inwards towards Saturn, where they smash into Iapetus—orbiting in the opposite direction—like bugs on a highway windshield. Was the dark, leading edge of Iapetus due to it being plastered with material from Phoebe? Did those impacts erode the bright surface layer away, revealing a darker substrate?

In reality, the dark particles picked up by Iapetus aren't enough to explain the incredible brightness differences alone, but they absorb and retain just enough extra heat from the Sun during Iapetus' day to sublimate the ice around it, which resolidifies preferentially on the trailing side, lightening it even further. So it's not just a thin, dark layer from an alien moon that turns Iapetus dark; it's the fact that surface ice sublimates and can no longer reform atop the leading side that darkens it so severely over time. And that story—only confirmed by observations in the last few years—is the reason for the one-of-a-kind appearance of Saturn's incredible two-toned moon, Iapetus!

Learn more about Iapetus here: <http://saturn.jpl.nasa.gov/science/moons/iapetus>.



*Images credit: Saturn & the Phoebe Ring (middle) - NASA / JPL-Caltech / Keck; Iapetus (top left) - NASA / JPL / Space Science Institute / Cassini Imaging Team; Phoebe (bottom right) - NASA / ESA / JPL / Space Science Institute / Cassini Imaging Team.*

## News Headlines

### **NASA solves mystery of 'jelly donut' on Mars**

It was a complete unknown -- it was a rolling stone. A mystery rock that appeared before NASA's Opportunity rover in late January -- and bore a strange resemblance to a jelly donut -- is no more than a common piece of stone that bounced in front of the cameras, NASA said Friday.

<http://www.foxnews.com/science/2014/02/14/nasa-solves-mystery-jelly-donut-on-mars/>

### **Kepler Has Discovered 715 New Extrasolar Planets**

NASA's Kepler mission announced Wednesday the discovery of 715 new planets. These newly-verified worlds orbit 305 stars, revealing multiple-planet systems much like our own solar system. Nearly 95 percent of these planets are smaller than Neptune, which is almost four times the size of Earth. This discovery marks a significant increase in the number of known small-sized planets more akin to Earth than previously identified exoplanets, which are planets outside our solar system.

<http://spaceref.com/astromony/kepler-has-discovered-715-new-extrasolar-planets.html>

### **Where dwarves collide**

Galaxies grow by attracting and ingesting smaller galaxies, or by merging with other galaxies of comparable size. Now, a team of astronomers, including Glenn van de Ven from the Max Planck Institute of Astronomy, have identified the smallest example of a remnant of such a galactic merger: the dwarf spheroidal galaxy Andromeda II (AndII), a satellite of the well-known Andromeda galaxy. From the motion of stars within this galaxy, the researchers identified two distinct groups of stars – what appears to be stars of the original dwarf galaxy, and stars from another dwarf galaxy that merged with AndII more than 3 billion years ago.

[http://www.mpg.de/7956419/dwarf-galaxy-andromeda\\_II?filter\\_order=LT&research\\_topic=PA-A PA-AP](http://www.mpg.de/7956419/dwarf-galaxy-andromeda_II?filter_order=LT&research_topic=PA-A PA-AP)

### **NASA Honors Astronaut Neil Armstrong with Center Renaming**

Two generations of aerospace engineering excellence will come together Saturday, March 1 when NASA's Dryden Flight Research Center in Edwards, Calif., is redesignated NASA's Armstrong Flight Research Center. The agency's center of excellence for atmospheric flight research is being renamed in honor of the late Neil A. Armstrong, a former research test pilot at the center and the first man to step on the moon during the historic Apollo 11 mission in 1969.

<http://www.nasa.gov/press/2014/february/nasa-honors-astronaut-neil-armstrong-with-center-renaming/>

### **Astronomers discover oldest star: Formed shortly after the Big Bang 13.7 billion years ago**

A team of astronomers has discovered the oldest known star in the Universe, which formed shortly after the Big Bang 13.7 billion years ago. The discovery has allowed astronomers for the first time to study the chemistry of the first stars, giving scientists a clearer idea of what the Universe was like in its infancy.

<http://www.sciencedaily.com/releases/2014/02/140209200836.htm>

### **Rule-breaking black hole blows weirdly powerful winds**

A black hole in a nearby galaxy is blowing a mighty wind. The black hole is about 100 times the mass of the sun but is causing the emission of millions of times more energy, breaking a long-accepted rule about the way black holes feed. The discovery suggests that even small black holes may play a larger role in galaxy evolution than previously realised.

<http://www.newscientist.com/article/dn25138-rulebreaking-black-hole-blows-weirdly-powerful-winds.html>



## March Sky Data

**Best time for deep sky observing this month:  
March 19 through March 31**

**Mercury** reaches its greatest elongation west of 18 degrees on March 14th and seen best about half an hour before sunrise. However, from our northerly locations the ecliptic at this time of year is at such a shallow angle to the horizon that it will be at a very low elevation. Its brightness from +0.7 to -0.2 during the month

**Venus** reaches greatest elongation west from the Sun on March 22nd. But again, due to the shallow angle of the ecliptic to the horizon this month it will not be far above the horizon on this date. During the month, Venus dims from magnitude -4.6 to -4.3.

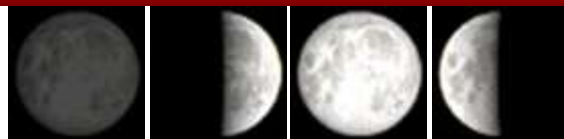
**Mars**, lying in Virgo, rises around 10 pm at the start of the month and about two hours earlier at month's end. Its brightness increases dramatically during the month from +0.5 to -1.3 with its angular size increasing from 11.6 to 14.6 arc seconds as it moves towards opposition on April 8th.

This month **Jupiter** is a little past its best and should be viewed soon after night fall when it is closest to the meridian and so highest in the sky. Shining at magnitude -2.4, it is visible for much of the evening and early morning. By month's end Jupiter will be due south at ~8:30 pm.

**Saturn** rises at about midnight at the start of the month and at about 10:30 pm at its end. Saturn reaches a stationary point on March 3rd and then begins its retrograde motion across the sky. The rings have now opened to around 23 degrees from the line of sight presenting a magnificent view. With a small telescope one should be able to spot the Cassini

There are no major **meteor-showers** in March, but we may see a handful of meteors from the Virginid shower, which is usually active during March and April; they appear to radiate outwards from the constellation of Virgo.

New Mar 1      First Qtr Mar 8      Full Mar 16      Last Qtr Mar 23



## Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
3/1/2014	06:20	18:36	06:20	17:48
3/5/2014	08:58	22:51	06:15	17:51
3/10/2014	12:52	02:14	06:08	17:55
3/15/2014	17:23	05:15	06:02	17:59
3/20/2014	22:17	08:14	05:55	18:03
3/25/2014	02:01	12:54	05:48	18:07
3/31/2014	06:09	19:32	05:40	18:12

## Planet Data

	Mar 1			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:03	10:31	16:02	0.7
<b>Venus</b>	03:43	09:04	14:26	-4.6
<b>Mars</b>	21:12	02:57	08:42	-0.5
<b>Jupiter</b>	12:40	19:57	03:15	-2.5
<b>Saturn</b>	23:16	04:37	09:57	0.4

	Mar 15			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:48	11:19	16:50	0.2
<b>Venus</b>	04:36	10:00	15:24	-4.4
<b>Mars</b>	21:11	02:57	08:43	-0.9
<b>Jupiter</b>	12:46	20:03	03:20	-2.4
<b>Saturn</b>	23:20	04:41	10:02	0.4

	Mar 31			
	Rise	Transit	Set	Mag
<b>Mercury</b>	05:48	11:40	17:28	-0.2
<b>Venus</b>	04:28	10:02	15:35	-4.3
<b>Mars</b>	19:47	01:37	07:27	-1.3
<b>Jupiter</b>	11:43	19:04	02:21	-2.3
<b>Saturn</b>	22:14	03:36	08:57	0.3

Planet, Sun, and Moon data calculated for local time at Lancaster, CA



## Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Star Party. Since this month is our Messier Marathon the list is the observing order for the night. You can download the order in Excel format at [http://www.avastronomyclub.org/docs/marathon\\_order.xls](http://www.avastronomyclub.org/docs/marathon_order.xls) or Adobe PDF at [http://www.avastronomyclub.org/docs/marathon\\_order.pdf](http://www.avastronomyclub.org/docs/marathon_order.pdf)

Order	Time	M #	NGC	Con	R.A.	Dec	Mag	Type	Comments
1		M 77	1068	CET	2h 43m	0° 1'	8.8	SG	
2		M 74	628	PSC	1h 37m	15° 47'	9.2	S	
3		M 33	598	TRI	1h 34m	30° 39'	5.7	SG	Pinwheel galaxy
4		M 31	224	AND	0h 43m	41° 16'	3.4	SG	Andromeda galaxy
5		M 32	221	AND	0h 43m	40° 52'	8.2	EG	
6		M 110	205	AND	0h 40m	41° 41'	8.0	EG	
7		M 52	7654	CAS	23h 24m	61° 35'	6.9	OC	
8		M 103	581	CAS	1h 33m	60° 42'	7.4	OC	
9		M 76	650	PER	1h 42m	51° 34'	11.5	PN	The Little Dumbell
11		M 34	1039	PER	2h 42m	42° 47'	5.2	OC	
11		M 45		TAU	3h 47m	24° 7'	1.2	OC	Pleiades
12		M 79	1904	LEP	5h 24m	-24° 33'	8.0	GC	
13		M 42	1976	ORI	5h 35m	-5° 27'	4.0	DN	Great Orion nebula
14		M 43	1982	ORI	5h 35m	-5° 16'	9.0	DN	
15		M 78	2068	ORI	5h 47m	0° 3'	8.0	DN	
16		M 1	1952	TAU	5h 34m	22° 1'	8.4	PN	Crab nebula
17		M 35	2168	GEM	6h 09m	24° 20'	5.1	OC	
18		M 37	2099	AUR	5h 52m	32° 33'	5.6	OC	
19		M 36	1960	AUR	5h 36m	34° 8'	6.0	OC	
20		M 38	1912	AUR	5h 29m	35° 50'	6.4	OC	
21		M 41	2287	CMA	6h 47m	-20° 44'	4.5	OC	
22		M 93	2447	PUP	7h 45m	-23° 52'	6.2	OC	
23		M 47	2422	PUP	7h 37m	-14° 30'	4.4	OC	
24		M 46	2437	PUP	7h 42m	-14° 49'	6.1	OC	
25		M 50	2323	MON	7h 03m	-8° 20'	5.9	OC	
26		M 48	2548	HYA	8h 14m	-5° 48'	5.8	OC	
27		M 44	2632	CNC	8h 40m	19° 59'	3.1	OC	Beehive Cluster
28		M 67	2682	CNC	8h 50m	11° 49'	6.9	OC	
29		M 95	3351	LEO	10h 44m	11° 42'	9.7	SG	
30		M 96	3368	LEO	10h 47m	11° 49'	9.2	SG	
31		M 105	3379	LEO	10h 48m	12° 35'	9.3	EG	
32		M 65	3623	LEO	11h 19m	13° 5'	9.3	SG	Leo's triplet
33		M 66	3627	LEO	11h 20m	12° 59'	9.0	SG	Leo's triplet
34		M 81	3031	UMA	9h 56m	69° 4'	6.8	SG	Bodes Galaxy
35		M 82	3034	UMA	9h 56m	69° 41'	8.4	IG	Cigar Galaxy
36		M 97	3587	UMA	11h 15m	55° 1'	11.2	PN	Owl Nebula
37		M 108	3556	UMA	11h 12m	55° 40'	10.0	SG	



Order	Time	M #	NGC	Con	R.A.	Dec	Mag	Type	Comments
38		M 109	3992	UMA	11h 58m	53° 23'	9.8	SG	
39		M 40		UMA	12h 22m	58° 5'	8.0	dbl	
40		M 106	4258	CVN	12h 19m	47° 18'	8.3	SG	
41		M 94	4736	CVN	12h 51m	41° 7'	8.1	SG	
42		M 63	5055	CVN	13h 16m	42° 2'	8.6	SG	Sunflower galaxy
43		M 51	5194	CVN	13h 30m	47° 12'	8.1	SG	Whirlpool galaxy
44		M 101	5457	UMA	14h 03m	54° 21'	7.7	SG	
45		M 102	5457	UMA	14h 03m	54° 21'	7.7	SG	Duplicate of M101
46		M 53	5024	COM	13h 13m	18° 10'	7.7	GC	
47		M 64	4826	COM	12h 57m	21° 41'	8.5	SG	Black eye galaxy
48		M 3	5272	CVN	13h 42m	28° 23'	6.4	GC	
49		M 98	4192	COM	12h 14m	14° 54'	10.1	SG	
50		M 85	4382	COM	12h 25m	18° 11'	9.2	EG	
51		M 99	4254	COM	12h 19m	14° 25'	9.8	SG	Pin Wheel nebula
52		M 100	4321	COM	12h 23m	15° 49'	9.4	SG	
53		M 84	4374	VIR	12h 25m	12° 53'	9.3	EG	
54		M 86	4406	VIR	12h 26m	12° 57'	9.2	EG	
55		M 87	4486	VIR	12h 31m	12° 24'	8.6	EG	
56		M 89	4552	VIR	12h 36m	12° 33'	9.8	EG	
57		M 90	4569	VIR	12h 37m	13° 10'	9.5	SG	
58		M 88	4501	COM	12h 32m	14° 25'	9.5	SG	
59		M 91	4548	COM	12h 35m	14° 30'	10.2	SG	
60		M 58	4579	VIR	12h 38m	11° 49'	9.8	SG	
61		M 59	4621	VIR	12h 42m	11° 39'	9.8	EG	
62		M 60	4649	VIR	12h 44m	11° 33'	8.8	EG	
63		M 49	4472	VIR	12h 30m	8° 0'	8.4	EG	
64		M 61	4303	VIR	12h 22m	4° 28'	9.7	SG	
65		M 104	4594	VIR	12h 40m	-11° 37'	8.3	SG	Sombrero galaxy
66		M 68	4590	HYA	12h 40m	-26° 45'	8.2	GC	
67		M 83	5236	HYA	13h 38m	-29° 52'	7.6	SG	Southern Pinwheel
68		M 5	5904	SER	15h 18m	2° 5'	5.8	GC	
69		M 13	6205	HER	16h 42m	36° 28'	5.9	GC	Hercules Cluster
70		M 92	6341	HER	17h 17m	43° 8'	6.5	GC	
71		M 57	6720	LYR	18h 54m	33° 2'	9.0	PN	Ring nebula
72		M 56	6779	LYR	19h 17m	30° 11'	8.2	GC	
73		M 29	6913	CYG	20h 23m	38° 32'	6.6	OC	
74		M 39	7092	CYG	21h 32m	48° 26'	4.6	OC	
75		M 27	6853	VUL	20h 00m	22° 43'	8.1	PN	Dumbbell nebula
76		M 71	6838	SGE	19h 54m	18° 47'	8.3	GC	
77		M 107	6171	OPH	16h 33m	-13° 3'	8.1	GC	
78		M 10	6254	OPH	16h 57m	-4° 6'	6.6	GC	
79		M 12	6218	OPH	16h 47m	-1° 57'	6.6	GC	
80		M 14	6402	OPH	17h 38m	-3° 15'	7.6	GC	
81		M 9	6333	OPH	17h 19m	-18° 31'	7.9	GC	
82		M 4	6121	SCO	16h 23m	-26° 32'	5.9	GC	

Order	Time	M #	NGC	Con	R.A.	Dec	Mag	Type	Comments
83		M 80	6093	SCO	16h 17m	-22° 59'	7.2	GC	
84		M 19	6273	OPH	17h 03m	-26° 16'	7.2	GC	
85		M 62	6266	OPH	17h 01m	-30° 7'	6.6	GC	
86		M 6	6405	SCO	17h 40m	-32° 13'	4.2	OC	Butterfly cluster
87		M 7	6475	SCO	17h 54m	-34° 49'	3.3	OC	Ptolemy's Cluster
88		M 11	6705	SCT	18h 51m	-6° 16'	5.8	OC	Wild Duck cluster
89		M 26	6694	SGR	18h 45m	-9° 24'	8.0	OC	
90		M 16	6611	SER	18h 19m	-13° 47'	6.0	DN	Eagle nebula
91		M 17	6618	SGR	18h 21m	-16° 11'	7.0	DN	Swan nebula
92		M 18	6613	SGR	18h 20m	-17° 8'	6.9	OC	
93		M 24	6603	SGR	18h 16m	-18° 29'	4.5	OC	
94		M 25		SGR	18h 32m	-19° 15'	4.6	OC	
95		M 23	6494	SGR	17h 57m	-19° 1'	5.5	OC	
96		M 21	6531	SGR	18h 05m	-22° 30'	5.9	OC	
97		M 20	6514	SGR	18h 02m	-23° 2'	8.5	DN	Trifid nebula
98		M 8	6523	SGR	18h 03m	-24° 23'	5.8	DN	Lagoon nebula
99		M 28	6626	SGR	18h 25m	-24° 52'	6.9	GC	
100		M 22	6656	SGR	18h 36m	-23° 54'	5.1	GC	
101		M 69	6637	SGR	18h 31m	-32° 21'	7.7	GC	
102		M 70	6681	SGR	18h 43m	-32° 18'	8.1	GC	
103		M 54	6715	SGR	18h 55m	-30° 29'	7.7	GC	
104		M 55	6809	SGR	19h 40m	-30° 58'	7.0	GC	
105		M 75	6864	SGR	20h 06m	-21° 55'	8.6	GC	
106		M 15	7078	PEG	21h 30m	12° 10'	6.4	GC	
107		M 2	7089	AQR	21h 33m	0° -49'	6.5	GC	
108		M 72	6981	AQR	20h 54m	-12° 32'	9.4	GC	
109		M 73	6994	AQR	20h 58m	-12° 38'		ast	
110		M 30	7099	CAP	21h 40m	-23° 11'	7.5	GC	

## 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/](http://www.avastronomyclub.org/)

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