



# Desert Sky Observer

**Volume 30**

**Antelope Valley Astronomy Club Newsletter**

**November 2010**

## Up-Coming Events

**November 9:** Star Party @ [Devil's Punchbowl](#)

**November 12:** Club Meeting\*

**November 13:** Moon Walk @ [Prime Desert Woodlands](#)

**November 15:** Board meeting @ [Don's house](#)

\* 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 Don Bryden**

Everyone kept calling me about the weather for last month's star party at Red Cliffs. It looked bad – it had even rained the day before. Was I going to be there? How did it look? By sundown we hadn't even set up the scopes. But fortunately the sky cleared up and the stars came out. And just as Red Cliffs always is the seeing was fantastic. One particularly great sight was Comet Hartley 2. Actually it was very diffuse and dim but it was fun finding it and soon everyone had it in their field of view.

Two weeks later we joined the Boy Scouts out at Littlerock Dam. They had a number of questions for us relating to their belt loops and badge requirements and again we dodged the clouds and made a nice evening of it. There were even clouds last weekend at Super Science Saturday. Still the Sun put on a nice show with many prominences and at least four sunspot groups.

This month we'll be out at Devil's Punchbowl with the rangers for their last telescope night of the year. They have a nice pad to set up scopes and Ranger Dave will even make cocoa to ward off the cold. Also, in the coming weeks, join me online at our website forum pages. We'll be discussing the construction of the 13" Coulter truss tube project. Go to <http://www.avastronomyclub.org> and click the forum link on the top toolbar. You'll find the discussion under the ATM forum. Later, if there's interest, we may get together out at my garage and work on some of the construction.

Don't miss the meeting on the 12th either because Doug has another great speaker lined up (see the VP's report below). Finally we get to the end of 2010 and December. Still there is much to do as we'll have a small star party at my house on the 4th. And while there's no club meeting, don't miss the Christmas party at the Embassy Suites in Palmdale on the 11th. The Geminids peak on the 13-14 of December and while the club isn't officially sponsoring an event I would encourage everyone to head out and enjoy the show. The Rangers at the Punchbowl are having a meteor watch the evening of the 13th starting at 9pm.

Also, come out the SAGE Planetarium on Monday the 20th and observe the only total lunar eclipse of the year. The club will have scopes and cameras and Jeremy will have the planetarium open as well. Lastly I'd like to introduce our new executive board. Rose Moore is your new VP with Frank and Virginia remaining as secretary and treasurer. And welcome to Robert Lynch who will be taking over as Director of Community Development. Congratulations to one and all!



## Vice President

### Doug Drake

Our Club Christmas Party is quickly coming up (December 11th, Saturday, at 6:00PM) and will be held at the “Embassy Suits” in Palmdale just behind Best Buy. The address is 39375 5th St. West, Palmdale. Steve has set-up our web site (<http://www.avastronomyclub.org>) so you can register and pay (\$25.00 per person) for the Christmas Party. Steve will also have a map to the Embassy Suits. Payment must be made before November 28th. Frank Moore, Club Secretary, will be making telephone calls to remind members to register and I shall be sending out e-mail reminders.

In addition to great food and friends, we will have:

1. An opportunity drawing for prizes.
2. Table center-place giveaway.
3. Two free tickets given to each person.
4. A silent auction.

Please e-mail me (use “Contacts” in our club web site) if you have items to donate for the silent auction. I will also have a sign-up sheet at our November 12th club meeting.

Dr. Eric Becklin, Astronomer and Chief Scientist for the SOFIA Project will be our speaker at our next meeting, November 12. SOFIA is a 747 aircraft with a large infra-red telescope.

Welcome aboard Rose Moore to be our 2011 Vice President. Rose is very committed to our club and will be the best ever, wait and see



## Director of Community Development

### Rose Moore

Thanks to all for your support this year in the Community Development position! And now for another year on the Board! As many of you know, I've been in the VP position before, and found it somewhat difficult in finding speakers for our club. So for any of you out there with any suggestions for speakers, or know of a club member who would like to do a presentation, please contact me via the website!

Star Party for October was at Red Cliffs, and it was pretty awesome! I had never been there before, and thought the site was a great one for our club. I was able to finally find a comet, Hartley 2, on my own! I've seen naked eye comets before, but never one with the telescope that I located myself! So a first for me.

We had our Boy Scouts event at Littlerock Dam this month, another good site for our club, though the Moon was up and washed the sky out a bit!

They were expecting at least 100 scouts, different ages and scout levels, and some parents. We had many scouts and adults looking through the scopes and asking lots of questions. We also had a few of the older scouts spending a bit more time at our scope, asking questions, and just talking astronomy. Some of the scouts came with their lists of what they had to observe or ask information about. We had a wonderful time

and look forward to attending again! Many thanks to those members who came to help with this big event! A special thanks to Kathy and John Rennie from the scouts who linked up with us to organize this event!

We also had Joe Walker Super Science Saturday this month, another annual event for us. Many kids and adults came by to view the Sun. There was no Moon or visible planets up for us, so the Sun was the 'Star' of the day! We had a few groups of sunspots and some prominences visible. We passed out handouts, plus Darrell brought the complementary copies of Sky and Telescope that he obtained at PATS! Many thanks to all members who came out to support our club, especially Don, who brought his RV, breakfast from Mickey D's, and lots of snacks and drinks! As usual, we had a great time and look forward to attending this event again!

Special thanks for Wes Thomas for getting us signed up for the event and helping organize the event!

Our last Prime Desert Woodlands event is this month on Saturday, November 13th, starting at 5:30pm. Please come on out and support your club! Bring a telescope, or just come out to talk to the public about what we do and what our club can offer them. This is an informal fun event for the club, so see you there!

November's club meeting on Friday, November 12th, is our last for the year, so please come by, bring a friend or more, and come listen to Dr. Eric Becklin speak about the SOFIA Telescope project!

Don't forget about our upcoming Christmas Party in December, and don't forget to nominate a member for the Keith Lawson Award and the Holland Fountain Award.

Stay warm, and clear skies!

Rose



## Secretary

### Frank Moore

Well, it looks like Rose and I will be serving another year on the Board of the Antelope Valley Astronomy Club. That's what we get for not being at the Annual Business Meeting on October 8 when elections were held.

All kidding aside, it's a privilege to serve our club and we will strive to make this a wonderful and memorable year for club activities and public outreach.

We had good cause to be absent from the Annual Business Meeting since, at the time, we were attending "Family Weekend" at the University of Arizona, in Tucson, where our daughter Hannah is a freshman. To be more specific, at the EXACT time of the AVAC meeting, we were attending "Stargazing At The Steward" in the Steward Observatory on campus.

"Stargazing At The Steward" was one of the many events for which we could register during "Family Weekend". After attending various campus events throughout the day, and having dinner at the "Cellar Bistro" in the Student Union, we wandered over to the observatory with Hannah and three of her friends. We knew where the "Steward" was, since we had stood outside it and taken pictures during the day, but figuring out how to get into it was another story.

You see, the Steward Observatory was built in 1922 and, at the time, was a mile from the campus. Since then the campus has grown up around it and the observatory is nestled in a complex of modern buildings. Like the rest of the UA campus, the Steward, and the surrounding astronomy department buildings, are a

striking contrast of old and new. UA is celebrating its 125th anniversary this year and there are buildings on campus built in 1885, right next to ultra modern buildings built in the last year.

Once we figured out how to get into the Steward, we wandered up flight after flight of stairs, past offices and classrooms with beautiful dark stained woodwork and doors. Like the experience at Mt. Wilson, it was like going back in a time machine. Three, or four stories up, at the dome level, there is a catwalk attaching the observatory to the modern high rise next door which provides for handicapped and elevator access to the dome.

The dome itself is constructed of slats of wood covered with a canvas and dope fabric (like the old biplanes of that era). Because of the construction techniques used, and unlike the metal dome at Mt. Wilson, the dome is almost silent when in motion and reminds me of the sound of an antique carousel.

The “Raymond E. White, Jr” telescope in the dome is a 21” Classic Cassegrain. This telescope was installed in the dome in 1964 after the original telescope, a 36-inch (0.9 m) Newtonian, was moved to Kitt Peak in order to take advantage of the darker nights and clearer sky there. It continues to operate today as a Spacewatch Telescope (part of the Spacewatch system, <http://spacewatch.lpl.arizona.edu/>) and was refurbished with the installation of an electronic imaging detector system for scanning the night sky for asteroids. On this telescope, Spacewatch first developed the technique of scanning the sky with a charge-coupled device (CCD), and has been using it to survey for asteroids and comets since 1984. In October of 2002 the conversion to a mosaic of CCDs was completed and a new primary mirror was installed.

But I digress, back to our night of observing at the Steward Observatory on Campus. Once we were into the dome, and our eyes adjusted to the dark and red light, we were greeted by a couple of sophomore students, one studying astronomy and the other studying astrophysics, who were running the program till Dr. Thomas Fleming, Phd., arrived from the Flandrau Planetarium where he was conducting another program.

Rose and I quickly learned that we, as mere hobbyists, actually had a bit more knowledge than these students. My first question for the students was whether the telescope before me was a Classic Cassegrain or Schmidt Cassegrain. One of them answered a Schmidt Cassegrain. I then asked if it had a corrector plate, he said no, and I explained that in that case it was a Classic Cassegrain (Dr. Fleming later confirmed this.) When I asked the focal length and f-ratio of the telescope, they were unable to answer. They had Albireo set up for observing at the time and explained that they knew, with the present 24mm eyepiece, they were at approximately 333 power. With a few quick calculations Rose and I figured that the telescope must have a focal length of around 8000mm.

The students explained that though Albireo looked like “just a single star” with the naked eye, it was in fact a double star. While sitting at the eyepiece, Rose expounded on that by telling the students and other program participants that it was, in fact, more than that since the brighter yellow star is actually itself a very close binary system. So it went throughout the early part of the night, with Rose and I (mostly Rose) expounding on the limited knowledge of the two students much to the delight of the other program participants and the amazement of Hannah's friends who had come along with us. It seems that no matter where you take us, we’ll find a way to do some “public outreach” in astronomy.

When Dr. Fleming arrived he quickly filled in the gaps of knowledge of the students. When I asked, and just as we had ascertained on our own, he explained that the telescope was indeed an 8000mm, f-15, Classic Cassegrain. He noted that the telescope could be configured for viewing and imaging from various points. Pointing to a precarious looking catwalk near the top of the dome, he explained it had been used with the original 36” newtonian reflector, that they used to also configure the 21” for imaging from that location, but that OSHA had since made it off-limits to anyone. I had a brief private conversation with Dr. Fleming, introduced myself and Rose, and told of “filling in the gaps” of the knowledge of his students. He laughed

and said he was grateful that we'd been there since, with the busy "Family Weekend" activities, he'd been scheduled to be in two places at the same time.

By this time, a new group of the public had found their way to the observatory, made the climb up the stairs, and the SMALL dome was becoming very crowded. Deciding that the traveling "AVAC Public Outreach Crew" was no longer needed we decided to call it a night and made our way out of the dome and back to ground level. One of Hannah's friends, that we had basically adopted for "Family Weekend" since her family from Spokane, WA was unable to attend, said that the telescope was one of the neatest things she had ever seen and that she would go back for other nights of viewing in the dome. It seems we infected another one with the "astronomy bug".

If you visit the Tucson area, make time to visit the many facilities of the University of Arizona Astronomy Department including the Steward Observatory, the Steward Mirror Lab, the Mount Lemmon SkyCenter, and collaboration with the National Optical Astronomy Observatory (NOAO) system at Kitt Peak.

A link to their public outreach programs can be found here:  
<http://www.as.arizona.edu/outreach/outreach.html>

## Avoiding Amateur Astronomy Disasters by Tom Koonce

The weather is turning cold and all of us want to maximize our observing time and minimize how long we're exposed to the bitter cold. In circumstances like this, we amateur astronomers tend to get in a hurry, or perhaps not think things through before doing something... and disaster can strike. Disasters come in many forms, among them, dropping an eyepiece to the ground because it wasn't held securely. Hearing the thud/crunch/tinkle sound is sickening, even for those observers around you. Having your secondary mirror come loose and drop onto your primary mirror is pretty bad, but what about dropping an expensive precision filter into the dirt? And then there are the truly dangerous mistakes such as not making sure a stepstool or ladder is on firm ground or loading your dobsonian telescope lengthwise into the car with the secondary at the front and the primary at the back of the car. I'll explain each of these and how to reduce the risk of these happening to you.

The cold affects each of us to a differing extent. I'm assuming you already know to dress for weather 20 degrees cooler than weather reports predict. After all, you're going to be standing still in freezing weather, not chopping a cord of wood. I also assume that you know to remain hydrated since this can affect your thought processes and reaction times. Some people get cold just thinking about going out at night, some must have a furnace built inside of them because they seem to remain warm with little notice of the thermometer. Most of us are in between these extremes. Fingers and toes get cold first, and then grasping objects becomes difficult, thought processes slow down, and our logic becomes blurry. The trick is to recognize how you respond and take steps to counteract it before you damage equipment.

Disaster: Dropping eyepieces. Think ahead about which eyepieces you will need for the next hour. Keep a fanny pack on over your jacket that makes storing and switching eyepieces convenient and minimizes how long your fingers have to grasp them. Stick your hands inside of your jacket and under your armpits for a couple of minutes before you do the eyepiece switch. Another trick is to place a packing quilt or old rug under your entire telescope setup so that if something is dropped even after taking precautions it might survive the plunge.



**Disaster: Secondary Mirror Drop.** Always check your equipment. Before you start your evening's observing, do a "walk-around" of your telescope. Are there any frayed wires? Are there any loose bolts? If you have a Newtonian, is the secondary secured to its mount? Have you placed a small safety wire between the spider and the secondary... just in case? This is a disaster that can be avoided. I have seen/heard this happen to my buddies 6 week-old 14" dob at a public outreach event. It destroyed his primary mirror. During your walk-around, be conscious of any tools that you need to setup your telescope. Wrenches and screwdrivers can be devastating when applied to any optical surface. Tools tend to slip when brains and fingers are cold. Consider drilling a hole through the handle and affixing a cord loop to each tool to wrap around your wrist to eliminate the possibility of despair.

**Disaster: Filter Drop.** Think ahead about the dexterity you're going to need to take the small filter out of its case and screw it onto the eyepiece. It's possible that filters can be only partially screwed onto the eyepiece and may drop off onto the primary mirror during observing. In my dobsonian, I can vouch for the fact that a two inch O-III makes a heart-stopping sound when it bounces off of the primary mirror. Not good. To remedy this situation, take the time to make sure that your fingers are warmed up and the filters are fully screwed on. Alternatively, consider installing a filter slide on newtonian or dobsonian telescopes. I have made this modification on my dob and it makes using filters simple, convenient and safe. If you have this type of telescope, check out <http://www.astrocrumb.com/> for the best filter slides I've found.



*A filter slide provides safe and easy access to your filters.*

*Photo used with permission. [www.astrocrumb.com](http://www.astrocrumb.com)*



**Disaster: Stepstool and Ladder Tilt.** Anyone who is showing the night sky to the general public or who has a larger dobsonian knows the pitfalls of using stepstools or ladders. They need to be sturdy and lightweight, but rarely are they made to be placed upon bare earth. Sometimes ground can be frozen hard on the surface, but mushy just an inch or two below. Take the time to be sure of the placement of their feet to avoid a fall in the darkness. Test the stepstool with your full weight with someone standing in the safety position to catch you before trusting it to anyone else.

**Disaster: Mirror Missile.** Avoid this disaster by loading your newtonian / dobsonian telescope correctly into the back of your SUV. Think of what might happen during an emergency stop or front crash. If the tube is loaded so that the primary mirror and mirror cell are forward and the secondary mirror closest to the rear of the vehicle, an emergency stop will just press the primary mirror more securely into the mirror cell. However, if the secondary mirror is forward and the primary mirror is closest to the back of the vehicle, such a stop will likely rip the mirror from the three small protrusions that keep it centered on the mirror cell, sending it crashing forward, through the secondary mirror and likely into the back of the head of a person sitting in the front seat. Having your life saved in a crash by an airbag only to have your telescope's mirror kill you in a shower of glass shards milliseconds later is a serious disaster easily avoided.

OK... Take a deep breath... there is only a miniscule chance that any of these disasters will happen to you, and they are even less likely to happen if you take a few simple precautions involving just a bit of forethought and cost. Stay warm and keep safe out there.

## Space Place

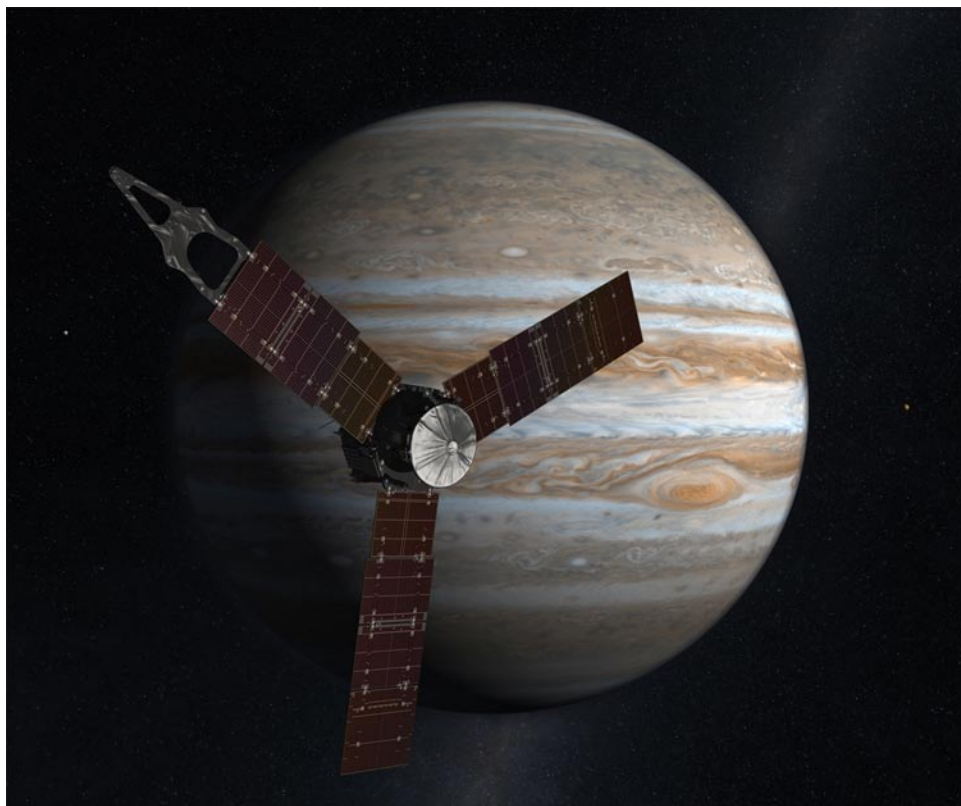
### Close Encounters with Jupiter by Dr. Tony Phillips

Jupiter and Earth just had a close encounter—and it was a good one. In late September 2010, the two worlds were 31 million km (about 19 million miles) closer than at any time in the past 11 years. Soaring high in the midnight sky, Jupiter shone six times brighter than Sirius and looked absolutely dynamite through a backyard telescope.

Planetary scientist Scott Bolton of the Southwest Research Institute isn't satisfied. "I'd like to get even closer," he says.

Bolton will get his wish in July 2016. That's when a NASA spacecraft named "Juno" arrives at Jupiter for a truly close-up look at the giant planet. Swooping as low as 5,000 km (about 3,000 miles) above the cloud tops, Juno will spend a full year orbiting nearer to Jupiter than any previous spacecraft.

The goal of the mission is to learn what lies inside the planet.



*The Juno mission, arriving at Jupiter in July 2016, will help to solve the mystery of what's inside the giant planet's core.*

Astronomers have been studying Jupiter since the invention of the telescope 400 years ago, but in all that time the planet's vast interior has remained hidden from view. Even the Galileo probe, which dived into the clouds in 1995, penetrated no more than about 0.1% of Jupiter's radius.

"Our knowledge of Jupiter is truly skin deep," says Bolton, Juno's principal investigator. "There are many basic things we just don't know—like how far down does the Great Red Spot go? And does Jupiter have a heavy core?"

Juno will improve the situation without actually diving into the clouds. Bolton explains how. "Juno will spend a full year in close polar orbit around Jupiter, flying over all latitudes

and longitudes. We will thus be able to fully map Jupiter's gravitational field and figure out how the interior is structured."

But that's not all. Researchers have good reason to believe that much of Jupiter's interior is filled with liquid metallic hydrogen, an exotic metal that could form only in the high-pressure, hydrogen-rich core of a giant planet. Jupiter's powerful magnetic field almost certainly springs from dynamo action inside this vast realm of electrically conducting metal.

“Juno’s magnetometers will precisely map Jupiter’s magnetic field,” says Bolton. “This map will tell us a great deal about planet’s inner magnetic dynamo—what it’s made of and how it works.”

Finally, Juno will probe Jupiter’s atmosphere using a set of microwave radiometers. “Our sensors can measure the temperature 50 times deeper than ever before,” says Bolton. Researchers will use that information to figure out how much water is underneath Jupiter’s clouds. “Microwave measurements of Jupiter’s water content are particularly exciting because they will help discriminate among competing theories of the planet’s origin.”

Now that’s a close encounter. Stay tuned for Juno.

Find out more about the Juno mission at [http://www.nasa.gov/mission\\_pages/juno](http://www.nasa.gov/mission_pages/juno). Play the new Solar System Explorer super game, which includes the Juno Recall mini-game at <http://spaceplace.nasa.gov/en/kids/solar-system>. It’s not just for kids!

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

## Astrophoto of The Month



**M1, the Crab Nebula in Taurus.** By Don Bryden  
SV-105, ST-10XME, LRGB+Ha



## News Headlines

### **Most Distant Galaxy Ever Measured**

A European team of astronomers using ESO's Very Large Telescope (VLT) has measured the distance to the most remote galaxy so far. By carefully analyzing the very faint glow of the galaxy they have found that they are seeing it when the Universe was only about 600 million years old (a redshift of 8.6). These are the first confirmed observations of a galaxy whose light is clearing the opaque hydrogen fog that filled the cosmos at this early time.

<http://www.sciencedaily.com/releases/2010/10/101020131706.htm>

### **LCROSS mission may have struck silver on the moon**

The title of the 1909 hit song By the Light of the Silvery Moon was not just poetic, it was also prophetic. A NASA spacecraft that crashed into the moon last year has found what appears to be silver, perhaps buried under a small layer of moon dust.

<http://www.newscientist.com/article/dn19609-lcross-mission-may-have-struck-silver-on-the-moon.html>

### **Hubble Astronomers Uncover an Overheated Early Universe**

If you think global warming is bad, 11 billion years ago the entire universe underwent, well, universal warming. The consequence was that fierce blasts of radiation from voracious black holes stunted the growth of some small galaxies for a stretch of 500 million years. This is the conclusion of a team of astronomers who used the new capabilities of NASA's Hubble Space Telescope to probe the invisible, remote universe.

<http://hubblesite.org/newscenter/archive/releases/2010/31/full/>

### **Growing Galaxies Gently**

New observations from ESO's Very Large Telescope have, for the first time, provided direct evidence that young galaxies can grow by sucking in the cool gas around them and using it as fuel for the formation of many new stars. In the first few billion years after the Big Bang the mass of a typical galaxy increased dramatically and understanding why this happened is one of the hottest problems in modern astrophysics. The results appear in the 14 October issue of the journal Nature.

<http://www.eso.org/public/news/eso1040/>

### **Cassini's long weekend: nine moons in 62 hours**

Taking a long-weekend road trip, NASA's Cassini spacecraft successfully glided near nine saturnian moons, sending back a stream of raw images as mementos of its adrenaline-fueled expedition. The spacecraft sent back particularly intriguing images of the moons Dione and Rhea.

<http://www.astronomy.com/en/News-Observing/News/2010/10/Cassinis%20long%20weekend%20nine%20moons%20in%2062%20hours.aspx>

### **Graham scope has both eyes open**

The Large Binocular Telescope atop Mount Graham became truly binocular for the first time last week when a newly installed instrument combined the light from its two giant mirrors to create a "high definition" view of astronomical objects.

<http://www.skyandtelescope.com/news/wires?id=151393738&c=y>

## November Sky Data

**Best time for deep sky observing this month:**  
**October 29 through November 10**

**Mercury** is to the east of the Sun this month, but it sets only minutes after sunset. We're unlikely to see this elusive little planet this month.

**Venus** was at inferior conjunction – almost directly in front of the Sun – at the end of October; this month it starts to appear as the “Morning Star”. Any time from mid-November onwards, try looking to the south-east before sunrise.

**Mars** sets less than an hour after the Sun, so the “Red Planet” can't be seen this month.

**Jupiter** is the one planet to be seen during the night this month. At dusk, the giant planet is well up in the south-east, and it's due south in the middle of the evening. It looks like a very bright star, shining with a strong, steady light. Relative to the genuine stars, which are all much fainter, Jupiter is almost stationary in the constellation of Aquarius, near to its border with Pisces. Throughout the night of Tuesday 16th November, our the gibbous Moon will appear close above Jupiter.

**Saturn** is rising in the east in the early hours of the morning, and it's well up in the south-eastern sky at dawn. Don't confuse it with the planet Venus, which is lower down to the left, and very much brighter. Relative to the stars, Saturn is moving very slowly south-eastwards in the constellation of Virgo. At dawn on Wednesday 3rd, the waning Moon will be to the right of Saturn, and a little higher. The following morning, if you can still find the Moon, Saturn will be above it and a little to the left.

The Leonid **meteor shower** is generally active between November 15th and 20th; this year it will probably peak very early on Thursday November 18th. Leonid meteors tend to be fast-moving, and the brighter ones often leave persistent trains. Around the peak we might hope to see one Leonid every five minutes or so. Unfortunately, this year there will be a lot of moonlight, which will drown out the fainter meteors.

New Nov 5      First Qtr Nov 13      Full Nov 21      Last Qtr Nov 28



## Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
11/1/2010	02:06	14:57	07:12	17:58
11/5/2010	06:45	17:25	07:16	17:54
11/10/2010	10:42	21:01	06:20	16:50
11/15/2010	13:19	00:48	06:25	16:47
11/20/2010	15:57	05:33	06:30	16:44
11/25/2010	20:44	10:08	06:34	16:42
11/30/2010	01:12	13:04	06:39	16:41

## Planet Data

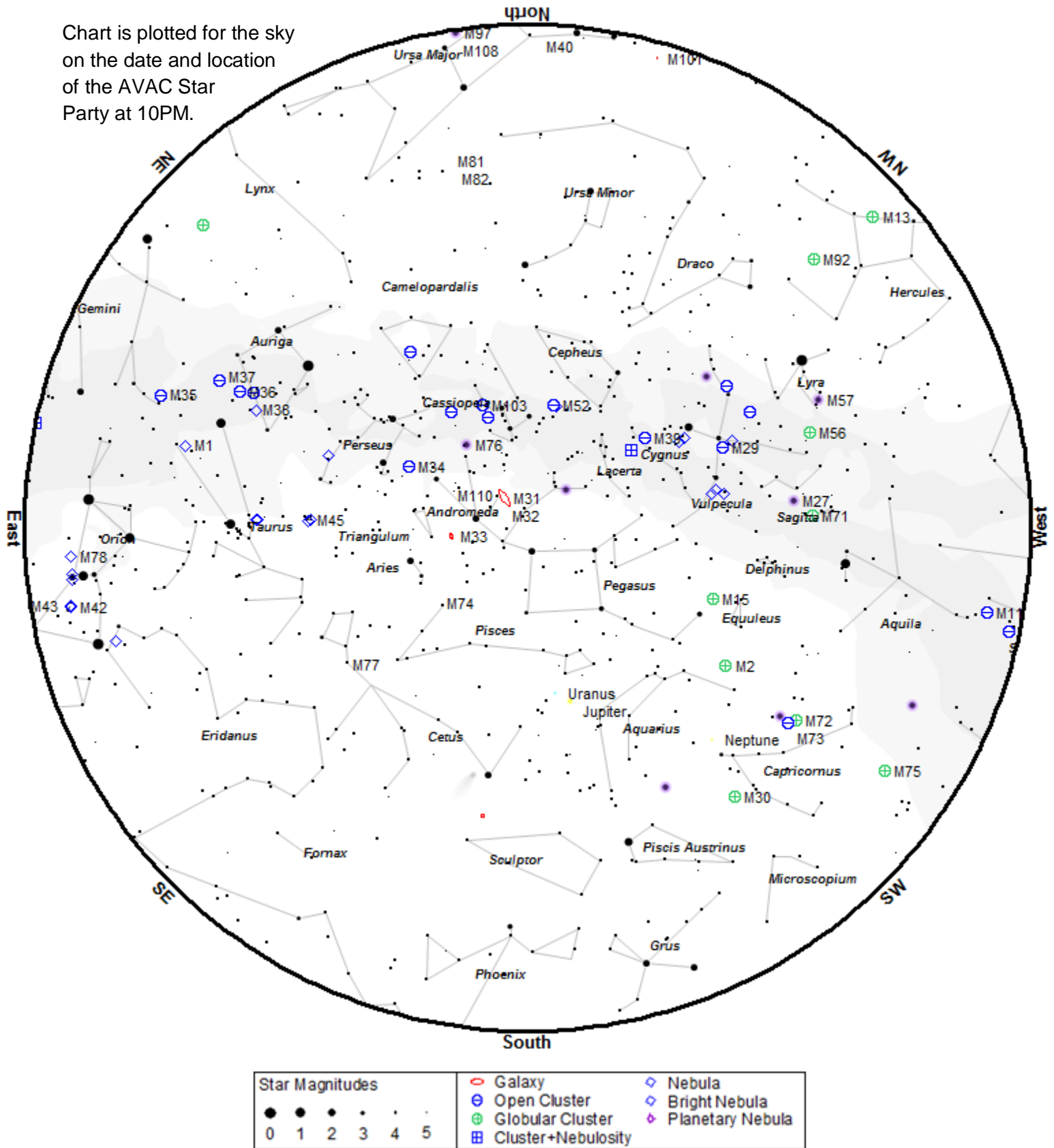
	Nov 1			
	Rise	Transit	Set	Mag
<b>Mercury</b>	08:00	13:13	18:29	-0.6
<b>Venus</b>	06:40	12:04	17:22	-4.1
<b>Mars</b>	09:05	14:12	19:18	1.4
<b>Jupiter</b>	15:49	21:46	03:43	-2.8
<b>Saturn</b>	04:50	10:50	16:54	0.9

	Nov 15			
	Rise	Transit	Set	Mag
<b>Mercury</b>	07:49	12:45	17:43	-0.4
<b>Venus</b>	04:16	09:49	15:27	-4.5
<b>Mars</b>	07:59	13:00	18:01	1.4
<b>Jupiter</b>	13:53	19:49	01:46	-2.7
<b>Saturn</b>	03:02	09:01	15:03	0.9

	Nov 30			
	Rise	Transit	Set	Mag
<b>Mercury</b>	08:21	13:12	18:05	-0.4
<b>Venus</b>	03:27	09:06	14:47	-4.7
<b>Mars</b>	07:51	12:49	17:47	1.3
<b>Jupiter</b>	12:54	18:51	00:48	-2.6
<b>Saturn</b>	02:10	08:07	14:08	0.8

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 6543	PNe	8.3	Dra	17h58m33.4s	+66°37'59"	18:49	19:20	21:58	obvious
M 57	PNe	9.4	Lyr	18h53m35.1s	+33°01'45"	18:57	19:21	21:37	easy
M 56	Glob	8.4	Lyr	19h16m36.0s	+30°11'06"	19:02	19:21	21:04	detectable
M 71	Glob	8.4	Sge	19h53m46.0s	+18°46'42"	18:57	19:22	21:55	easy
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	18:58	19:23	22:11	easy
M 27	PNe	7.3	Vul	19h59m36.3s	+22°43'16"	18:58	19:23	22:04	easy
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	18:58	19:25	22:43	easy
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	18:58	19:25	22:33	easy
NGC 7009	PNe	8.3	Aqr	21h04m10.9s	-11°21'48"	18:50	19:25	21:35	obvious
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	18:58	19:31	22:56	easy
M 2	Glob	6.6	Aqr	21h33m27.0s	-00°49'24"	19:00	19:32	22:33	detectable
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	18:57	19:33	00:10	easy
M 30	Glob	6.9	Cap	21h40m22.0s	-23°10'42"	19:00	19:33	20:38	detectable
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	18:54	19:43	01:41	obvious
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	19:01	20:02	23:50	detectable
NGC 7293	PNe	6.3	Aqr	22h29m38.5s	-20°50'14"	19:01	20:17	21:55	detectable
M 52	Open	8.2	Cas	23h24m48.0s	+61°35'36"	19:06	21:12	00:47	detectable
NGC 7789	Open	7.5	Cas	23h57m24.0s	+56°42'30"	19:08	21:44	01:02	detectable
NGC 7790	Open	7.2	Cas	23h58m24.0s	+61°12'30"	18:56	21:46	03:43	obvious
NGC 55	Gal	8.5	Scl	00h15m08.4s	-39°13'13"	21:08	22:02	22:57	difficult
M 110	Gal	8.9	And	00h40m22.3s	+41°41'09"	19:11	22:27	01:58	detectable
M 31	Gal	4.3	And	00h42m44.3s	+41°16'07"	19:02	22:29	02:55	easy
M 32	Gal	8.9	And	00h42m41.8s	+40°51'58"	19:03	22:30	02:51	easy
NGC 253	Gal	7.9	Scl	00h47m33.1s	-25°17'20"	22:09	22:34	23:00	detectable
NGC 288	Glob	8.1	Scl	00h52m45.0s	-26°35'00"	21:09	22:40	00:11	difficult
NGC 457	Open	5.1	Cas	01h19m35.0s	+58°17'12"	18:58	23:07	04:56	obvious
NGC 559	Open	7.4	Cas	01h29m31.0s	+63°18'24"	18:59	23:17	05:18	easy
M 103	Open	6.9	Cas	01h33m23.0s	+60°39'00"	18:57	23:20	05:15	obvious
M 33	Gal	6.4	Tri	01h33m50.9s	+30°39'36"	19:42	23:20	03:01	detectable
M 76	PNe	10.1	Per	01h42m19.9s	+51°34'31"	19:19	23:29	03:43	detectable
NGC 637	Open	7.3	Cas	01h43m04.0s	+64°02'24"	18:55	23:30	05:35	obvious
NGC 663	Open	6.4	Cas	01h46m09.0s	+61°14'06"	19:02	23:33	05:06	easy
NGC 752	Open	6.6	And	01h57m41.0s	+37°47'06"	19:21	23:44	04:08	challenging
NGC 869	Open	4.3	Per	02h19m00.0s	+57°07'42"	18:59	00:06	05:51	obvious
NGC 884	Open	4.4	Per	02h22m18.0s	+57°08'12"	18:59	00:09	05:55	obvious
NGC 957	Open	7.2	Per	02h33m21.0s	+57°33'36"	19:15	00:20	05:28	easy
NGC 1027	Open	7.4	Cas	02h42m40.0s	+61°35'42"	20:26	00:29	04:32	detectable
M 34	Open	5.8	Per	02h42m05.0s	+42°45'42"	20:22	00:29	04:35	easy



ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 77	Gal	9.7	Cet	02h42m40.8s	-00°00'48"	21:34	00:29	03:24	detectable
NGC 1245	Open	7.7	Per	03h14m42.0s	+47°14'12"	20:10	01:02	05:51	challenging
NGC 1342	Open	7.2	Per	03h31m38.0s	+37°22'36"	21:21	01:18	05:15	easy
M 45	Open	1.5	Tau	03h47m00.0s	+24°07'00"	20:57	01:33	06:04	obvious
NGC 1444	Open	6.4	Per	03h49m25.0s	+52°39'30"	19:59	01:36	06:14	obvious
NGC 1502	Open	4.1	Cam	04h07m50.0s	+62°19'54"	19:55	01:54	06:18	obvious
NGC 1528	Open	6.4	Per	04h15m23.0s	+51°12'54"	21:09	02:02	06:07	easy
NGC 1647	Open	6.2	Tau	04h45m55.0s	+19°06'54"	23:26	02:32	05:37	detectable
NGC 1664	Open	7.2	Aur	04h51m06.0s	+43°40'30"	21:55	02:37	06:10	easy
NGC 1851	Glob	7.1	Col	05h14m06.0s	-40°02'48"	01:44	03:00	04:16	detectable
M 38	Open	6.8	Aur	05h28m40.0s	+35°50'54"	23:22	03:15	06:07	detectable
M 1	Neb	8.4	Tau	05h34m30.0s	+22°01'00"	01:16	03:20	05:27	challenging
M 42	Neb	4.0	Ori	05h35m18.0s	-05°23'00"	00:11	03:21	06:11	easy
M 36	Open	6.5	Aur	05h36m18.0s	+34°08'24"	22:42	03:22	06:14	easy
M 37	Open	6.2	Aur	05h52m18.0s	+32°33'12"	23:09	03:38	06:13	easy
NGC 2129	Open	7.0	Gem	06h01m07.0s	+23°19'20"	23:14	03:47	06:16	obvious
NGC 2169	Open	7.0	Ori	06h08m24.0s	+13°57'54"	23:44	03:54	06:16	obvious
M 35	Open	5.6	Gem	06h09m00.0s	+24°21'00"	23:50	03:55	06:13	easy
NGC 2175	Open	6.8	Ori	06h09m39.0s	+20°29'12"	00:32	03:56	06:08	detectable
NGC 2264	Open	4.1	Mon	06h40m58.0s	+09°53'42"	00:31	04:27	06:13	obvious
M 41	Open	5.0	CMa	06h46m01.0s	-20°45'24"	02:53	04:32	06:08	easy
NGC 2301	Open	6.3	Mon	06h51m45.0s	+00°27'36"	01:09	04:38	06:13	easy
M 50	Open	7.2	Mon	07h02m42.0s	-08°23'00"	02:02	04:48	06:10	detectable
NGC 2353	Open	5.2	Mon	07h14m30.0s	-10°16'00"	02:12	05:00	06:14	easy
NGC 2355	Open	9.7	Gem	07h16m59.0s	+13°45'00"	02:44	05:02	06:05	difficult
NGC 2360	Open	9.1	CMa	07h17m43.0s	-15°38'30"	02:46	05:03	06:14	challenging
NGC 2392	PNe	8.6	Gem	07h29m10.8s	+20°54'42"	00:46	05:15	06:20	obvious
NGC 2423	Open	7.0	Pup	07h37m06.0s	-13°52'18"	02:53	05:22	06:12	easy
M 47	Open	4.3	Pup	07h36m35.0s	-14°29'00"	02:57	05:22	06:14	obvious
NGC 2439	Open	7.1	Pup	07h40m45.0s	-31°41'36"	03:23	05:26	06:12	easy
M 46	Open	6.6	Pup	07h41m46.0s	-14°48'36"	03:05	05:26	06:10	detectable
NGC 2440	PNe	11.5	Pup	07h41m55.4s	-18°12'31"	03:27	05:27	06:09	detectable
M 93	Open	6.5	Pup	07h44m30.0s	-23°51'24"	04:32	05:29	06:13	easy
NGC 2451	Open	3.7	Pup	07h45m23.0s	-37°57'21"	03:44	05:30	06:12	easy
NGC 2477	Open	5.7	Pup	07h52m10.0s	-38°31'48"	03:52	05:36	06:13	easy
NGC 2506	Open	8.9	Mon	08h00m01.0s	-10°46'12"	04:12	05:37	06:02	difficult
M 44	Open	3.9	Cnc	08h40m24.0s	+19°40'00"	02:30	05:44	06:13	easy
M 82	Gal	9.0	UMa	09h55m52.4s	+69°40'47"	01:41	05:46	06:11	easy
M 81	Gal	7.8	UMa	09h55m33.1s	+69°03'56"	01:58	05:46	06:11	detectable
M 67	Open	7.4	Cnc	08h51m18.0s	+11°48'00"	03:58	05:45	06:07	detectable
NGC 2571	Open	7.4	Pup	08h18m56.0s	-29°45'00"	03:54	05:46	06:11	easy
NGC 2546	Open	5.2	Pup	08h12m15.0s	-37°35'42"	05:03	05:46	06:03	difficult
NGC 2547	Open	5.0	Vel	08h10m09.0s	-49°12'54"	05:05	05:49	06:08	detectable
NGC 3227	Gal	11.5	Leo	10h23m30.6s	+19°51'54"	04:45	05:50	06:06	difficult
M 106	Gal	9.1	CVn	12h18m57.6s	+47°18'13"	04:53	05:52	06:08	detectable

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Membership in the Antelope Valley Astronomy Club is open to any individual or family.

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### AVAC

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