



Desert Sky Observer

Volume 32

Antelope Valley Astronomy Club Newsletter

December 2012

Up-Coming Events

December 15: Annual Club Christmas Party @ [Embassy Suites Palmdale](#)

* 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

'Twas the night before Christmas, when all through the dome
Not a creature was stirring, I was observing alone;

The cables were hung by the camera with care,
In hopes that the Horsehead soon would be there;

The eyepieces were nestled all snug in their case,
While images from CCD's glowed in their place;

And I in my cap at the computer control station,
Had just settled down for a long integration;

When out on the lawn there arose such a clatter,
I sprang from the mount to see what was the matter.

Away to the dome slit I flew like a flash,
Tore open the shutters and threw up the sash.

The red l.e.d. of my new flashlight,
Gave the lustre of mid-day to objects in sight,

When, what to my dark-adapted eyes should appear,
But a miniature sleigh, and eight tiny reindeer,

With headlights a blazing, he hadn't a clue and
I knew in a moment that my session was ruined.

We interrupt this Christmas poem for the rest of my article as it would probably take me well into the New Year to finish mangling Clement Moore's "A Visit from St. Nicholas". Still, it's that time of year to reflect on friends and family and the coming New Year. While we have only the Christmas Party (see the articles below!) this month – no meeting and no star party – we



have much to look forward to in the coming year. Exciting guest speakers, new dome shows and lots of star parties. Possibly a session on the 100" Hooker telescope at Mt. Wilson and a number of club events with the 20" AINA scope alongside the 24" LooneyScope if we're lucky!

As we speak, plans for next year's Youth Exploring Astronomy contest are underway. There will be trips to Mt. Pinos, Red Rocks, Brite Lake and Devil's Punchbowl and possibly even longer "star safaris" if we can work out the details.

Still, before we can start the New Year we have to end this year. And what better way to do that than to join your fellow AVAC members for a festive Christmas Party on the 15th of December. I won't give away all the details but I promise lots of goodies for the raffle and silent auction so be sure to get your tickets ASAP and I'll see you there! By the way, can you name all ten reindeer? That's Dasher, Dancer, Prancer, Vixen, Comet, Cupid, Donner and Blitzen. Then, of course, Rudolf and Olive – you know, "Olive, the other reindeer."



Vice President

Doug Drake

Hi everyone, well it's the end of the year and I'll be turning the VP job over to Frank. He will take care of the Club Picnic and the Christmas Party for 2013. Frank will do a good job as he always does, thanks Frank.

I have everything setup for this Christmas Party, December 15 at 6:00pm. I've been with the club since 1997 and I know you are part of the best Astronomy Club ever! You have an excellent Board to keep the club moving forward. See you at the Christmas Party to say, "Merry Christmas"!



Director of Community Development

Rose Moore

Our club Christmas Party is fast approaching!! See Doug's note above!

If you want to attend, please let Doug or Virginia know as soon as possible! Doug needs a head count for the restaurant by Nov. 30th. So if you haven't signed up and would like to attend, please contact them! I'm including the PayPal link again for those who can pay online, <http://www.avastronomyclub.org/christmas.html>.

Please submit your vote for the Keith Lawson award or the Holland Fountain award!

There is possibly one event for December, and that is the Amargosa Creek Star Party. This has tentatively been rescheduled from November due to bad weather. It is possibly set for Tuesday, Dec. 11th, at 5:30-7:30pm. More information will be coming as we get closer to the date, and if and when we know it's definitely scheduled. This event coincides with their annual Science Fair. I will need help with members with telescopes!

Everyone have a safe and happy holiday season, Merry Christmas and a Happy New Year!



Secretary

Frank Moore

Hello friends. I missed all of you at the last AVAC meeting because I was at the [Arizona Science and Astronomy Expo](#) at the Convention Center in Tucson, AZ. This was a huge show, dwarfing anything similar in California, featuring manufacturers, vendors, organizations, and government agencies affiliated with astronomy, astrophysics, and many related sciences. In addition to the events at the convention center, the expo offered events at remote sites like the Kitt Peak Nation Observatory, Mount Lemmon Sky Center, and tours of the Steward Mirror Lab at the University of Arizona.

On the first day of the expo, the International Dark Sky Association, which is based in Tucson, was having its Annual General Meeting in one of the ballrooms. I had told IDA Managing Director Scott Kardel that I might show up for a little while, and listen to a few of the speakers, but that I didn't want to commit an entire day to attending the whole meeting. Once I got there, I was so fascinated with the international roster of speakers, all of them IDA members and affiliates, that I couldn't leave and ended up staying through the entire meeting and reception following.

The meeting began with a participatory workshop, or “round table discussion”, on effective dark sky advocacy. Much of the discussion was led by Bill Wren, the retired public affairs director of the University of Texas McDonald Observatory, who now serves as a special assistant to the observatory superintendent and whose main mission is to educate West Texans on observatory-friendly lighting practices. More on this later.

This was followed by Dr. Connie Walker from the National Optical Astronomy Observatory (NOAO) and director of the [Globe at Night](#) program. In addition to discussion of GLOBE at Night's many programs, her primary focus was to present the dark sky advocacy infomercial, “Losing the Dark”, by Loch Ness Productions. “Losing the Dark” is a six minute dome show intended for presentation before or during a planetarium's normal programming. Once this is ready for distribution, we will make every effort to get it for the SAGE Planetarium.

Next up was Mike Simmons, President of [Astronomers Without Borders](#), who made a presentation on behalf of Xiaohua Wang, from IDA China, on their success in creating International Dark Sky Parks in China. According to Mike, Americans have the impression that the government in China would make it difficult to get things done, especially where an ecological endeavor like preserving the night sky is concerned. However, they have found that the opposite is true and that one person, with the stroke of a pen, can “move mountains” in China. Xiaohua Wang was successful in pitching dark skies as a tourism issue to Chinese government officials however, since the word “dark” has a negative connotation in Asia, the resulting astronomy preserves are called. “Starry Sky Parks”. Several of these are being built, in very dark locales, with the intention of bringing Chinese locals and international visitors for astronomy vacations.

Next, in a videotaped presentation, Dr. Christopher Kyba, physicist at the Freie Universität in Berlin and an IDA Board Member, gave a wide ranging talk on the history of light pollution, how animals use the polarization of natural sun and star light as a “celestial compass” to navigate (even at night), and the health effects of light pollution including how it killed hamsters in lab experiments. He described how artificial lighting in our cities has created societies wherein the inhabitants suffer from a form of “permanent jet lag” because it suppresses the production of melatonin. This has been proven to result in increased incidence of

more rapidly spreading cancers and obesity, He described how modern society has destroyed what he describes as “circadian hygiene”.

One of the most dynamic, informative, and entertaining presenters was Ranger Kevin Poe also known as “[The Dark Ranger](#)” from [Bryce Canyon National Park](#). The rangers at Bryce Canyon NP, led by Kevin Poe, have established such a successful astronomy program that rangers from other National Parks are sent to Bryce for “astronomy boot camps” to learn how to establish these programs at their parks. Kevin describes the night sky as “The Greatest Show on Earth” and pitches dark sky awareness to governments and communities by telling them, “darkness is money”.

The astronomy program at Bryce has become so successful that during the summer months Bryce Canyon offers astronomy programs every Tuesday, Thursday, and Saturday, night at two different venues to accommodate the crowds. One of the themes of the National Parks Service's Centennial Platform is, “**Half the park is after dark.**”

Also at Bryce are exciting Full Moon hikes Usually offered on the night before and the night of the full moon. Finally astronomy continues all year long at Bryce! Nearly every Saturday night you catch a winter astronomy program. Bryce's Dark Rangers are a hardy bunch, they won't cancel a show until the still air temperature drops below -20F! Besides, as they say, “the colder the air the better the stargazing!”

Information on the year round astronomy programs at Bryce Canyon National Park can be found here: <http://www.nps.gov/bryce/planyourvisit/astronomyprograms.htm>

Kevin also made a lengthy presentation on the how losing the night sky causes us to lose our connection to our culture through the loss of our “Star Stories” and how darkness makes high quality habitat for animals. As Kevin says, “Darkness is noisy” (with sound of wildlife).

Kevin shares his presentations on astronomy and dark skies freely and encourages their download and use. His YouTube channel can be found here: <http://www.youtube.com/iamthedarkranger>

His PowerPoint presentations, which he encourages others to, “**Download & Personalize, Borrow, Learn, Practice and Share**”, can be found here: <http://www.slideshare.net/iamthedarkranger/presentations>

Martin Morgan-Taylor, a law professor at De Montfort University School of Law, in Leicester, UK, and an IDA Board Member, gave a presentation on “Legal Methods for Regulating Light Pollution”. He gave examples of good and bad lighting in the UK and had some especially entertaining slides on instances where good lights, were installed wrong, and thus creating bad light. He noted that one of the ways the UK is trying to deal with light pollution is via “passive enforcement”, with industry cooperation, wherein industry is including “Good Lighting Guides”, with detailed usage and installation instructions, in the packaging for outdoor lighting products sold in the UK.

He also detailed the needs for governments to establish uniform definitions for terms such as “light pollution” and “light trespass”, and how uniform, objective, standards of measurement must be established.

Now, back to Bill Wren. I mentioned him at the beginning of this article. I noted that Bill Wren is now “a special assistant to the McDonald Observatory superintendent and whose main mission is to educate West Texans on observatory-friendly lighting practices”. The reason for this position? After many years of effort the McDonald Observatory has been successful in getting the Texas State Legislature to establish the “West Texas Dark Sky Reserve” This legislation is described as a “one-of-a-kind” state law aiming to protect the region’s “one-of-a-kind skies.” Under this law, any county or municipality in Texas, wherein ANY part of that county is within 57 miles of the McDonald Observatory, MUST establish dark sky friendly outdoor lighting regulations in order to help preserve the science at the McDonald Observatory. So far, the counties of Jeff Davis, Brewster, Presidio, Pecos, Reeves, Culberson and Hudspeth have come into

compliance with the law and have passed, and are enforcing, appropriate dark sky friendly lighting standards.

This has actually proved to be a boon for many West Texas communities as Texas' state, county, and national parks, which have struggled with falling visitor numbers and budget cuts for many years, are promoting opportunities for night-sky viewing, away from city lights, in their quest to lure people back to the parks. [Big Bend National Park](#), which is in Brewster County (one of the counties affected by the dark sky/outdoor lighting legislation), has been designated as an "**International Dark Sky Park**" and one of ten places in the world certified as a "gold tier" park to have especially dark night skies, favored for stargazing, by the International Dark Sky Association. According to the International Dark-Sky Association, Big Bend has the darkest measured skies in the lower 48 states and is the largest park in the world with the designation.

Finally, Bob Parks, Executive Director of the IDA, outlined the goals of the IDA in the coming years. Among these are that:

- Awareness is still our primary goal to achieve Dark Sky Preservation.
- We must promote research because the knowledge gained allows us to win arguments.
- We will continue to develop technical standards like the IDA's Model Lighting Ordinance (MLO)

We MUST get in on the ground floor in informing industry and government about the Solid State Lighting (SSL) Revolution. Solid state lights last for 40 years or more and, if they continue to install Blue/White LED lights, in the frequencies and lighting temperatures that are the worst for the night sky, we will have to live with it for decades. The IDA is trying to lead the SSL Revolution in the direction of warmer colors with "true amber" being the current goal.

Support and promote legislation.

Monitor night sky brightness. In this regard, the IDA's Night Sky Monitoring Committee has finalized new standards for night sky brightness monitoring instruments. (NAB). They have already installed many of these at observatories and other locations throughout the world and will continue to do so in order to establish a worldwide database of night sky brightness.

And finally, my little personal appeal. The IDA, like many non-profit organizations, is struggling through reduced donations and corporate sponsorship in these trying economic times. They have cut staff significantly, while still continuing to fulfill their mission, but can't do everything that they have in the past. If dark skies are important to you, and you haven't already, I encourage you to consider joining or donating to the IDA. Let's turn back the clock on light pollution and regain our night sky. <http://www.darksky.org/>

Happy Holidays, and dark skies to you all.

Space Place

It Takes More Than Warm Porridge to Make a Goldilocks Zone

By Diane K. Fisher

The “Goldilocks Zone” describes the region of a solar system that is just the right distance from the star to make a cozy, comfy home for a life-supporting planet. It is a region that keeps the planet warm enough to have a liquid ocean, but not so warm that the ocean boils off into space. Obviously, Earth orbits the Sun in our solar system’s “Goldilocks Zone.”

But there are other conditions besides temperature that make our part of the solar system comfortable for life. Using infrared data from the Spitzer Space Telescope, along with theoretical models and archival observations, Rebecca Martin, a NASA Sagan Fellow from the University of Colorado in Boulder, and astronomer Mario Livio of the Space Telescope Science Institute in Baltimore, Maryland, have published a new study suggesting that our solar system and our place in it is special in at least one other way.

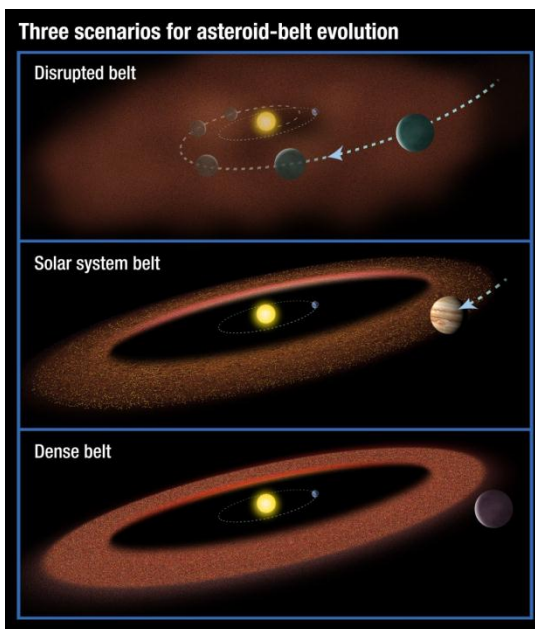
This fortunate “just right” condition involves Jupiter and its effect on the asteroid belt.

Many other solar systems discovered in the past decade have giant gas planets in very tight orbits around their stars. Only 19 out of 520 solar systems studied have Jupiter-like planets in orbits beyond what is known as the “snow line”—the distance from the star at which it is cool enough for water (and ammonia and methane) to condense into ice. Scientists believe our Jupiter formed a bit farther away from the Sun than it is now. Although the giant planet has moved a little closer to the Sun, it is still beyond the snow line.

So why do we care where Jupiter hangs out? Well, the gravity of Jupiter, with its mass of 318 Earths, has a profound effect on everything in its region, including the asteroid belt. The asteroid belt is a region between Mars and Jupiter where millions of mostly rocky objects (some water-bearing) orbit. They range in size from dwarf planet Ceres at more than 600 miles in diameter to grains of dust. In the early solar system, asteroids (along with comets) could have been partly responsible for delivering water to fill the ocean of a young Earth. They could have also brought organic molecules to Earth, from which life eventually evolved.

Jupiter’s gravity keeps the asteroids pretty much in their place in the asteroid belt, and doesn’t let them accrete to form another planet. If Jupiter had moved inward through the asteroid belt toward the Sun, it would have scattered the asteroids in all directions before Earth had time to form. And no asteroid belt means no impacts on Earth, no water delivery, and maybe no life-starting molecules either. Asteroids may have also delivered such useful metals as gold, platinum, and iron to Earth’s crust.

But, if Jupiter had not migrated inward at all since it formed father away from the Sun, the asteroid belt would be totally undisturbed and would be a lot more dense with asteroids than it is now. In that case, Earth would have been blasted with a lot more asteroid impacts, and life may have never had a chance to take root.



Our solar system is represented by the middle scenario, where the gas giant planet has migrated inward, but still remains beyond the asteroid belt.

The infrared data from the Spitzer Space Telescope contributes in unexpected ways in revealing and supporting new ideas and theories about our universe. Read more about this study and other Spitzer contributions at spitzer.caltech.edu. Kids can learn about infrared light and enjoy solving Spitzer image puzzles at spaceplace.nasa.gov/spitzer-slyder.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Winter Solstice by Paul Derrick

The winter solstice, the first day of winter and the shortest day and longest night of the year in the Northern Hemisphere, falls on December 21 this year.

Have you ever wondered about the word "solstice?" Literally, it means "the Sun stands still," and it happens twice each year, at winter and summer solstice. Of course, the Sun really doesn't stand still--indeed it doesn't even move as it's apparent daily movement across our sky comes from Earth's rotation on its axis.

What does stand still is the Sun's rising and setting point on the horizon. The Earth's 23 1/2 degree tilt on its axis which produces seasons also causes the Sun to rise and set at a slightly different place on the horizon each day of the year. At the spring equinox the Sun rises exactly due east and sets exactly due west, making day and night each 12 hours in length.

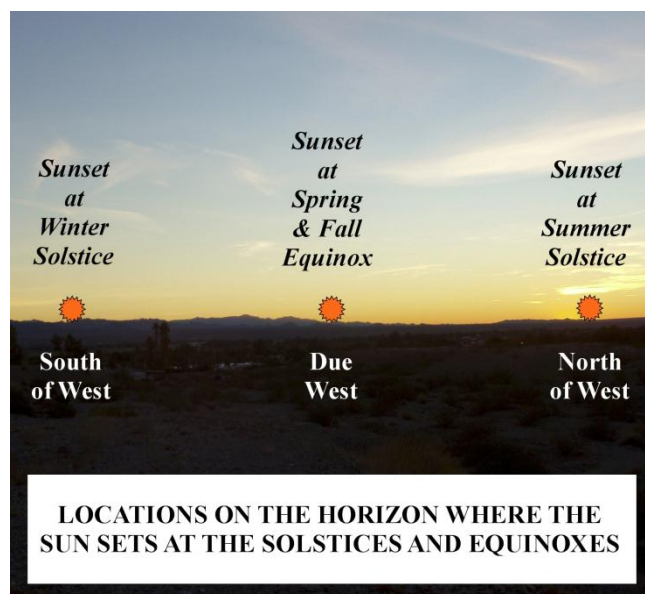
Each day thereafter it rises slightly north of east and sets slightly north of west. Since the Sun's path across the sky tilts to the south in our hemisphere, the Sun is in the sky slightly longer each day, and days grow increasingly longer than nights until the summer solstice. Then the gradual daily northward movement of the Sun's rising and setting points stops and the Sun "stands still." The day of the summer solstice is the year's longest day with the Sun in the sky longer than any other day--at our latitude about 14 hours.

The Sun then reverses course and begins retracing its steps, rising and setting slightly south of where it rose and set the previous day, making each day slightly shorter. At the fall equinox, when it again rises and sets due east and west, the day and night are again of equal length.

The rising and setting points continue to gradually move southward until the winter solstice when the Sun again "stands still" on the year's shortest day--about 10 hours for us. So next week when the Sun stands still at its southern-most rising and setting points, it will be the shortest day of the year and the beginning of winter, but it also means each day thereafter we can look forward to gradually longer days until the summer solstice.

Knowledge of the movements of the Sun, Moon, planets and stars was important in the lives of the ancients, thus they were quite in tune with rhythms of nature, like the solstices. That we moderns no longer are, I think, is our loss.

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News Headlines

'Super-Jupiter' Discovery Dwarfs Solar System's Largest Planet

In a rare direct photo of a world beyond Earth, astronomers have spotted a planet 13 times more massive than Jupiter, the largest planet in our own solar system. The planet orbits a star called Kappa Andromedae that is 2.5 times the mass of the sun and is located 170 light-years away from Earth.

<http://www.space.com/18522-super-jupiter-alien-planet-photo.html>

NASA's Kepler Completes Prime Mission, Begins Extended Mission

NASA is marking two milestones in the search for planets like Earth -- the successful completion of the Kepler Space Telescope's 3 1/2- year prime mission and the beginning of an extended mission that could last as long as four years. Scientists have used Kepler data to identify more than 2,300 planet candidates and confirm more than 100.

http://www.nasa.gov/mission_pages/kepler/news/kepler_prime_mission.html

Born-Again Star Foreshadows Fate of Solar System

Astronomers say evidence of a dying sun-like star coming briefly back to life after throwing off its gassy shells shows the possible fate our own solar system. The "born-again" star, Abell 30, was captured in a composite of visible images from NASA's Hubble Space Telescope and X-ray data from the European Space Agency's XMM-Newton and NASA's Chandra space telescopes, a release from the Paris headquarters of the ESA said Thursday.

http://www.esa.int/esaCP/SEM0UBGPI9H_index_0.html

'Rogue' alien planet found wandering nearby

Astronomers have discovered a potential "rogue" alien planet wandering alone just 100 light-years from Earth, suggesting that such starless worlds may be extremely common across the galaxy. The free-floating object, called CFBDSIR2149, is likely a gas giant planet four to seven times more massive than Jupiter, scientists say in a new study unveiled Tuesday. The planet cruises unbound through space relatively close to Earth (in astronomical terms), perhaps after being booted from its own solar system.

<http://www.foxnews.com/science/2012/11/15/orphan-alien-planet-found-nearby/>

New super-Earth in six-planet system may be just right to support life

A new super-Earth planet that may have an Earth-like climate and be just right to support life has been discovered around a nearby star by an international team of astronomers. The new super-Earth planet exists in the habitable zone of a nearby star and is part of a six-planet system. The system was previously thought to contain three planets in orbits too close to the star to support liquid water.

http://www.astronomy.com/~link.aspx?_id=a2fd14bc-2d2f-4e1d-a380-b0721a0024d1

Comet Collisions Fuel Star's Oddly Young Look

A cosmic mystery around the star named 49 CETI has puzzled astronomers nearly two decades, but it may finally be solved. At 40 million years old, the star is quite ancient, and yet it's surrounded by a tremendous amount of gas — a signature feature of young stars that usually fades within 10 million years, scientist say. So what keeps 49 CETI looking young? A new study suggests that a prolific number of comet collisions are rejuvenating the star's fresh appearance.

<http://www.space.com/18421-comet-collisions-explain-star-mystery.html>

December Sky Data

Best time for deep sky observing this month:
December 5 through December 16

Mercury is at its greatest distance west of the Sun on December 4th, and we have a chance to see this elusive little planet low in the south-eastern sky before dawn. The best period will be between November 28th and December 10th. Mercury will be low in the south-eastern sky around 7:30 am.

At the start of December, **Venus** is rising about 5:30 am, and by dawn the brilliant “Morning Star” is well up in the south-eastern sky. It outshines every other star-like object in the sky. Venus is moving rapidly south-eastwards out of Libra and across the northern part of Scorpius, to end the month in Ophiuchus.

Mars continues to lurk very low in the south-western sky at dusk; throughout December the “Red Planet” continues to set just as the sky is growing dark. It’s not very bright, and it won’t be easy to see.

The giant planet **Jupiter** is at opposition (to the Sun) on December 3rd. This means it rises at sunset, shines all night, and sets at sunrise. It’s moving very slowly westwards in the constellation of Taurus, just above the bright star Aldebaran.

Saturn is rising in the early hours of the morning, and it’s well up in the eastern sky at dawn, lying to the upper right of the much brighter planet Venus. At the start of December, Saturn is just 5 degrees away from Venus. But the two planets quickly draw apart, with Saturn climbing higher each morning as Venus sinks into the twilight. Saturn is moving very slowly south-eastwards, leaving Virgo and at last entering Libra.

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. The peak this year is expected in the evening of Friday 14th; that night we might expect to see one meteor every few minutes, if the sky is clear, and there will be no interference from moonlight.

Last Qtr
Dec 6

New
Dec 13

First Qtr
Dec 19

Full
Dec 28



Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
12/1/2012	19:33	08:58	06:41	16:40
12/5/2012	23:22	11:21	06:44	16:40
12/10/2012	03:41	14:30	06:48	16:41
12/15/2012	08:52	19:47	06:51	16:42
12/20/2012	11:53	-----	06:54	16:44
12/25/2012	14:57	04:34	06:57	16:47
12/31/2012	20:17	08:51	06:58	16:51

Planet Data

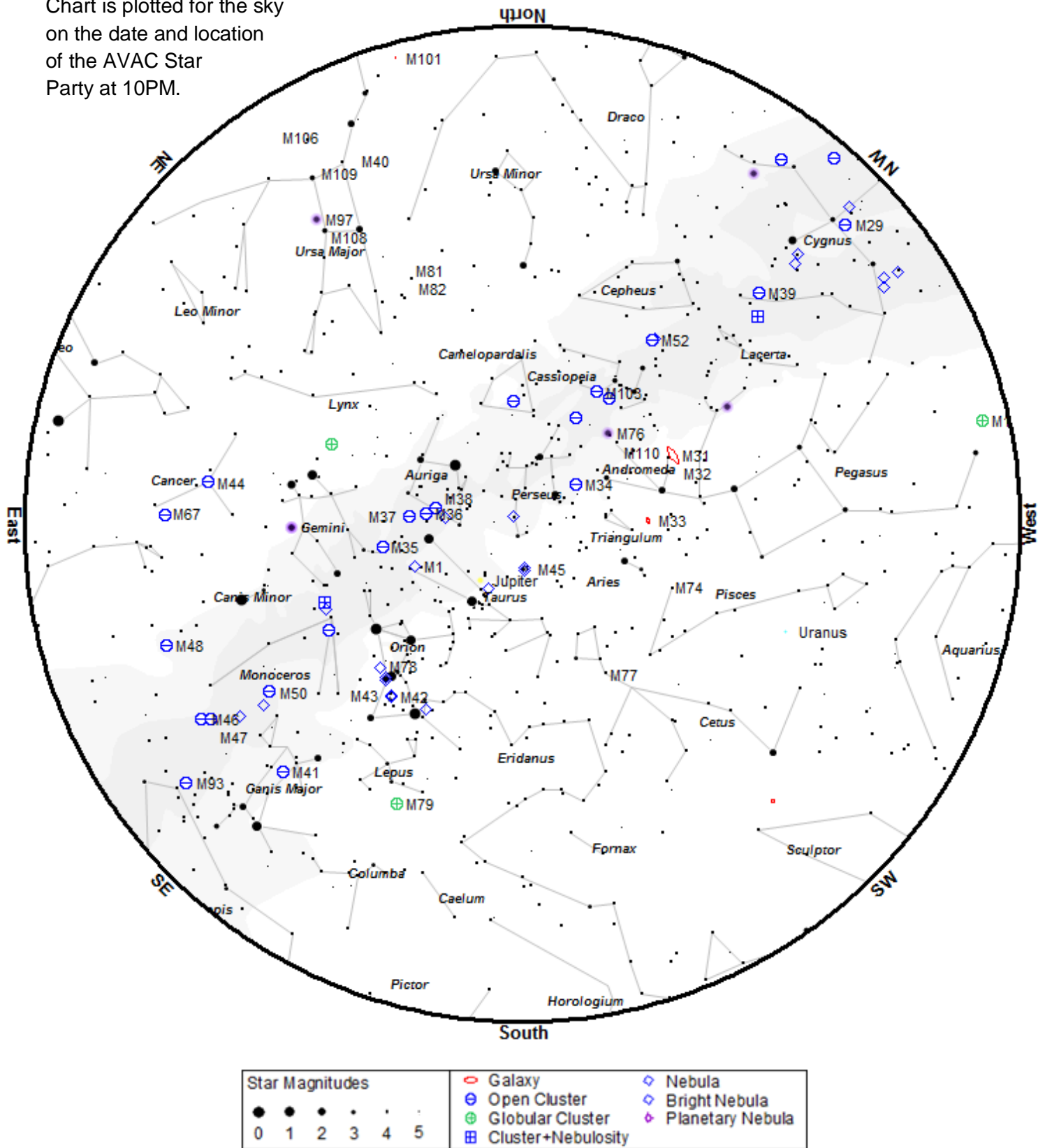
	Dec 1			
	Rise	Transit	Set	Mag
Mercury	04:56	10:19	15:44	-0.3
Venus	04:21	09:49	15:16	-4.0
Mars	08:59	13:56	18:53	1.2
Jupiter	16:35	23:45	06:55	-2.8
Saturn	03:50	09:24	15:02	0.6

	Dec 15			
	Rise	Transit	Set	Mag
Mercury	05:24	10:33	15:40	-0.5
Venus	04:50	10:03	15:16	-4.0
Mars	08:46	13:48	18:49	1.2
Jupiter	15:33	22:42	05:51	-2.8
Saturn	03:02	08:35	14:11	0.6

	Dec 31			
	Rise	Transit	Set	Mag
Mercury	06:17	11:13	16:07	-0.6
Venus	05:22	10:25	15:26	-3.9
Mars	08:27	13:37	18:47	1.2
Jupiter	14:23	21:32	04:40	-2.8
Saturn	02:05	07:37	13:13	0.6

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

Chart is plotted for the sky
on the date and location
of the AVAC Star
Party at 10PM.



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
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	17:52	18:11	19:20	easy
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	17:51	18:12	19:47	easy
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	17:51	18:12	19:43	easy
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	17:52	18:13	19:48	detectable
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	17:49	18:15	21:12	easy
Cocoon	Neb	10.0	Cyg	21h53m24.0s	+47°16'00"	17:48	18:16	21:30	challenging
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	17:46	18:17	22:08	obvious
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	17:53	18:17	20:59	detectable
M 52	Open	8.2	Cas	23h24m48.0s	+61°35'36"	17:54	18:21	21:54	detectable
NGC 7790	Open	7.2	Cas	23h58m24.0s	+61°12'30"	17:45	18:26	00:08	easy
NGC 7789	Open	7.5	Cas	23h57m24.0s	+56°42'30"	17:55	18:26	22:04	difficult
M 110	Gal	8.9	And	00h40m22.3s	+41°41'09"	17:52	18:47	22:45	detectable
NGC 559	Open	7.4	Cas	01h29m31.0s	+63°18'24"	17:46	19:46	01:45	easy
M 103	Open	6.9	Cas	01h33m23.0s	+60°39'00"	17:45	19:46	01:41	obvious
NGC 457	Open	5.1	Cas	01h19m35.0s	+58°17'12"	17:46	19:46	01:22	easy
M 31	Gal	4.3	And	00h42m44.3s	+41°16'07"	17:48	19:46	23:35	easy
M 32	Gal	8.9	And	00h42m41.8s	+40°51'58"	17:48	19:46	23:31	easy
M 33	Gal	6.4	Tri	01h33m50.9s	+30°39'36"	17:52	19:46	23:35	detectable
M 76	PNe	10.1	Per	01h42m19.9s	+51°34'31"	17:52	19:53	00:07	detectable
NGC 637	Open	7.3	Cas	01h43m04.0s	+64°02'24"	17:44	19:55	02:01	obvious
NGC 663	Open	6.4	Cas	01h46m09.0s	+61°14'06"	17:49	19:58	01:53	easy
NGC 752	Open	6.6	And	01h57m41.0s	+37°47'06"	18:08	20:09	22:32	challenging
NGC 869	Open	4.3	Per	02h19m00.0s	+57°07'42"	17:46	20:30	02:18	obvious
NGC 884	Open	4.4	Per	02h22m18.0s	+57°08'12"	17:46	20:33	02:21	obvious
NGC 957	Open	7.2	Per	02h33m21.0s	+57°33'36"	17:49	20:45	02:16	easy
Heart	Neb	6.5	Cas	02h33m52.0s	+61°26'50"	18:31	20:46	23:13	challenging
NGC 1027	Open	7.4	Cas	02h42m40.0s	+61°35'42"	17:55	20:54	01:27	detectable
M 77	Gal	9.7	Cet	02h42m40.8s	-00°00'48"	18:02	20:54	00:00	detectable
M 34	Open	5.8	Per	02h42m05.0s	+42°45'42"	17:53	20:54	01:19	detectable
NGC 1245	Open	7.7	Per	03h14m42.0s	+47°14'12"	19:21	21:26	23:43	challenging
NGC 1342	Open	7.2	Per	03h31m38.0s	+37°22'36"	17:57	21:43	01:59	detectable
M 45	Open	1.5	Tau	03h47m00.0s	+24°07'00"	17:51	21:58	02:35	obvious
NGC 1444	Open	6.4	Per	03h49m25.0s	+52°39'30"	17:47	22:01	03:37	obvious
NGC 1502	Open	4.1	Cam	04h07m50.0s	+62°19'54"	17:44	22:19	04:20	obvious
NGC 1528	Open	6.4	Per	04h15m23.0s	+51°12'54"	17:56	22:27	03:39	easy
NGC 1647	Open	6.2	Tau	04h45m55.0s	+19°06'54"	19:40	22:56	02:20	detectable
NGC 1664	Open	7.2	Aur	04h51m06.0s	+43°40'30"	18:09	23:02	04:02	easy
NGC 1746	Open	6.1	Tau	05h03m50.0s	+23°46'12"	19:46	23:15	02:46	detectable

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 38	Open	6.8	Aur	05h28m40.0s	+35°50'54"	19:33	23:40	03:50	detectable
M 1	Neb	8.4	Tau	05h34m30.0s	+22°01'00"	21:46	23:45	01:44	challenging
M 43	Neb	9.0	Ori	05h35m30.0s	-05°16'00"	20:36	23:46	02:57	challenging
M 42	Neb	4.0	Ori	05h35m18.0s	-05°23'00"	20:36	23:46	02:55	easy
M 36	Open	6.5	Aur	05h36m18.0s	+34°08'24"	18:55	23:47	04:42	easy
M 78	Neb	8.0	Ori	05h46m48.0s	+00°05'00"	20:28	23:57	03:28	challenging
M 37	Open	6.2	Aur	05h52m18.0s	+32°33'12"	19:22	00:03	04:47	easy
NGC 2129	Open	7.0	Gem	06h01m07.0s	+23°19'20"	19:39	00:11	04:46	obvious
NGC 2169	Open	7.0	Ori	06h08m24.0s	+13°57'54"	20:07	00:19	04:29	obvious
NGC 2175	Open	6.8	Ori	06h09m39.0s	+20°29'12"	20:39	00:20	04:00	detectable
M 35	Open	5.6	Gem	06h09m00.0s	+24°21'00"	20:02	00:20	04:37	easy
NGC 2237	Neb	5.5	Mon	06h32m02.0s	+04°59'10"	20:58	00:42	04:28	challenging
NGC 2264	Open	4.1	Mon	06h40m58.0s	+09°53'42"	20:50	00:51	04:52	easy
NGC 2301	Open	6.3	Mon	06h51m45.0s	+00°27'36"	21:31	01:02	04:33	easy
M 50	Open	7.2	Mon	07h02m42.0s	-08°23'00"	22:16	01:13	04:10	detectable
NGC 2353	Open	5.2	Mon	07h14m30.0s	-10°16'00"	22:37	01:25	04:13	easy
NGC 2355	Open	9.7	Gem	07h16m59.0s	+13°45'00"	22:43	01:27	04:11	difficult
NGC 2360	Open	9.1	CMa	07h17m43.0s	-15°38'30"	00:01	01:28	02:55	challenging
NGC 2392	PNe	8.6	Gem	07h29m10.8s	+20°54'42"	21:11	01:40	05:46	obvious
M 47	Open	4.3	Pup	07h36m35.0s	-14°29'00"	23:23	01:47	04:12	obvious
NGC 2423	Open	7.0	Pup	07h37m06.0s	-13°52'18"	23:18	01:47	04:15	easy
M 46	Open	6.6	Pup	07h41m46.0s	-14°48'36"	23:30	01:52	04:13	detectable
NGC 2506	Open	8.9	Mon	08h00m01.0s	-10°46'12"	00:13	02:10	04:07	challenging
M 44	Open	3.9	Cnc	08h40m24.0s	+19°40'00"	22:46	02:51	05:42	easy
M 67	Open	7.4	Cnc	08h51m18.0s	+11°48'00"	00:08	03:02	05:32	detectable
M 81	Gal	7.8	UMa	09h55m33.1s	+69°03'56"	22:16	04:06	05:44	detectable
M 82	Gal	9.0	UMa	09h55m52.4s	+69°40'47"	21:58	04:07	05:45	detectable
NGC 3227	Gal	11.5	Leo	10h23m30.6s	+19°51'54"	01:34	04:33	05:40	difficult
M 97	PNe	9.7	UMa	11h14m47.7s	+55°01'09"	01:01	05:08	05:42	detectable
M 65	Gal	10.1	Leo	11h18m55.7s	+13°05'32"	02:08	05:10	05:43	detectable
M 66	Gal	9.7	Leo	11h20m14.9s	+12°59'30"	02:04	05:11	05:42	detectable
M 106	Gal	9.1	CVn	12h18m57.6s	+47°18'13"	02:17	05:16	05:41	detectable
M 94	Gal	8.7	CVn	12h50m53.1s	+41°07'12"	02:21	05:18	05:43	detectable
M 87	Gal	9.6	Vir	12h30m49.2s	+12°23'29"	03:09	05:18	05:41	detectable
NGC 4565	Gal	10.1	Com	12h36m20.8s	+25°59'15"	03:25	05:18	05:40	difficult
M 86	Gal	9.8	Vir	12h26m12.2s	+12°56'44"	03:23	05:18	05:40	detectable
M 84	Gal	10.1	Vir	12h25m03.9s	+12°53'12"	03:08	05:18	05:42	detectable
M 49	Gal	9.3	Vir	12h29m46.8s	+08°00'01"	03:11	05:18	05:41	detectable
M 51	Gal	8.7	CVn	13h29m52.3s	+47°11'40"	02:35	05:19	05:45	easy
M 64	Gal	9.3	Com	12h56m43.8s	+21°41'00"	03:07	05:19	05:42	detectable
M 101	Gal	8.4	UMa	14h03m12.4s	+54°20'53"	03:30	05:20	05:40	detectable
NGC 5195	Gal	10.5	CVn	13h29m59.6s	+47°15'58"	03:11	05:20	05:41	detectable
M 3	Glob	6.3	CVn	13h42m11.0s	+28°22'42"	03:21	05:20	05:43	detectable
M 104	Gal	9.1	Vir	12h39m59.3s	-11°37'22"	04:10	05:20	05:42	detectable

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The Club has three categories of membership.

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**P.O. BOX 8545,
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president@avastronomyclub.org

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vice-president@avastronomyclub.org

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secretary@avastronomyclub.org

Treasurer:

Virgina Reed (661) 824-3932
treasurer@avastronomyclub.org

Director of Community Development:

Rose Moore (661) 972-1953
community@avastronomyclub.org

Appointed Positions

Newsletter Editor:

Steve Trotta (661) 269-5428
newsletter@avastronomyclub.org

Equipment & Library:

Bill Grove
library@avastronomyclub.org

Club Historian:

Tom Koonce (661) 943-8200
history@avastronomyclub.org

Webmaster:

Steve Trotta (661) 269-5428
webmaster@avastronomyclub.org

Astronomical League Coordinator:

Don Bryden (661) 270-0627
al@avastronomyclub.org

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