ANTELOPE VALLEY ASTRONOMY CLUB, INC.

Desert Sky Observer

Volume 31 *Antelope Valley Astronomy Club Newsletter* **December 2011**

Up-Coming Events

December 3: Vasquez Rocks Star Party @ Vasquez Rocks
December 7: Acton Library Astronomy Lecture @ Acton Library
December 10: Super Science Saturday @ Joe Walker Middle School
December 10: Annual Club Christmas Party @ Embassy Suites Palmdale
December 12: Executive Board Meeting @ Don's house
December 17: Dark Sky Star Party @ Saddle Back Butte

* Monthly meetings are held at the S.A.G.E. Planetarium on the Cactus School campus in Palmdale, the second Friday of each month. The meeting location is at the northeast corner of Avenue R and 20th Street East. Meetings start at 7 p.m. and are open to the public. *Please note that food and drink are not allowed in the planetarium*

President

Don Bryden

Another year has come and gone! If this were Mars we'd have another 320 or so days to go but instead we've packed our Earthly year full as well as started planning for next year. Your executive board is lining up speakers, planning for star parties and the YEA committee, thanks in big part to Deb Pedroza, is getting underway! Actually we're not even done with 2011. The third we'll be out at Vasquez Rocks with the Local Group for the last of four joint star parties. And of course, the following weekend is our Christmas Party. Even though we've paid for everyone by the time you read this, we usually have the leeway of adding a few more at the last second – and you shouldn't miss it! Among the many goodies we'll offer for silent auction or as raffle prizes will be a pair of APM 10x50 binoculars and a 12" Meade Lightbridge!

And we're still not done. The following Saturday, the 17th, we'll be out at the group site in Saddleback Butte for the last star party of the year. Come out early and take a hike then stay late for some (hopefully) frost-free observing (Duane, don't forget to check your corrector plate this time!).

Some 2012 dates to plan for include The Annual Messier Marathon on March 24th and of course RTMC the week of May 23rd through the 28th (Memorial weekend). Beside these annual pilgrimages, we have some unique events this year too. On the 20th of May, just before RTMC there will be an annular eclipse of the Sun at least partially visible this far south. We may even take a star safari up to the Reno area to see it in annular totality. The next month, in June, will play host to the last Transit of Venus for over a hundred years. Come out the afternoon of June 5th to the SAGE planetarium to take part in this once (more) in a lifetime event!

And the Astronomical League Messier Club will start up again in either January or February were you can work on your Messier list or get in some practice for the marathon. Once we add in all the regular star parties, outreach events and Prime Deserts it looks like another jam-packed year. Maybe we should make that switch to Martian time but I suspect we'd fill up those 680 days as well.

Happy Holidays and see you in 2012

Vice President

Rose Moore

A very Merry Christmas, Happy Holidays, and a Happy New Year to all!

We have our last Acton Library Astronomy Lecture for the year on Wednesday, Dec. 7th at 6:30pm. Come on out and listen to Jeremy speak on 'Astronomy and Ancient Cultures'! Stargazing after the lecture, weather permitting.

On Saturday, Dec. 10th during the day, we have Joe Walker Middle School's 'Super Science Saturday' at the school grounds in Quartz Hill. Time for the event is 8am to 12:30pm. We need members with telescopes, or other astronomy items of interest, to come out and share with the kids and their parents. Come on out and attend this annual event!!

The main event for December is, of course, our club Christmas Party!

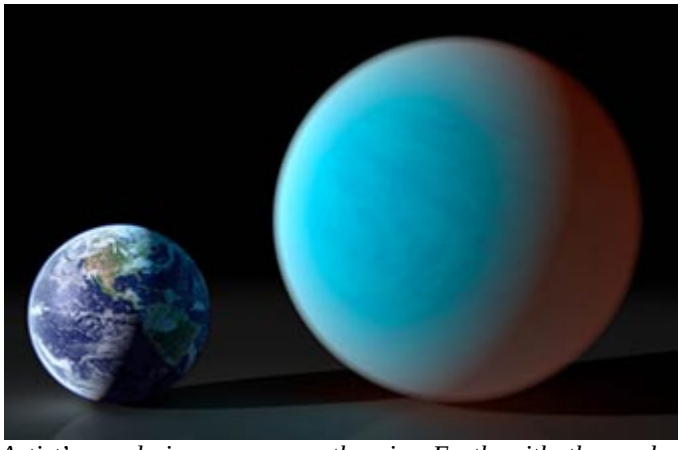
It's scheduled for Saturday, Dec. 10th at 6pm at the Embassy Suites in Palmdale. Some of us will be arriving early to get things set up for the tables, raffle and auctions. Any further donations for the raffle or silent auction please bring directly to the party. If you have not signed up for the party, we will only have a few extra empty spots for the buffet. If you still want to attend, but have not paid or notified me, please let me know asap by phone only!!

Keep warm and clear skies!

Space Place

Re-thinking an Alien World: The Strange Case of 55 Cancri e

Forty light years from Earth, a rocky world named “55 Cancri e” circles perilously close to a stellar inferno. Completing one orbit in only 18 hours, the alien planet is 26 times closer to its parent star than Mercury is to the Sun. If Earth were in the same position, the soil beneath our feet would heat up to about 3200 F. Researchers have long thought that 55 Cancri e must be a wasteland of parched rock.



Artist’s rendering compares the size Earth with the rocky “super-Earth” 55 Cancri e. Its year is only about 18 hours long!

Now they’re thinking again. New observations by NASA's Spitzer Space Telescope suggest that 55 Cancri e may be wetter and weirder than anyone imagined.

Spitzer recently measured the extraordinarily small amount of light 55 Cancri e blocks when it crosses in front of its star. These transits occur every 18 hours, giving researchers repeated opportunities to gather the data they need to estimate the width, volume and density of the planet.

According to the new observations, 55 Cancri e has a mass 7.8 times and a radius just over twice that of Earth. Those properties place 55 Cancri e in the

"super-Earth" class of exoplanets, a few dozen of which have been found. Only a handful of known super-Earths, however, cross the face of their stars as viewed from our vantage point in the cosmos, so 55 Cancri e is better understood than most.

When 55 Cancri e was discovered in 2004, initial estimates of its size and mass were consistent with a dense planet of solid rock. Spitzer data suggest otherwise: About a fifth of the planet's mass must be made of light elements and compounds—including water. Given the intense heat and high pressure these materials likely experience, researchers think the compounds likely exist in a "supercritical" fluid state.

A supercritical fluid is a high-pressure, high-temperature state of matter best described as a liquid-like gas, and a marvelous solvent. Water becomes supercritical in some steam turbines—and it tends to dissolve the tips of the turbine blades. Supercritical carbon dioxide is used to remove caffeine from coffee beans, and sometimes to dry-clean clothes. Liquid-fueled rocket propellant is also supercritical when it emerges from the tail of a spaceship.

On 55 Cancri e, this stuff may be literally oozing—or is it steaming? —out of the rocks.

With supercritical solvents rising from the planet's surface, a star of terrifying proportions filling much of the daytime sky, and whole years rushing past in a matter of hours, 55 Cancri e teaches a valuable lesson: Just because a planet is similar in size to Earth does not mean the planet is like Earth.

It's something to re-think about.

Get a kid thinking about extrasolar planets by pointing him or her to "Lucy's Planet Hunt," a story in rhyme about a girl who wanted nothing more than to look for Earth-like planets when she grew up. Go to http://spaceplace.nasa.gov/story-lucy.

The original research reported in this story has been accepted for publication in Astronomy and Astrophysics. The lead author is Brice-Olivier Demory, a post-doctoral associate in Professor Sara Seager's group at MIT.

Buying a Telescope for the Holidays? by Paul Derrick

It's the time of year when many are considering buying a telescope as a holiday gift – a decision many face with many questions – and given the options available, it's no wonder. While we don't have space for Telescope Buying 101, we can offer some help in making the decision easier.

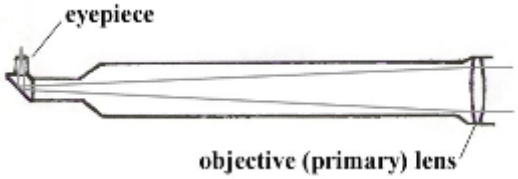
Cost. Prices range from less than $100 to thousands of dollars. The least-expensive are usually more disappointing than satisfying as they are often wobbly and finding objects can be challenging. At the other end, few can afford the big scopes, or figure out how to use them if they do. But $200 to $400, spent wisely, can purchase a fun and satisfying scope.

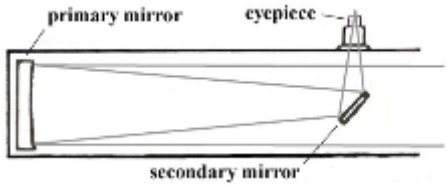
Binoculars. If you're not ready to spend that much for a scope, $100 or so can purchase a respectable pair of binoculars – 7x50s being a good size for stargazing as well as general viewing. Virtually all stargazers, even those with large scopes, use them. If you've never viewed the night sky with binoculars, you'll be surprised at how much more can be seen than with naked eyes.

Power. The magnifying power of a telescope is not fixed but rather depends upon the eyepiece, the part of the scope into which one actually views and which does the magnifying. Eyepieces (and thus power) can be switched out easily and quickly in the field. Most new scopes come with two or three different sizes of eyepieces producing different powers, and other sizes can be purchased later if more options (powers) are desired.

Aperture. A more relevant consideration than power is a telescope's aperture – the diameter of the "big end" – and generally bigger is better. The larger the aperture, the more light a scope gathers, and since seeing light from faint objects is what it's all about, larger apertures make objects look brighter, and can reveal objects too faint to be seen in smaller aperture scopes. Also, larger apertures scopes can generally be "pushed" to higher powers before the image becomes too fuzzy.

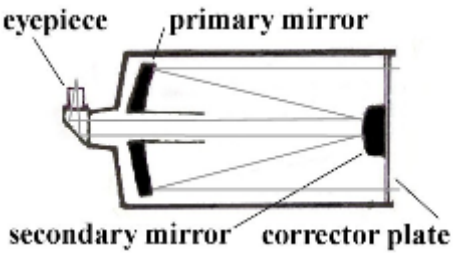
Types: The three basic types of telescopes are refractors, reflectors, and Cassegrains. Refractors, the first type of telescope invented in 1608 by Hans Lippershey, have an objective lens at the front end to gather light and focus it on the eyepiece at the back end.





In 1668, Isaac Newton invented reflecting telescopes, now called Newtonian reflectors. The objective lens at the front is replaced by a concave mirror at the back end which gathers and focus the light to the eyepiece. (A small interior diagonal mirror re-directs the light 90 degrees to the eyepiece placed at the side rather than at the back end.) Since mirrors are less expensive to make than lens, reflectors of a given aperture cost less than refractors of the same size. For example, a 6" reflector will generally cost much less than a 6" refractor.

The Cassegrain, designed by Laurent Cassegrain in 1672, is a variation of Newton's reflector. Both have a light-gathering concave mirror at the back, but in the Cassegrain the light is focused onto small convex mirror at the front end which re-directs the light back down the tube, through a small hole in the big mirror, and into the eyepiece at the scope's back end. Advantages of Cassegrains are their compactness and ease of portability, but with their more complex design they cost more than reflectors.



Mounts. Telescopes are attached on a mount which holds them and enables them to be pointed at objects. The three primary kinds of mounts are equatorial, fork, and altazimuth. Most, but not all, mounts are affixed atop a tripod stand. With mounts and tripods, sturdier is better.

A creative non-tripod altazimuth mount, invented in the 1960s by American amateur astronomer John Dobson, is by far the simplest and least-expensive. The rotating and pivoting base holding a Newtonian reflector scope (informally called a Dobsonian telescope, or simply a Dob) is, dollar for dollar, hard to beat.

GoTo Electronics. An increasing number of scopes have electronic "GoTo" and tracking capabilities. The GoTo feature finds objects while tracking gradually moves the scope at the same rate but in the opposite direction of Earth's rotation to keep the object visible in the eyepiece. These can be marvelous aids, but they increase a scope's cost and are rarely as simple to use as the advertising claims.

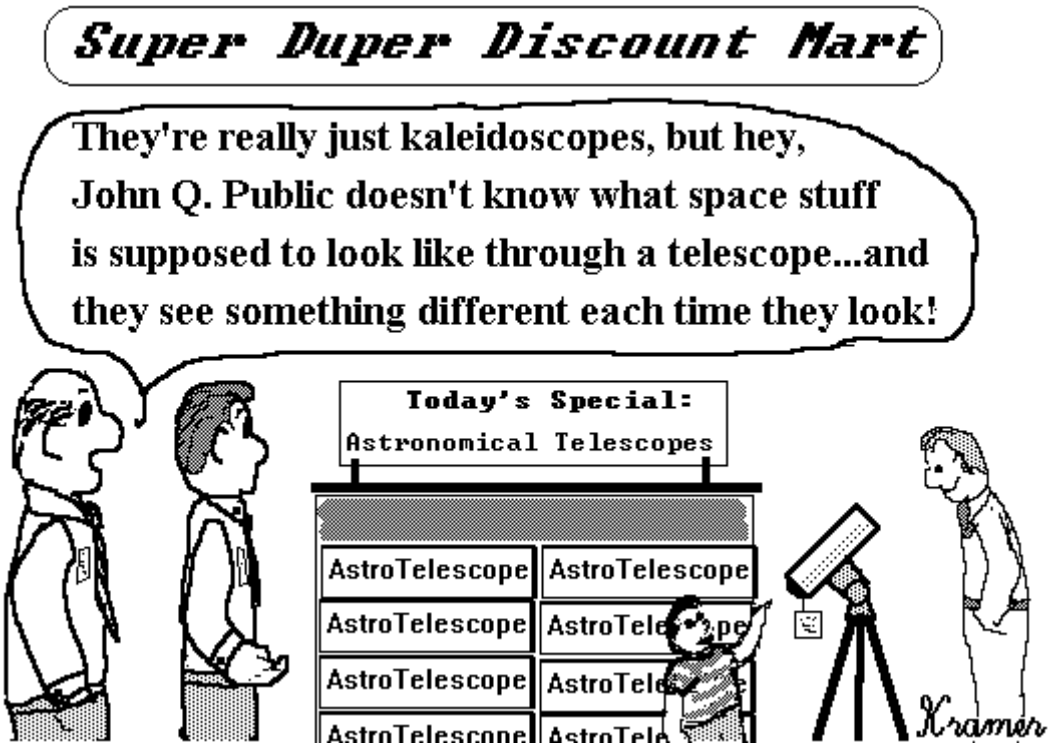
Using. When you get a new scope, don't expect to set it up and immediately start using it like an expert. Telescopes have a learning curve, and some pointers from an experienced stargazer can greatly help jump-

start your learning. Since amateur astronomers often hang out together and are usually eager to help others get started, search the Internet for “astronomy clubs” to find one near you. In our area, that would be the Central Texas Astronomical Society (www.centexastronomy.com).

If you have an opportunity, attend a public star party where amateur astronomers are likely to have a variety of types and sizes of scopes set up. They won't mind answering questions about their scope, and asking “How much did it cost?” is not considered impolite.

While there are several reputable brands of telescopes, Celestron and Meade being two of the most popular, anyone contemplating buying a scope might wish to request an Orion Telescope catalog – on-line at www.OrionTelescopes.com or by calling 800-676-1343. While I'm not recommending Orion or any other brand of scope – mine happens to be a Celestron – Orion's catalog gives a good idea of the wide array of telescopes, binoculars, and spotting scopes available – types, sizes, prices, and accessories.

Astronomy Humor



News Headlines

Mars Rover Curiosity Takes Off
NASA began a historic voyage to Mars with the Nov. 26 launch of the Mars Science Laboratory, which carries a car-sized rover named Curiosity. Liftoff from Cape Canaveral Air Force Station aboard an Atlas V rocket occurred at 10:02 a.m. EST (7:02 a.m. PST).
http://science.nasa.gov/science-news/science-at-nasa/2011/26nov_msllaunch/

New Study Shows Very First Stars Not Monstrous
The very first stars in our universe were not the behemoths scientists had once thought, according to new simulations performed at NASA's Jet Propulsion Laboratory, Pasadena, Calif. Astronomers "grew" stars in their computers, mimicking the conditions of our primordial universe. The simulations took weeks. When the scientists' concoctions were finally done, they were shocked by the results -- the full-grown stars were much smaller than expected.
http://www.jpl.nasa.gov/news/news.cfm?release=2011-348

Scientists find evidence for subsurface 'great lake' on Europa
In a finding of significance in the search for life beyond Earth, scientists have discovered locked inside the icy shell of Jupiter's moon Europa what appears to be a body of liquid water the volume of the North American Great Lakes, an area that could represent a new potential habitat for life.
http://gazette.jhu.edu/2011/11/28/scientists-find-evidence-for-subsurface-great-lake-on-europa/

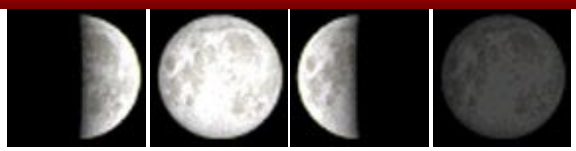
Hubble Uncovers Tiny Galaxies Bursting With Starbirth in Early Universe
Using its infrared vision to peer nine billion years back in time, the NASA/ESA Hubble Space Telescope has uncovered an extraordinary population of tiny, young galaxies that are brimming with star formation.
http://www.sciencedaily.com/releases/2011/11/111110094842.htm

NASA's Chandra Contributes to Black Hole Birth Announcement
New details about the birth of a famous black hole that took place millions of years ago have been uncovered, thanks to a team of scientists who used data from NASA's Chandra X-ray Observatory as well as from radio, optical and other X-ray telescopes.
http://www.nasa.gov/mission_pages/chandra/news/cygnusx1.html

Hubble confirms that galaxies are the ultimate recyclers
New observations by NASA's Hubble Space Telescope are expanding astronomers' understanding of the ways in which galaxies continuously recycle immense volumes of hydrogen gas and heavy elements. This process allows galaxies to build successive generations of stars stretching over billions of years.
http://www.astronomy.com/~/link.aspx?_id=052924a3-c433-49fe-8d59-9c131d64ebea

Aliens don't need a moon like ours
TALK about being over the moon. It seems planets don't need a big satellite like Earth's in order to support life, increasing the number on which life could exist. In 1993, Jacques Laskar of the Paris Observatory in France and colleagues showed that the moon helps stabilise the tilt of Earth's rotation axis against perturbations by Jupiter's gravity. The researchers calculated that without the moon, Jupiter's influence would make the current tilt of some 23 degrees wander chaotically between 0 and 85 degrees. That could cause huge climate swings, making it hard for life to survive, especially large, land-based organisms like us.
http://www.newscientist.com/article/mg21228384.600-aliens-dont-need-a-moon-like-ours.html

December Sky Data



Best time for deep sky observing this month:
December 16 through December 28

Mercury is at its greatest distance west of the Sun on December 23rd, and we may have a chance to see this elusive little planet before dawn. Between about December 16th and 24th, try looking out around 7:30 a.m. The planet Mars will be high in the south-west, and Saturn will be fairly high in the south. Draw a line from Mars to Saturn and continue the same distance again, to find Mercury, low down in the south-east.

Venus is visible low in the south-western sky immediately after sunset. At the start of December, Venus sets just after 5 pm, but it sets later each evening; by the end of the month, it stays above the horizon until after 6:30 pm, when the sky is quite dark.

Mars is rising in the east late in the evening, and it's high in the southern sky before dawn. Relative to the stars, the "Red Planet" is moving steadily south-eastwards in the constellation of Leo. Throughout the month, as the Earth draws closer to Mars, Mars grows brighter.

Jupiter is well up in the south-eastern sky at dusk. Relative to the stars, it is moving very slowly westwards on the Aries-Pisces border. It doesn't set in the west until the early hours of the morning.

Saturn is rising in the east around 3 a.m., and it's well up in the southern sky at dawn. Relative to the stars, Saturn is in the constellation of Virgo, close to the upper left of its brightest star Spica, and moving gradually further left. Saturn appears a little brighter than Spica, and it shines with a steadier light.

One of the most reliable **meteor-showers** of the year is the Geminid shower, which occurs every December. Geminid meteors may be seen any time between December 7th and 16th. Their radiant point is close to the bright star Castor in Gemini, so it can be seen throughout the hours of darkness, though the best meteor numbers are usually seen after midnight. The peak this year is expected in the afternoon of Wednesday 14th

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
12/1/2010	11:37	23:31	06:40	16:40
12/5/2010	13:33	02:16	06:43	16:40
12/10/2010	17:00	06:51	06:47	16:40
12/15/2010	22:02	10:19	06:51	16:42
12/20/2010	02:25	13:18	06:54	16:44
12/25/2010	07:40	18:10	06:56	16:46
12/31/2010	11:04	------	06:58	16:50

Planet Data

Dec 1

	Rise	Transit	Set	Mag
Mercury	06:54	12:06	17:09	3.6
Venus	08:45	13:39	18:35	-3.9
Mars	23:21	05:57	12:35	0.7
Jupiter	14:30	21:07	03:44	-2.8
Saturn	03:00	08:46	14:35	0.7

Dec 15

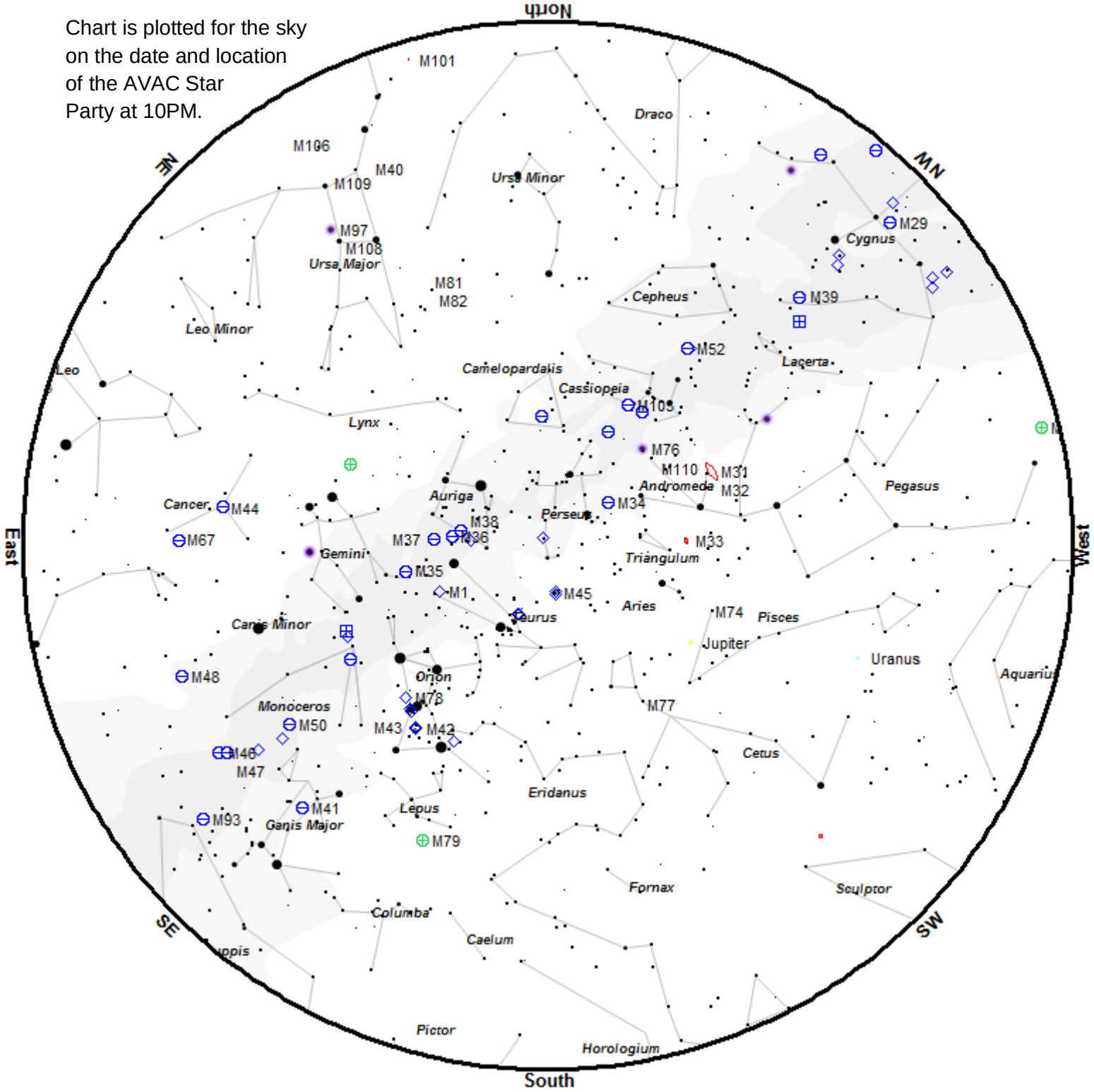
	Rise	Transit	Set	Mag
Mercury	05:07	10:23	15:42	0.0
Venus	08:59	14:00	19:01	-4.0
Mars	22:53	05:23	11:52	0.5
Jupiter	13:33	20:09	02:45	-2.7
Saturn	02:11	07:56	13:44	0.7

Dec 31

	Rise	Transit	Set	Mag
Mercury	05:24	10:29	15:31	-0.4
Venus	09:03	14:18	19:35	-4.0
Mars	22:12	04:38	11:03	0.2
Jupiter	12:29	19:06	01:42	-2.6
Saturn	01:14	06:57	12:45	0.7

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.



To use the chart, go outside within an hour or so of the time listed and hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge.

Suggested Observing List

The list below contains objects that will be visible on the night of the AVAC Star Party. The list is sorted by the best time to observe the object. The difficulty column describes how difficult it is to observe the object from the current location on a perfect night in a 6 inch Newtonian telescope.

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 13	Glob	5.8	Her	16h41m41.0s	+36°27'36"	17:49	18:03	18:34	easy
M 57	PNe	9.4	Lyr	18h53m35.1s	+33°01'45"	17:47	18:09	19:10	easy
NGC 6543	PNe	8.3	Dra	17h58m33.4s	+66°37'59"	17:41	18:10	18:18	obvious
M 56	Glob	8.4	Lyr	19h16m36.0s	+30°11'06"	17:56	18:10	18:13	detectable
M 71	Glob	8.4	Sge	19h53m46.0s	+18°46'42"	17:52	18:10	18:24	easy
NGC 7009	PNe	8.3	Aqr	21h04m10.9s	-11°21'48"	17:41	18:10	19:09	obvious
M 30	Glob	6.9	Cap	21h40m22.0s	-23°10'42"	17:54	18:10	18:52	detectable
M 27	PNe	7.3	Vul	19h59m36.3s	+22°43'16"	17:53	18:11	18:40	easy
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	17:53	18:12	19:13	easy
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	17:52	18:13	19:41	easy
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	17:52	18:13	19:37	easy
M 2	Glob	6.6	Aqr	21h33m27.0s	-00°49'24"	17:54	18:13	19:09	detectable
NGC 7293	PNe	6.3	Aqr	22h29m38.5s	-20°50'14"	17:54	18:13	18:14	detectable
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	17:54	18:14	19:43	easy
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	17:50	18:16	21:05	easy
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	17:46	18:17	22:01	obvious
IC 1396	Neb		Cep	21h39m06.0s	+57°30'00"	17:49	18:17	21:33	v. challenging
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	17:53	18:17	20:53	detectable
Cocoon	Neb	10.0	Cyg	21h53m24.0s	+47°16'00"	17:49	18:17	21:23	v. challenging
M 52	Open	8.2	Cas	23h24m48.0s	+61°35'36"	17:55	18:22	21:48	detectable
NGC 55	Gal	8.5	Scl	00h15m08.4s	-39°13'13"	17:58	18:25	19:29	difficult
NGC 7790	Open	7.2	Cas	23h58m24.0s	+61°12'30"	17:46	18:27	00:01	obvious
NGC 7789	Open	7.5	Cas	23h57m24.0s	+56°42'30"	17:56	18:27	21:58	detectable
M 110	Gal	8.9	And	00h40m22.3s	+41°41'09"	17:54	18:47	22:39	detectable
M 31	Gal	4.3	And	00h42m44.3s	+41°16'07"	17:49	18:50	23:28	easy
M 32	Gal	8.9	And	00h42m41.8s	+40°51'58"	17:49	18:50	23:27	easy
NGC 253	Gal	7.9	Scl	00h47m33.1s	-25°17'20"	18:29	18:54	19:20	detectable
NGC 288	Glob	8.1	Scl	00h52m45.0s	-26°35'00"	18:02	18:59	20:30	difficult
NGC 457	Open	5.1	Cas	01h19m35.0s	+58°17'12"	17:48	19:27	00:13	obvious
NGC 559	Open	7.4	Cas	01h29m31.0s	+63°18'24"	17:49	19:37	00:11	easy
M 103	Open	6.9	Cas	01h33m23.0s	+60°39'00"	17:47	19:40	00:15	obvious
M 33	Gal	6.4	Tri	01h33m50.9s	+30°39'36"	17:52	19:40	23:33	detectable
M 76	PNe	10.1	Per	01h42m19.9s	+51°34'31"	17:54	19:49	00:05	detectable
NGC 637	Open	7.3	Cas	01h43m04.0s	+64°02'24"	17:45	19:50	01:28	obvious
NGC 663	Open	6.4	Cas	01h46m09.0s	+61°14'06"	17:49	19:52	00:12	easy
NGC 752	Open	6.6	And	01h57m41.0s	+37°47'06"	18:05	20:04	22:33	challenging
NGC 869	Open	4.3	Per	02h19m00.0s	+57°07'42"	17:47	20:26	01:26	obvious
NGC 884	Open	4.4	Per	02h22m18.0s	+57°08'12"	17:47	20:29	01:24	obvious

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
Heart Neb.	Neb	6.5	Cas	02h33m52.0s	+61°26'50"	18:15	20:40	23:15	challenging
NGC 957	Open	7.2	Per	02h33m21.0s	+57°33'36"	17:50	20:40	00:13	easy
NGC 1027	Open	7.4	Cas	02h42m40.0s	+61°35'42"	17:55	20:49	00:12	detectable
M 34	Open	5.8	Per	02h42m05.0s	+42°45'42"	17:54	20:49	00:12	easy
M 77	Gal	9.7	Cet	02h42m40.8s	-00°00'48"	17:59	20:49	23:57	detectable
NGC 1245	Open	7.7	Per	03h14m42.0s	+47°14'12"	18:58	21:21	23:44	challenging
NGC 1342	Open	7.2	Per	03h31m38.0s	+37°22'36"	17:58	21:38	00:13	easy
M 45	Open	1.5	Tau	03h47m00.0s	+24°07'00"	17:52	21:53	01:30	obvious
NGC 1444	Open	6.4	Per	03h49m25.0s	+52°39'30"	17:47	21:56	03:25	obvious
NGC 1502	Open	4.1	Cam	04h07m50.0s	+62°19'54"	17:45	22:14	04:13	obvious
NGC 1528	Open	6.4	Per	04h15m23.0s	+51°12'54"	17:55	22:22	01:12	easy
Hyades	Open	0.8	Tau	04h26m54.0s	+15°52'00"	18:17	22:32	01:11	easy
NGC 1647	Open	6.2	Tau	04h45m55.0s	+19°06'54"	19:27	22:52	00:12	detectable
NGC 1664	Open	7.2	Aur	04h51m06.0s	+43°40'30"	18:04	22:57	02:17	easy
NGC 1746	Open	6.1	Tau	05h03m50.0s	+23°46'12"	19:35	23:10	00:13	detectable
NGC 1851	Glob	7.1	Col	05h14m06.0s	-40°02'48"	22:04	23:20	00:11	detectable
M 38	Open	6.8	Aur	05h28m40.0s	+35°50'54"	19:23	23:35	00:12	detectable
M 1	Neb	8.4	Tau	05h34m30.0s	+22°01'00"	21:37	23:40	00:13	challenging
M 43	Neb	9.0	Ori	05h35m30.0s	-05°16'00"	20:30	23:41	01:47	challenging
M 42	Neb	4.0	Ori	05h35m18.0s	-05°23'00"	20:31	23:41	02:14	easy
M 36	Open	6.5	Aur	05h36m18.0s	+34°08'24"	18:47	23:42	03:28	easy
M 78	Neb	8.0	Ori	05h46m48.0s	+00°05'00"	20:22	23:52	02:08	challenging
M 37	Open	6.2	Aur	05h52m18.0s	+32°33'12"	19:14	23:58	03:29	easy
NGC 2129	Open	7.0	Gem	06h01m07.0s	+23°19'20"	19:34	00:07	04:06	obvious
M 44	Open	3.9	Cnc	08h40m24.0s	+19°40'00"	22:20	00:11	05:35	easy
NGC 2301	Open	6.3	Mon	06h51m45.0s	+00°27'36"	21:25	00:11	03:36	easy
NGC 2353	Open	5.2	Mon	07h14m30.0s	-10°16'00"	22:31	00:11	04:06	easy
NGC 2451	Open	3.7	Pup	07h45m23.0s	-37°57'21"	23:31	00:11	03:42	easy
M 82	Gal	9.0	UMa	09h55m52.4s	+69°40'47"	21:37	00:12	05:45	easy
M 81	Gal	7.8	UMa	09h55m33.1s	+69°03'56"	21:39	00:12	05:43	detectable
M 35	Open	5.6	Gem	06h09m00.0s	+24°21'00"	19:56	00:12	03:13	easy
NGC 2392	PNe	8.6	Gem	07h29m10.8s	+20°54'42"	21:07	00:12	05:43	obvious
NGC 2175	Open	6.8	Ori	06h09m39.0s	+20°29'12"	20:33	00:11	00:12	detectable
NGC 2506	Open	8.9	Mon	08h00m01.0s	-10°46'12"	23:31	00:11	00:12	difficult
M 46	Open	6.6	Pup	07h41m46.0s	-14°48'36"	23:24	00:11	03:22	detectable
M 93	Open	6.5	Pup	07h44m30.0s	-23°51'24"	22:48	00:11	04:07	easy
NGC 2169	Open	7.0	Ori	06h08m24.0s	+13°57'54"	20:03	00:12	03:58	obvious
NGC 2355	Open	9.7	Gem	07h16m59.0s	+13°45'00"	22:26	00:12	00:13	difficult
M 67	Open	7.4	Cnc	08h51m18.0s	+11°48'00"	23:16	00:12	00:13	detectable
NGC 2264	Open	4.1	Mon	06h40m58.0s	+09°53'42"	20:47	00:12	03:47	obvious
NGC 2237	Neb	5.5	Mon	06h32m02.0s	+04°59'10"	22:54	00:12	00:13	challenging
M 50	Open	7.2	Mon	07h02m42.0s	-08°23'00"	22:11	00:12	02:30	detectable
NGC 2440	PNe	11.5	Pup	07h41m55.4s	-18°12'31"	23:46	00:12	00:13	detectable
NGC 2423	Open	7.0	Pup	07h37m06.0s	-13°52'18"	23:13	00:12	03:43	easy
M 47	Open	4.3	Pup	07h36m35.0s	-14°29'00"	23:17	00:12	04:07	obvious

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
NGC 2360	Open	9.1	CMa	07h17m43.0s	-15°38'30"	23:34	00:12	00:13	challenging
M 41	Open	5.0	CMa	06h46m01.0s	-20°45'24"	23:13	00:12	00:13	easy
NGC 2571	Open	7.4	Pup	08h18m56.0s	-29°45'00"	23:34	00:12	04:37	easy
NGC 2439	Open	7.1	Pup	07h40m45.0s	-31°41'36"	23:15	00:12	03:32	easy
NGC 2477	Open	5.7	Pup	07h52m10.0s	-38°31'48"	23:37	00:12	03:50	easy
NGC 2546	Open	5.2	Pup	08h12m15.0s	-37°35'42"	01:26	02:23	03:20	difficult
NGC 2547	Open	5.0	Vel	08h10m09.0s	-49°12'54"	02:48	03:30	04:12	detectable
IC 2391	Open	2.6	Vel	08h40m32.0s	-53°02'00"	03:37	04:00	04:25	detectable
IC 2395	Open	4.6	Vel	08h42m30.0s	-48°06'48"	02:57	04:02	05:07	easy
NGC 3227	Gal	11.5	Leo	10h23m30.6s	+19°51'54"	02:02	04:42	05:41	difficult
NGC 3242	PNe	8.6	Hya	10h24m46.1s	-18°38'32"	03:47	05:05	05:36	obvious
M 66	Gal	9.7	Leo	11h20m14.9s	+12°59'30"	03:00	05:06	05:30	detectable
M 106	Gal	9.1	CVn	12h18m57.6s	+47°18'13"	03:02	05:07	05:28	detectable
M 65	Gal	10.1	Leo	11h18m55.7s	+13°05'32"	03:04	05:07	05:28	detectable
Col 256	Open	2.9	Com	12h25m06.0s	+26°06'00"	03:05	05:08	05:31	easy
M 94	Gal	8.7	CVn	12h50m53.1s	+41°07'12"	03:07	05:08	05:30	easy
NGC 3132	PNe	8.2	Vel	10h07m01.8s	-40°26'11"	03:31	05:08	05:35	easy
NGC 3132	PNe	8.2	Vel	10h07m01.8s	-40°26'11"	03:31	05:08	05:35	easy
M 101	Gal	8.4	UMa	14h03m12.4s	+54°20'53"	03:57	05:09	05:27	detectable
NGC 5195	Gal	10.5	CVn	13h29m59.6s	+47°15'58"	03:46	05:09	05:27	detectable
M 51	Gal	8.7	CVn	13h29m52.3s	+47°11'40"	03:25	05:09	05:30	easy
NGC 4565	Gal	10.1	Com	12h36m20.8s	+25°59'15"	04:00	05:09	05:25	difficult
M 64	Gal	9.3	Com	12h56m43.8s	+21°41'00"	03:47	05:09	05:29	detectable
M 86	Gal	9.8	Vir	12h26m12.2s	+12°56'44"	04:00	05:09	05:27	detectable
M 84	Gal	10.1	Vir	12h25m03.9s	+12°53'12"	03:49	05:09	05:27	detectable
M 87	Gal	9.6	Vir	12h30m49.2s	+12°23'29"	03:51	05:09	05:27	detectable
M 49	Gal	9.3	Vir	12h29m46.8s	+08°00'01"	03:55	05:09	05:27	detectable
M 3	Glob	6.3	CVn	13h42m11.0s	+28°22'42"	04:17	05:10	05:28	easy
M 104	Gal	9.1	Vir	12h39m59.3s	-11°37'22"	04:22	05:12	05:28	detectable
3C 273.0	QSO	12.8	Vir	12h29m06.7s	+02°03'08"	04:23	05:12	05:28	difficult
3C 273.0	QSO	12.8	Vir	12h29m06.7s	+02°03'08"	04:23	05:12	05:28	difficult
M 97	PNe	11.0	UMa	11h14m47.7s	+55°01'09"	00:20	05:13	05:50	challenging
M 68	Glob	7.3	Hya	12h39m28.0s	-26°44'36"	04:55	05:15	05:25	detectable
NGC 3228	Open	6.4	Vel	10h21m22.0s	-51°43'42"	04:52	05:19	05:34	easy

A.V.A.C. Information

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The Club has three categories of membership.

- Family membership at $30.00 per year.
- Individual membership at $25.00 per year.
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Membership entitles you to…

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