ANTELOPE VALLEY ASTRONOMY CLUB, INC.

Desert Sky Observer

Volume 30 *Antelope Valley Astronomy Club Newsletter* **July 2010**

Up-Coming Events

July 9: Club Meeting*
July 10: Dark Sky Star Party @ Mt. Pinos
July 12: Board Meeting
July 14: SAGE Observations at the S.A.G.E Planetarium
July 16: 'A Night to Explore' at Highland High School in 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

Early June at Mt. Pinos – usually a star party to avoid! It's cold, windy, cloudy – did I mention COLD! Well, Matt, Duane and I braved the elements and were rewarded with perfect conditions! We could only make it up late Saturday afternoon and upon arriving we started hearing the horror stories: Too cold, too cloudy, rain, wind…

Some folks were half packed up, waiting to see how it was after dinner. Others were giving up and heading down the hill. On the way up, there were ominous black clouds and the wind was blowing, too. Still, at the top, it was sunny and warm. Soon, Matt and Duane arrived, setups were completed and dinner was had. We set up the Coronado and looked at the Sun. Two nice but small sunspots and one particularly huge prominence were visible and we invited several neighbors and passersby to take a look. One fellow put on his white light filter and though the prominence was not visible, the sunspots looked even better!

We set up and collimated as dark fell and lo and behold – NO WIND or CLOUDS! It only got down to 39° which for no wind at Pinos is like a day at the beach. Matt and I started hunting for Herschel objects while Duane resumed his search for the center of the galaxy. About midnight a few carloads of kids and teachers showed up and though there was a little white light faux pas it was great to take a break and look at some of the big, bright showpieces like the Swan nebula, the Dumbbell or the Trifid.

Soon everyone who wasn't staying the night had headed down the hill and we settled back into our Herschel hunt. We went inside for some coffee and Duane announced he was going to just rest his eyes for a bit – he was soon down for the count! My last object was the blinking planetary – a cool little planetary nebula if you've ever seen it, small but bright until you look right at it, then it disappears! Look away with averted vision and it pops back out, bright as ever. Finally about 3am, Jupiter cleared the pines and I got a nice look. Four equatorial bands were obvious and it was big as a beach ball. Then it was off to bed.

Next month we're going back. There should be more folks from the club as a number of us plan on staying for a few nights. Matt will be up there from the Thursday before until the Wednesday after! So set aside some time for the 10th of July and head up to Mt. Pinos, you'll see why it's our favorite star party destination!

Vice President

Doug Drake

Albion H. Bowers will be our speaker for our next club meeting on July 9th, Friday. He is a project manager of the Environmentally Responsible Aviation Project, part of NASA's Aeronautics Research Mission Directorate's Integrated Systems Research Program at NASA's Dryden Flight Research Center, Edwards, Calif. Bowers earned a Bachelor of Science in aeronautical engineering and a Master of Engineering from California Polytechnic State University.

Friday July 17th is our annual club picnic and will be at the Poppy Reserve. This is a potluck style so please bring your favorite dish and chairs and maybe a table. A hat to keep the sun off you would be a good too. This is a fun event in the parking lot and will start at 4:00PM, with the potluck at 5:00PM; sunset is 8:00PM. Matt Leone will bring the meat and the club will supply the drinks. Please call me (661-433-0672) so I can put you down for the type of food you will bring.

Director of Community Development

Rose Moore

The month of July brings us a couple of club events. We have another club star party at Mt. Pinos on the weekend of July 10th and 11th. Several members are planning to make the weekend of it, so come on out on Saturday night and do some star gazing!

For those who cannot attend Mt. Pinos, please come out to Prime Desert Woodlands for a Moon Walk with Jeremy, also on Saturday, July 10th! He will need any club members who can bring out some telescopes for the public to view the night sky before and after the Moon Walk. The event starts at 8:30pm!

Wednesday July 14th is Jeremy's SAGE Observations at the Planetarium. 'Wonders of the Universe' starts at 6:30pm, followed by a class 'Cosmic Ladder Distances' at 7:15. If weather permits there will be observing after the class.

Friday, July 16th is 'A Night to Explore' at Highland High School in Palmdale, for the kids of Lockheed-Martin employees! The event is from 6-9pm; we need members with telescopes, and other astronomy items of interest. If you have item(s) where you may need a booth inside, please let me know ASAP. We will have the club's solar scope out there as the Sun will be up till approximately 8pm. They are expecting a large amount of kids and parents for the event.

And of course our summer club picnic event is on Saturday, July 17th! Please contact me, Doug or any of the board members for information and signups for the 'StarBQue', to be held at the Poppy Reserve starting at 4pm. We will have a BBQ, followed by the raffle and silent auctions. As dark approaches we will be set up for observing. So come on out for a wonderful afternoon and evening with club members and their families! We will be calling members soon to confirm attendance and dishes. We also need donations for the raffle/silent auctions, so if you have anything astronomical you can part with, contact one of the board members!

Because our picnic is not at a member's home, please make sure to bring the following: your pot luck dish, chairs for sitting, sunscreen, hat, a few layers of clothes to keep warm if staying for the stargazing, red flashlights for night vision, and any other items you may need!

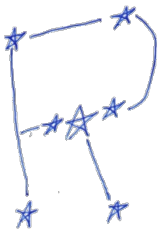
Wishing for dark skies,
Rose

Roswell's Report by Roswell

Greetings to all earthlings from Belluckleonia (or as you pronounce it, Belt Buckle)!

Overheard in the galley of an intergalactic Star Cruiser B-1RD: Two earthlings were walking in the desert when the first earthling said to the other, "Look, a meteorite!" The second earthling looked up in the sky and said "Where?"

Silly earthlings!



Roswell

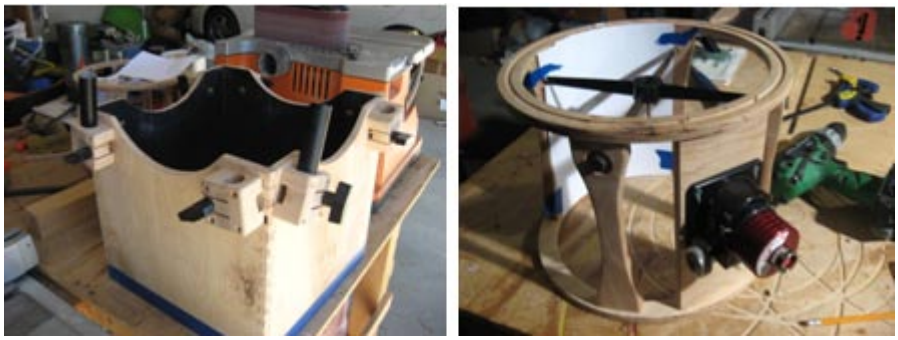
Telescope Transformation – Making Observing Easier by Tom Koonce

What if the sky was clear and steady, the temperature was comfortable, and all that kept you from observing the stars was that you couldn't physically move your telescope outside? What if you were unable to stand for long periods of time at the eyepiece without significant pain? What if manipulating small parts with your hands made it difficult and frustrating to assemble your telescope for the night's viewing? Situations like these are more common than major telescope manufacturers seem to acknowledge. The reality is that amateur astronomy has a 'mature' demographic, and many of us have physical limitations like these that hinder us from being the best observers that we can be. The good news is that there are ways to maximize our enjoyment of astronomy through modification of commercial telescope equipment, adaptation, and innovation.

An excellent example of such modification and innovation was Antelope Valley Astronomy Club (Palmdale, CA) President, Don Bryden's recent project undertaken for a close observing friend. His friend, Duane, has some significant physical limitations and found it cumbersome, and sometimes even dangerous, to lift his C10, 10" f/4.7 newtonian onto his CG-5 mount. The manual non-GoTo mount had small controls and locking levers that were difficult for Duane to manipulate. The telescope provided great views, but because of its weight, lack of handholds, and slippery sides, it had been dropped on occasion, luckily without serious damage, but it was clearly not the right telescope configuration for the user.

Don Bryden and another mutual friend first thought to help Duane with this project by simply mounting the newtonian in a dobsonian-style cradle mount. But as they thought this through, they realized that a solid tube dobsonian would present transportability problems and be hard for Duane to store. Since Don had recently finished building a truss-tube dobsonian for himself and had enjoyed the work, he suggested converting the C10 into a truss-tube scope. High level design considerations were that the resulting telescope would have to be simple for Duane to setup, use, and store. Other considerations were that since Duane has difficulty with the use of his hands, any hardware should be easy to manipulate, but hard to lose.

During the build process, the truss-tube dob emerged and incorporated further considerations of the user's needs. The focuser was set at a 45 degree angle from the plane of the altitude motion for ease of use and the focuser height was tailored to a convenient height for Duane when in a seated position. A stable 14" base was added and dimensioned so that the secondary cage fits into the mirror box which fits into the base for convenient transport and storage. Each individual section is light weight with easy ways to hold onto them.



Large knobs and thoughtful design details make the scope easy to use

The spider and mirror cell were from the original design and required an allen wrench for adjustment. Don made a slot in the side of the secondary cage so that the allen wrench was always available. No other tools are required for setup and adjustments. A major design decision was the method to attach the truss tubes in four groups of two at the top to wooden fittings that in turn receive the secondary cage. To make the attachment of the secondary cage to the truss-tube wooden fittings, bicycle seat post quick-release clamps were used which are simple to operate and impossible to lose.

The resulting scope was dubbed "Marvin the Martian" for its green color and custom Marvin the Martian emblem. It took approximately 20 hours of Don's labor spread over three months, allowing him time to think through the design challenges that arose. The telescope holds collimation well, is comfortable to use for Duane and is considered a resounding success by him. The telescope was entered in the 2010 Riverside Telescope Makers Conference contest and won a special Merit Award.

News Headlines

Wet Era On Early Mars Was Global
Conditions favourable to life may once have existed all over Mars. Detailed studies of minerals found inside craters show that liquid water was widespread, not only in the southern highlands, but also beneath the northern plains.
http://www.marsdaily.com/reports/Wet_Era_On_Early_Mars_Was_Global_999.html

Hatch closed! 18-month Mars500 mission has begun
Mars500, the first full-length simulated mission to Mars, started today in Moscow at 13:49 local time (11:49 CET), when the six-man crew entered their 'spacecraft' and the hatch was closed. The experiment will end in November 2011.
http://www.spaceref.com/news/viewpr.html?pid=30962

Rocky mounds and a plateau on Mars
When Mars Express set sail for the crater named after Portuguese navigator Ferdinand Magellan, it found a windblown plateau and mysterious rocky mounds nearby. Stretching across 120 by 70 miles (190 by 112 kilometers), this region of Mars covers an area of about 8,216 square miles (21,280 square km), which is roughly the size of Slovenia.
http://www.astronomy.com/asy/default.aspx?c=a&id=9995

The Coolest Stars Come Out of the Dark
Astronomers have uncovered what appear to be 14 of the coldest stars known in our universe. These failed stars, called brown dwarfs, are so cold and faint that they'd be impossible to see with current visible-light telescopes. Spitzer's infrared vision was able to pick out their feeble glow, much as a firefighter uses infrared goggles to find hot spots buried underneath a dark forest floor.
http://www.jpl.nasa.gov/news/news.cfm?release=2010-210&cid=release_2010-210

Astronomers' Doubts About the Dark Side: Errors in Big Bang Data Larger Than Thought?
New research by astronomers in the Physics Department at Durham University suggests that the conventional wisdom about the content of the Universe may be wrong. Graduate student Utane Sawangwit and Professor Tom Shanks looked at observations from the Wilkinson Microwave Anisotropy Probe (WMAP) satellite to study the remnant heat from the Big Bang. The two scientists find evidence that the errors in its data may be much larger than previously thought, which in turn makes the standard model of the Universe open to question.
http://www.sciencedaily.com/releases/2010/06/100613212708.htm

A Tidal Wave of Exoplanet Candidates
It’s a rich universe out there. The Kepler spacecraft has found signs of planet silhouettes crossing the faces of more than 700 stars, NASA announced on Tuesday. Most of these "planet candidates" still await confirmation by followup studies from the ground, and Kepler science team leader William Borucki (NASA/Ames Research Center) says that as many as half of them may prove to be false alarms. But already the sheer statistics are telling a lot. In particular, it looks like the universe is even richer in small planets than giant ones.
http://www.skyandtelescope.com/news/96594814.html

Space Place

Black Holes No Joke

by Dr. Tony Phillips

Kip Thorne: Why was the black hole hungry?

Stephen Hawking: It had a light breakfast!

Black hole humor—you gotta love it. Unless you're an astronomer, that is. Black holes are among the most mysterious and influential objects in the cosmos, yet astronomers cannot see into them, frustrating their attempts to make progress in fields ranging from extreme gravity to cosmic evolution.

How *do* you observe an object that eats light for breakfast?

"Black holes are creatures of gravity," says physicist Marco Cavaglia of the University of Mississippi. "So we have to use gravitational waves to explore them."

Enter LIGO—the NSF-funded Laser Interferometer Gravitational-wave Observatory. According to Einstein's Theory of General Relativity, black holes and other massive objects can emit gravitational waves—ripples in the fabric of space-time that travel through the cosmos. LIGO was founded in the 1990s with stations in Washington state and Louisiana to detect these waves as they pass by Earth.

Laser Interferometer Gravitational-wave Observatory in Livingston, Louisiana. Each of the two arms is 4 kilometers long. LIGO has another such observatory in Hanford, Washington.

"The principle is simple," says Cavaglia, a member of the LIGO team. "Each LIGO detector is an L-shaped ultra-high vacuum system with arms four kilometers long. We use lasers to precisely measure changes in the length of the arms, which stretch or contract when a gravitational wave passes by."

Just one problem: Gravitational waves are so weak, they change the length of each detector by just 0.001 times the width of a proton! "It is a difficult measurement," allows Cavaglia.

Seismic activity, thunderstorms, ocean waves, even a truck driving by the observatory can overwhelm the effect of a genuine gravitational wave. Figuring out how to isolate LIGO from so much terrestrial noise has been a major undertaking, but after years of work the LIGO team has done it. Since 2006, LIGO has been ready to detect gravitational waves coming from spinning black holes, supernovas, and colliding neutron stars anywhere within about 30 million light years of Earth.

So far the results are … nil. Researchers working at dozens of collaborating institutions have yet to report a definite detection.

Does this mean Einstein was wrong? Cavaglia doesn't think so. "Einstein was probably right, as usual," he says. "We just need more sensitivity. Right now LIGO can only detect events in our little corner of the Universe. To succeed, LIGO needs to expand its range."

So, later this year LIGO will be shut down so researchers can begin work on Advanced LIGO—a next generation detector 10 times more sensitive than its predecessor. "We'll be monitoring a volume of space a thousand times greater than before," says Cavaglia. "This will transform LIGO into a real observational tool."

When Advanced LIGO is completed in 2014 or so, the inner workings of black holes could finally be revealed. The punch line may yet make astronomers smile.

Find out more about LIGO at http://www.ligo.caltech.edu/. The Space Place has a LIGO explanation for kids (of all ages) at http://spaceplace.nasa.gov/en/kids/ligo, where you can "hear" a star and a black hole colliding!

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

Extraterrestrial Tidbits (ET) by Jeff Riechmann

NASA has been studying space rocks in their home environment for a number of years. A couple of these were called NEAR and Stardust. Perhaps none had a bigger impact than Deep Impact.

On 4 July 2005, an 814-pound projectile launched from the Deep Impact spacecraft impacted deeply into the Comet Tempel 1 with the intent of flinging out a bunch of comet dust – the same stuff Roswell mentioned last month in his report – so that scientists could study what a comet was made of. The very spectacular deep impact caught many scientists by surprise as they soon discovered that the comet was far more dusty than icy.

These findings have had a deep impact on what we know about comets.

July Sky Data

Best time for deep sky observing this month:
July 7 through July 13

Mercury was at superior conjunction (almost directly behind the Sun) on June 28th; throughout July, it is setting only a few minutes after sunset. We are very unlikely to see this elusive little planet, this month.

Venus is visible in the western sky as soon as it starts to get dark, and doesn't set in the north-west until late in the evening. Relative to the stars, Venus is moving rapidly south-eastwards, right across the constellation of Leo. It passes just a degree above Regulus (the brightest star in Leo) on the evening of Saturday 10th

Mars is in the western sky at dusk, and it sets in the north-west shortly before midnight. At the start of July, Mars lies almost midway between Venus to its lower right, and Saturn to its upper left. As the month goes by, Mars moves leftwards towards Saturn, but is rapidly pursued by Venus; on the evening of Friday 30th, Mars stands directly below Saturn, less than 2 degrees away, with Venus about 10 degrees further right. Relative to the stars, Mars is moving steadily south-eastwards, leaving Leo and crossing into Virgo on July 19th.

This month, **Jupiter** is the only planet visible in the dawn sky. The giant planet is rising in the east around midnight, and it's well up in the south-east at dawn. Although it's not as brilliant as Venus, Jupiter can be seen even when the sky is growing bright. Relative to the stars, Jupiter is virtually stationary in Pisces.

Saturn is in the western sky at dusk, and set around midnight. As described above, Mars and Venus are further right, but moving leftwards, and Mars reaches Saturn by the end of July. Saturn is just a little brighter (and whiter) than Mars. Relative to the stars Saturn is moving very slowly south-eastwards in Virgo

There are various minor **meteor-showers** which are active in July, mainly with radiants in the Capricornus-Aquarius area. Towards the end of the month we may also start to see the first of the Perseids, which peak in August.

Sun and Moon Rise and Set

Date	Moonrise	Moonset	Sunrise	Sunset
7/1/2010	23:17	10:37	05:47	20:14
7/5/2010	00:38	14:24	05:49	20:14
7/10/2010	04:30	19:30	05:52	20:12
7/15/2010	10:28	22:46	05:55	20:11
7/20/2010	16:00	01:10	05:58	20:08
7/25/2010	19:55	05:40	06:01	20:05
7/31/2010	22:39	11:16	06:06	20:00

Planet Data

Jul 1

	Rise	Transit	Set	Mag
Mercury	05:56	13:19	20:47	-1.8
Venus	08:52	15:50	22:50	-4.1
Mars	10:44	17:17	23:49	1.4
Jupiter	00:16	06:27	12:41	-2.5
Saturn	11:54	18:16	00:34	1.1

Jul 15

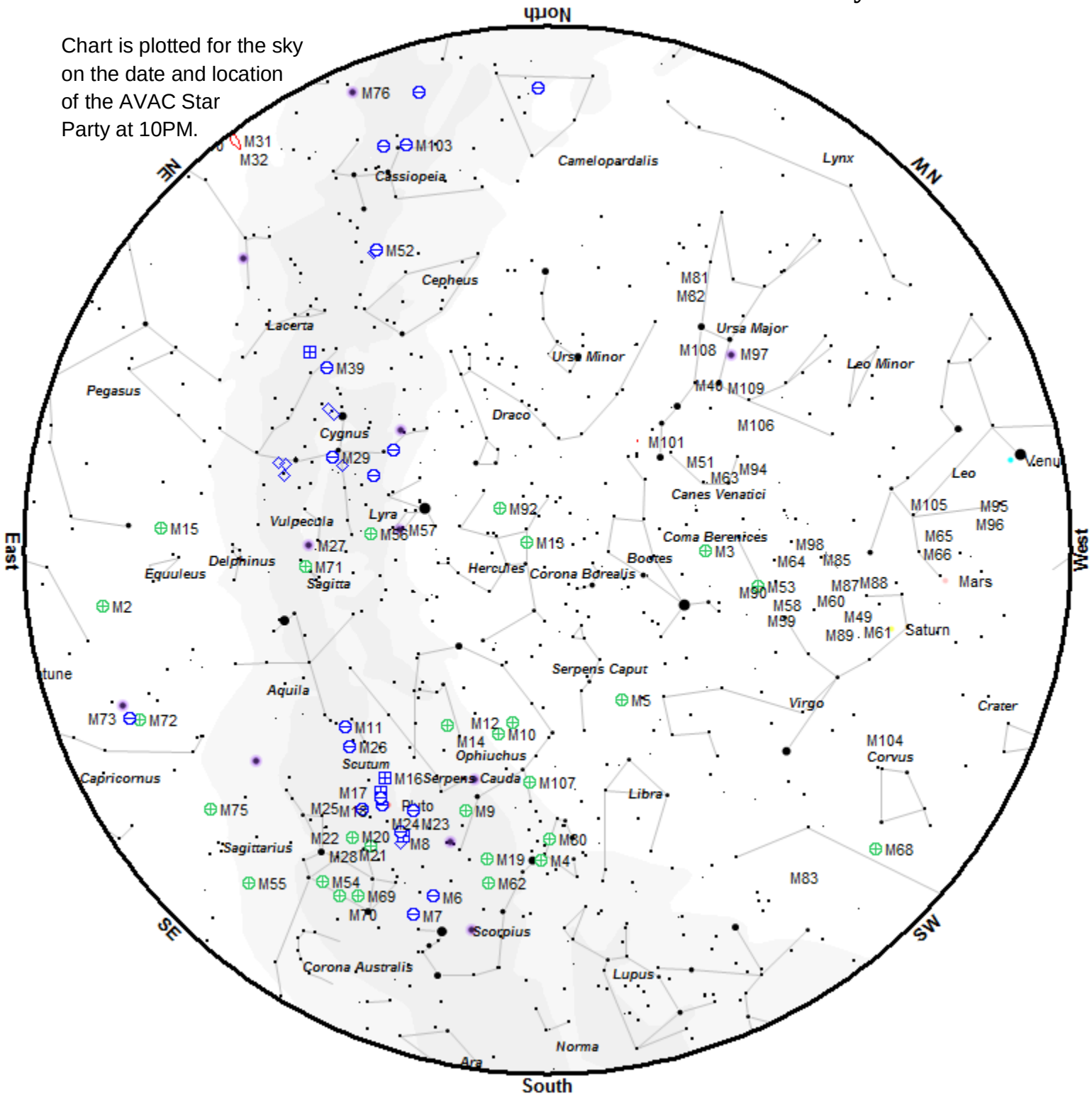
	Rise	Transit	Set	Mag
Mercury	07:15	14:19	21:28	-0.5
Venus	09:15	15:55	22:36	-4.1
Mars	10:29	16:52	23:14	1.4
Jupiter	23:23	05:34	11:45	-2.6
Saturn	11:03	17:24	23:41	1.1

Jul 31

	Rise	Transit	Set	Mag
Mercury	08:10	14:46	21:23	0.2
Venus	09:37	15:55	22:14	-4.2
Mars	10:12	16:24	22:35	1.5
Jupiter	22:21	04:31	10:42	-2.7
Saturn	10:07	16:26	22:41	1.1

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

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



Star Magnitudes							Galaxy	Nebula
0	1	2	3	4	5		Open Cluster	Bright Nebula
							Globular Cluster	Planetary Nebula
							Cluster+Nebulosity	

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

Suggested Observing List

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

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 83	Gal	7.8	Hya	13h37m00.8s	-29°51'56"	21:24	21:42	22:18	detectable
M 49	Gal	9.3	Vir	12h29m46.8s	+08°00'01"	21:29	21:49	22:07	detectable
M 86	Gal	9.8	Vir	12h26m12.2s	+12°56'44"	21:32	21:50	22:17	detectable
M 84	Gal	10.1	Vir	12h25m03.9s	+12°53'12"	21:30	21:50	22:15	detectable
M 87	Gal	9.6	Vir	12h30m49.2s	+12°23'29"	21:30	21:50	22:19	detectable
NGC 4565	Gal	10.1	Com	12h36m20.8s	+25°59'15"	21:33	21:52	22:46	difficult
M 64	Gal	9.3	Com	12h56m43.8s	+21°41'00"	21:29	21:52	23:08	detectable
NGC 5986	Glob	7.6	Lup	15h46m03.0s	-37°47'12"	21:28	21:53	23:03	detectable
M 106	Gal	9.1	CVn	12h18m57.6s	+47°18'13"	21:32	21:56	23:23	detectable
M 94	Gal	8.7	CVn	12h50m53.1s	+41°07'12"	21:28	21:56	23:45	easy
M 3	Glob	6.3	CVn	13h42m11.0s	+28°22'42"	21:28	21:56	00:04	easy
NGC 5897	Glob	8.4	Lib	15h17m24.0s	-21°00'36"	21:33	21:55	22:31	difficult
M 82	Gal	9.0	UMa	09h55m52.4s	+69°40'47"	21:31	21:57	22:05	easy
M 81	Gal	7.8	UMa	09h55m33.1s	+69°03'56"	21:31	21:57	22:03	detectable
NGC 5195	Gal	10.5	CVn	13h29m59.6s	+47°15'58"	21:31	21:57	00:01	detectable
M 51	Gal	8.7	CVn	13h29m52.3s	+47°11'40"	21:28	21:57	00:36	easy
M 5	Glob	5.7	Ser	15h18m34.0s	+02°05'00"	21:26	21:58	00:37	easy
M 101	Gal	8.4	UMa	14h03m12.4s	+54°20'53"	21:33	22:00	00:25	detectable
M 80	Glob	7.3	Sco	16h17m02.0s	-22°58'30"	21:27	22:07	23:06	detectable
NGC 6124	Open	6.3	Sco	16h25m20.0s	-40°39'12"	21:36	22:09	23:04	difficult
NGC 6167	Open	6.6	Nor	16h34m34.0s	-49°46'18"	21:27	22:16	23:34	easy
NGC 6178	Open	7.2	Sco	16h35m47.0s	-45°38'36"	21:23	22:18	00:08	easy
NGC 6193	Open	5.4	Ara	16h41m20.0s	-48°45'48"	21:26	22:23	23:51	easy
M 13	Glob	5.8	Her	16h41m41.0s	+36°27'36"	21:24	22:25	03:04	easy
M 12	Glob	6.1	Oph	16h47m14.0s	-01°56'48"	21:26	22:29	01:50	easy
M 10	Glob	6.6	Oph	16h57m09.0s	-04°06'00"	21:28	22:38	01:41	detectable
M 19	Glob	6.8	Oph	17h02m38.0s	-26°16'06"	21:30	22:44	00:54	detectable
M 62	Glob	6.4	Oph	17h01m13.0s	-30°06'48"	21:29	22:43	00:57	detectable
M 92	Glob	6.5	Her	17h17m07.0s	+43°08'12"	21:25	22:58	03:50	easy
M 9	Glob	7.8	Oph	17h19m12.0s	-18°31'00"	21:33	23:00	00:56	detectable
NGC 6322	Open	6.5	Sco	17h18m25.0s	-42°56'00"	21:25	23:00	01:10	easy
NGC 6383	Open	5.4	Sco	17h34m48.0s	-32°34'00"	21:28	23:16	01:41	easy
M 14	Glob	7.6	Oph	17h37m36.0s	-03°14'48"	21:31	23:18	02:23	detectable
NGC 6388	Glob	6.8	Sco	17h36m17.0s	-44°44'06"	21:49	23:18	00:49	detectable
M 6	Open	4.6	Sco	17h40m20.0s	-32°15'12"	21:24	23:21	02:00	easy
IC 4665	Open	5.3	Oph	17h46m18.0s	+05°43'00"	21:32	23:27	02:38	detectable
M 7	Open	3.3	Sco	17h53m51.0s	-34°47'36"	21:35	23:34	01:47	easy
NGC 6543	PNe	8.3	Dra	17h58m33.4s	+66°37'59"	21:15	23:39	04:45	obvious

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
M 23	Open	5.9	Sgr	17h57m04.0s	-18°59'06"	21:47	23:39	01:30	detectable
M 20	Open	5.2	Sgr	18h02m42.0s	-22°58'18"	22:37	23:43	00:52	easy
M 8	Neb	5.0	Sgr	18h04m02.0s	-24°23'14"	23:05	23:45	00:25	easy
M 21	Open	7.2	Sgr	18h04m13.0s	-22°29'24"	22:32	23:46	01:00	detectable
NGC 6541	Glob	6.3	CrA	18h08m02.0s	-43°42'54"	22:26	23:49	01:13	detectable
NGC 6572	PNe	8.0	Oph	18h12m06.4s	+06°51'12"	21:11	23:53	03:45	obvious
M 16	Open	6.5	Ser	18h18m48.0s	-13°48'24"	21:31	00:00	02:27	obvious
M 17	Open	7.3	Sgr	18h20m47.0s	-16°10'18"	21:49	00:02	02:14	detectable
M 18	Open	7.5	Sgr	18h19m58.0s	-17°06'06"	21:55	00:01	02:08	easy
M 28	Glob	6.9	Sgr	18h24m33.0s	-24°52'12"	23:40	00:06	00:31	detectable
NGC 6633	Open	5.6	Oph	18h27m15.0s	+06°30'30"	21:26	00:08	03:58	easy
M 25	Open	6.2	Sgr	18h31m47.0s	-19°07'00"	22:23	00:12	02:04	detectable
M 22	Glob	5.2	Sgr	18h36m24.0s	-23°54'12"	23:25	00:17	01:08	detectable
IC 4756	Open	5.4	Ser	18h39m00.0s	+05°27'00"	21:32	00:19	03:54	easy
M 70	Glob	7.8	Sgr	18h43m13.0s	-32°17'30"	22:25	00:24	02:21	detectable
M 11	Open	6.1	Sct	18h51m05.0s	-06°16'12"	21:40	00:32	03:37	detectable
NGC 6716	Open	7.5	Sgr	18h54m34.0s	-19°54'06"	22:51	00:35	02:19	detectable
M 57	PNe	9.4	Lyr	18h53m35.1s	+33°01'45"	21:26	00:34	04:35	easy
M 54	Glob	7.7	Sgr	18h55m03.0s	-30°28'42"	22:50	00:36	02:23	detectable
NGC 6723	Glob	6.8	Sgr	18h59m33.0s	-36°37'54"	22:55	00:41	02:27	detectable
M 56	Glob	8.4	Lyr	19h16m36.0s	+30°11'06"	21:41	00:57	04:22	detectable
M 55	Glob	6.3	Sgr	19h40m00.0s	-30°57'42"	23:16	01:21	03:24	detectable
NGC 6818	PNe	10.0	Sgr	19h43m57.8s	-14°09'12"	22:59	01:25	03:50	easy
M 71	Glob	8.4	Sge	19h53m46.0s	+18°46'42"	21:39	01:35	04:36	easy
M 27	PNe	7.3	Vul	19h59m36.3s	+22°43'16"	21:39	01:40	04:36	easy
NGC 6871	Open	5.8	Cyg	20h05m59.0s	+35°46'36"	21:38	01:46	04:36	easy
NGC 6910	Open	7.3	Cyg	20h23m12.0s	+40°46'42"	21:38	02:03	04:38	easy
M 29	Open	7.5	Cyg	20h23m57.0s	+38°30'30"	21:41	02:04	04:37	easy
NGC 7009	PNe	8.3	Aqr	21h04m10.9s	-11°21'48"	00:02	02:45	04:49	obvious
M 15	Glob	6.3	Peg	21h29m58.0s	+12°10'00"	23:22	03:10	04:37	easy
M 39	Open	5.3	Cyg	21h31m48.0s	+48°26'00"	21:54	03:12	04:39	easy
M 2	Glob	6.6	Aqr	21h33m27.0s	-00°49'24"	23:53	03:14	04:38	detectable
M 30	Glob	6.9	Cap	21h40m22.0s	-23°10'42"	02:16	03:21	04:26	detectable
NGC 7160	Open	6.4	Cep	21h53m40.0s	+62°36'12"	21:29	03:32	04:43	obvious
NGC 7243	Open	6.7	Lac	22h15m08.0s	+49°53'54"	23:29	03:47	04:35	detectable
M 52	Open	8.2	Cas	23h24m48.0s	+61°35'36"	00:32	03:59	04:32	detectable
NGC 7293	PNe	6.3	Aqr	22h29m38.5s	-20°50'14"	02:35	03:58	04:38	detectable
NGC 7790	Open	7.2	Cas	23h58m24.0s	+61°12'30"	23:38	04:01	04:42	obvious
NGC 7789	Open	7.5	Cas	23h57m24.0s	+56°42'30"	01:18	04:02	04:31	detectable
NGC 559	Open	7.4	Cas	01h29m31.0s	+63°18'24"	01:04	04:05	04:38	easy
NGC 637	Open	7.3	Cas	01h43m04.0s	+64°02'24"	01:16	04:06	04:42	obvious
NGC 663	Open	6.4	Cas	01h46m09.0s	+61°14'06"	01:27	04:06	04:36	easy
M 103	Open	6.9	Cas	01h33m23.0s	+60°39'00"	01:16	04:06	04:40	obvious
NGC 457	Open	5.1	Cas	01h19m35.0s	+58°17'12"	01:08	04:06	04:38	obvious
NGC 1027	Open	7.4	Cas	02h42m40.0s	+61°35'42"	02:23	04:07	04:30	detectable

ID	Cls	Mag	Con	RA 2000	Dec 2000	Begin	Best	End	Difficulty
NGC 957	Open	7.2	Per	02h33m21.0s	+57°33'36"	02:24	04:08	04:37	easy
NGC 884	Open	4.4	Per	02h22m18.0s	+57°08'12"	02:14	04:07	04:40	obvious
NGC 869	Open	4.3	Per	02h19m00.0s	+57°07'42"	02:10	04:07	04:40	obvious
M 110	Gal	8.9	And	00h40m22.3s	+41°41'09"	01:54	04:07	04:34	detectable
M 76	PNe	10.1	Per	01h42m19.9s	+51°34'31"	02:09	04:08	04:33	detectable
M 31	Gal	4.3	And	00h42m44.3s	+41°16'07"	01:15	04:07	04:38	easy
M 32	Gal	8.9	And	00h42m41.8s	+40°51'58"	01:17	04:07	04:38	easy
NGC 1502	Open	4.1	Cam	04h07m50.0s	+62°19'54"	03:45	04:09	04:42	obvious
NGC 752	Open	6.6	And	01h57m41.0s	+37°47'06"	03:34	04:09	04:25	challenging
NGC 1444	Open	6.4	Per	03h49m25.0s	+52°39'30"	03:51	04:11	04:40	obvious
M 34	Open	5.8	Per	02h42m05.0s	+42°45'42"	03:05	04:10	04:33	easy
M 33	Gal	6.4	Tri	01h33m50.9s	+30°39'36"	02:34	04:10	04:34	detectable
NGC 1528	Open	6.4	Per	04h15m23.0s	+51°12'54"	02:55	04:11	04:35	easy
NGC 1342	Open	7.2	Per	03h31m38.0s	+37°22'36"	04:07	04:13	04:33	easy
NGC 253	Gal	7.9	Scl	00h47m33.1s	-25°17'20"	03:29	04:19	04:39	detectable
NGC 288	Glob	8.1	Scl	00h52m45.0s	-26°35'00"	03:56	04:20	04:32	difficult
NGC 55	Gal	8.5	Scl	00h15m08.4s	-39°13'13"	04:00	04:24	04:36	difficult

Astrophoto of The Month

B33 & the Flame by Don Bryden

A.V.A.C. Information

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

The Club has three categories of membership.

- Family membership at $30.00 per year.
- Individual membership at $25.00 per year.
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- The Reflector – the publication of the Astronomical League.
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