

BULLETIN

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**OUR 84th YEAR OF
ASTRONOMY IN LOS ANGELES**

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Editor's Corner

As we go to press, an issue with liability has been raised by Griffith Observatory concerning the use of the ladders for the 26-inch telescope. Your LAAS board, and especially the President and the LAAS liaison with Griffith, are working to resolve this issue as soon as possible. Until the issue is resolved, future use of the 26-inch at Griffith public star parties has been postponed indefinitely.

Again, to those that wish to use their telescopes at Garvey Ranch Park on Wednesdays that the Tai Chi class that was occupying the front lawn is **GONE**. So far, few have taken advantage of the facility for observing. Please come back and enjoy astronomy without the large crowds at Griffith !

Articles, short news or story items, and photographs and images are welcome as long as they're focused on LAAS interests. Articles need to be 1,500 words or less. Please submit only a few images at one time, and please supply a caption for each. Include such information as camera type, telescope or other equipment used, and exposure times. The deadline for submitting bulletin material is the 10th of each month. If possible, please submit electronically to:

BulletinEditor@laas.org

Material may be sent to the LAAS address listed at the top of the column at left, but timely reception and publication cannot be guaranteed. ✧

David Nakamoto

Outreach Program

We've got a large number of requests despite the Recession and the cutback in school funding.

We especially need people living in the San Gabriel Valley to go to outreach events there. Nearly all of the regular volunteers live in the San Fernando Valley, so the need in the "other" valley is great.

Come on out to the school and show all the enthusiastic kids, parents, and teachers the night sky. They always appreciate it. And if you get WOW's when they look through you scope, you'll feel good. If no scope, come out anyway and help up set up or answer questions from the kids. So, Outreach volunteers, let's pitch in. I'm sure the kids and adults will appreciate our effort.

Thanks !

Outreach@laas.org (818) 891-3087 ✧

(Editors Note: Be aware that often these requests come with very little advanced notice. Therefore, we won't post any events in the bulletin. The best way to get news of these events is to use the Internet and either join the LAAS Yahoo group or access the LAAS website. To join the LAAS Yahoo group, see page 16.)

Don DeGregori

New Members

The new members approved at the February board meeting are:

- Laura Morales
- Luis and Kathleen Ashelford

Welcome to our club, and we hope you'll enjoy your Astronomy with all of us !

✧

The Crab Nebula

By Timothy Thompson

John Bevis discovered the Crab Nebula (M1; NGC 1952) in 1731 and added it to his *Uranographia Britannica* sky atlas. Unaware of Bevis, Charles Messier observed the Crab Nebula on August 28, 1758 while looking for Comet Halley. Messier cataloged the nebula as the first entry in his list of annoying objects on

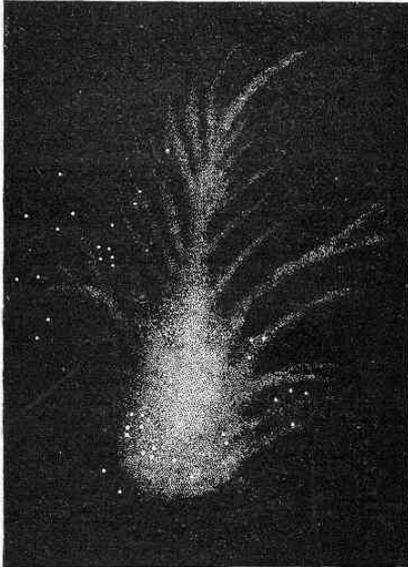


Fig. 438.

September 12, 1758. The Crab Nebula was first called “Crab” by William Parsons, the 3rd Earl of Rosse, when he made a drawing in 1844 through the 36-inch reflector at Birr Castle, shown at left, that looked like a crab to Parsons. The name stuck and we now have a Crab Nebula.

But the Crab Nebula was born well before it was discovered.

“In the first year of the period *chih-ho*, the fifth moon, the day *chi-ch’ou*, a guest star appeared approximately several inches south-east of *T’ien-kuan*. After more than a year, it gradually became invisible”

This is a passage from the *Sung-shi* (“History of the Sung Dynasty”) by T’o-t’o, which dates from the period 1313-1355.

The first year of the period *chih-ho* is 1054

and the day *chi-ch’ou* is 4 July. This is a Chinese record of a supernova explosion, which became visible on 4 July 1054. Further along in the *Sung-shi* we find yet another reference to this guest star...

“On the day *hsin-wei* the Chief of the Astronomical Bureau reported that from the fifth moon of the first year of the period *Chih-ho* a guest star had appeared in the morning in the eastern heavens, remaining in *T’ien-kuan*, which only now had become invisible.”

Now, the day *hsin-wei* is identified with the third moon of the first year of the period *chia-yu*, or 15 April 1056. So we know that the guest star was visible from 4 July 1054 to 15 April 1056, 650 days. It was even visible in daylight for 23 days.

1921 was a banner year for the Crab. In that year the Chinese historical records

(Continued on page 5)

first came to the attention of western scholars and Knut Lundmark first associated the position of the Chinese guest star with the Crab Nebula. In 1921 Carl Lampland used the 40-inch reflector at Lowell Observatory to measure proper motion of filaments in the Crab. The same year and only shortly afterwards, John Duncan used the 60-inch reflector at Mt. Wilson Observatory to make even better measurements of proper motion of Crab filaments.

Originally classified as a planetary nebula by Heber Curtis in 1918, the Crab was spectroscopically confirmed as a supernova remnant as a result of observations made at Lick Observatory in 1934. In 1939 Nicholas Mayall, from Lick Observatory, combined the spectroscopy with updated proper motion measurements to confirm the Crab Nebula as the remnant of SN 1054 found in the Chinese historical records.

In 1949 J.G. Bolton identified the Crab Nebula as the optical counterpart for the radio source Taurus A, discovered in 1948. It later gained the classification 3C 144 in the third Cambridge Catalog of radio sources, published in 1959. In 1954, V.A. Dombrovsky measured the polarization of the Taurus A radio emission and confirmed that it was in fact synchrotron emission, which is known to be emitted by electrons trapped in a magnetic field. The Crab had become the first confirmed astrophysical source of synchrotron radiation.

High altitude rocket observations in October 1962 and April 1963 discovered that the optical Crab Nebula and radio source Taurus A was also an X-ray source, which became Taurus X-1.

Already heavily studied as a result of being a prominent object in Radio, optical and X-rays, the Crab gained additional notoriety when a compact pulsating radio source was discovered in the Crab on 9 November 1968 at the 300-meter Arecibo radio observatory in Puerto Rico. We now know this object as the Crab Nebula Pulsar. A team of astronomers from Steward Observatory, University of Arizona in Tucson, on 15 January 1969, discovered that the Crab pulsar was flashing in visible light at precisely the same period as the radio source. The Crab pulsar had become identified as the first known optical pulsar, flashing on and off every 33.085 milliseconds.

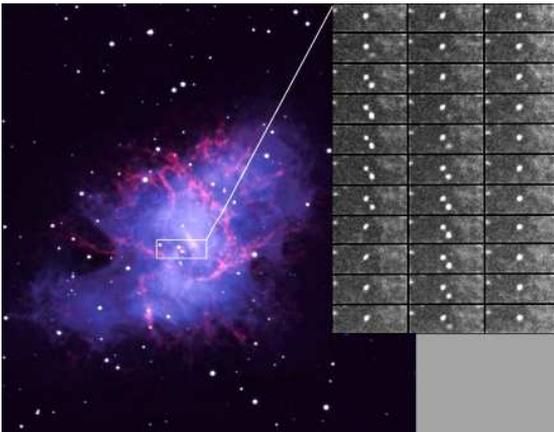
The Crab is about 6520 +/- 652 light years (2000 +/- 200 parsecs) away in Taurus, so subtract 6520 years of light travel time from 1054 and we know the supernova blast actually went off about 5465 BC, well before the earliest writing appears in human history at about 5000 BC.

The nebula is about 10 light years across, and expanding at an average rate of about 1264 km/sec (785 mi/sec or 2,828,000 mi/hour). Measured speeds of jets in the complex filaments of the nebula range from 1650 to 2520 km/sec (1025 mi/sec or 3,691,000 mi/hour to 1566 mi/sec or 5,637,000 mi/hour). These

(Continued on page 6)

speeds are great enough to allow the proper motion of the nebula to be measured from Earth, starting with Lampland & Duncan in 1921, as noted above, and of course more precisely & accurately today.

At the heart of the nebula is the Crab pulsar (PSR J0534+2200 or PSR B0531+21). This is a neutron star, which amounts to an atomic nucleus that carries about 1.4 solar masses but is small enough to fit inside Los Angeles County, dwarfed by our own Earth, let alone the Sun. The pulsar itself spins over 30 times per second and is moving along at about 142 km/sec (88.2 mi/sec or 317,700 mi/hour). The spin of the pulsar slows down because of braking by its intense magnetic field, and loses kinetic energy at a rate of about 4.4×10^{31} Watts. Some of this energy lost by the pulsar is transferred to the nebula and converted into radiant luminosity. Measured over all electromagnetic wavelengths, the Crab Nebula shines at $1\text{-}2 \times 10^{31}$ Watts, about 39,000 times more than the Sun's radiant power of 3.845×10^{26} Watts.



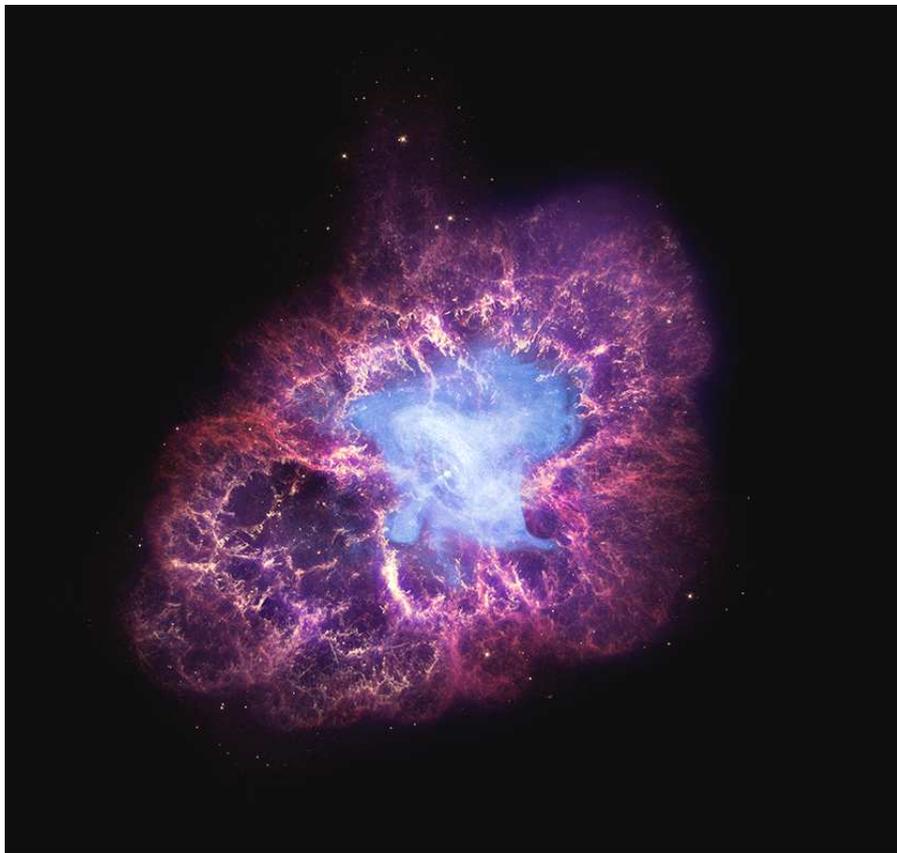
The image at left illustrates the pulsation of the Crab pulsar. The images of the nebula and the pulsar were both made by the 4-meter () Mayall Telescope at Kitt Peak National Observatory. The pulsar images were made on the night of 20 October 1989 using a B-band optical filter. The pulse period measured that night was 33.36702 milliseconds.

All of this energy originated in the core collapse supernova explosion of the progenitor star, one of the most energetic events that happens in the Galaxy. A spectroscopic study of the nebula reveals that elements are distributed non-randomly in the nebula, and the distribution partly reveals how the elements were distributed inside the progenitor star before the explosion. Comparing these data to our models for the evolution of massive stars allows us to determine that the progenitor star weighed in at no less than 9.5 solar masses and probably not more than 11 solar masses. The nebula itself carries about 4.6 solar masses and the pulsar about 1.4 solar masses. The rest of the mass of the progenitor was likely blown away from the star as intense stellar wind in the million years or so before the explosion. This mass should be visible as an H-alpha halo around the Crab Nebula, but attempts to observe this halo have not yet produced results.

(Continued on page 7)

The Crab Nebula is a busy place; certainly the most heavily studied supernova remnant in the sky, it is the brightest diffuse source of X-rays known and is used as a standard candle by X-ray and radio astronomers. About 6x4 arcminutes in size with a visual magnitude +8.4, the Crab shows up well in dark skies, seen in 7x50 or 10x50 binoculars. But its low surface brightness makes it a challenge in urban or moonlit skies. It is so big and has such low surface brightness that it is essentially invisible when viewed by eye in the 60-inch telescope on Mt. Wilson.

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The Chandra X-ray Observatory released this image on 23 November 2009. The blue central portion is a Chandra X-ray image of the pulsar wind nebula, dominated by jets & winds from the pulsar and its magnetic field. The red & yellow filament colors are optical data from the HST, and infrared data from the Spitzer Space Telescope is purple.

The 2010 LAAS Banquet

Did you miss the LAAS Annual Banquet at the Monterey Hills Steakhouse on Sunday, January 24? Here's what you missed.

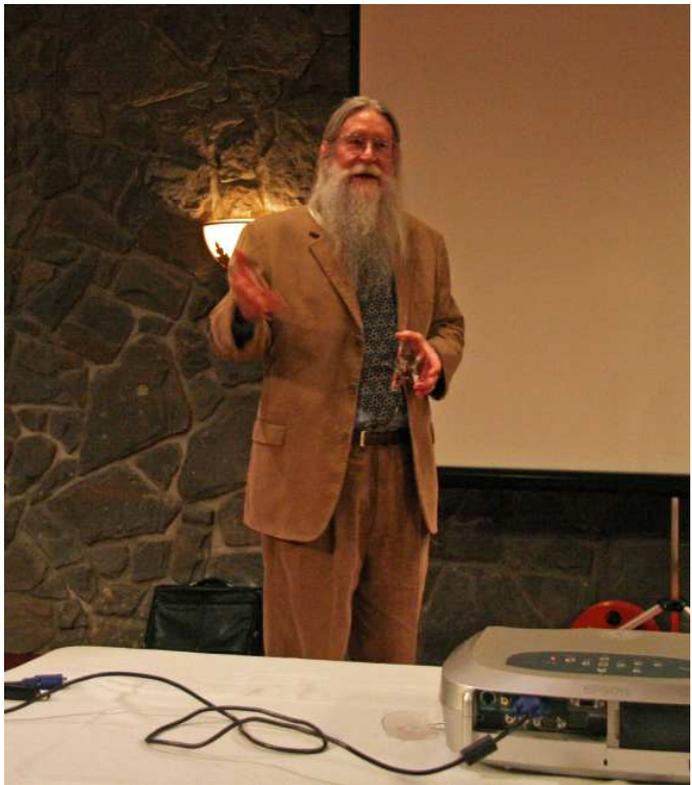
After the 5:00 to 6:00 pm set-up and mingling , there was a good buffet with plenty of food. After dinner Dr. Hal McAlister, shown on page 11, the director and CEO of the Mount Wilson Institute, spoke to us about the people and history of Mount Wilson.

The new LAAS board members and officers were presented and officially took office. Then PJ Goldfinger, the lady smiling at right looking at the camera and our awards chairman, presented the awards. David Nakamoto, below with the blue vest, received an award for long term meritorious service. Bob Deubler, below and first on the right, and Mark Briggs (not shown) received an award for their work on the 26 inch telescope. Andee Sherwood received an award for her leadership in the New Member Star Party and the Children's Star Party. Rick Silveira received the Griffith Observatory Public Star Party award. The double star award went to Norm Vargas and Sara Shaw. Mike White received an award for Public Outreach (star parties.) Michael Rudy, below and second from the left, received an award for his service at Lockwood. Richard Roosman received a service award for printing and assembling (with the help of Garvey Ranch regulars) the bulletin. Hal McAlister (our speaker) and Susan McAlister received

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an award. Please let us know if you received an award and didn't get mentioned.

The banquet, as usual, ended with giving away door prizes. Roger Keen (page 9, bottom image, in the black suit at left), Dave Pinsky (page 9 bottom image, second on the right and behind the blonde lady's head), and Dave Beraru (page 9 bottom image, first on the right) ran the door prize section. Thanks to every company and every LAAS member who donated door prizes.

The banquet was a success because of the efforts of many people. Tim Thompson, shown above, booked the restaurant and booked the speaker. Mary Brown arranged for a number of door prizes. Andee Sherwood ran the reception table. Shirley Sunada donated the box of chocolates for the reception table. Shirley also stored door prizes until the banquet. Stephen Dashiell solicited and transported door prizes. Herbert Kraus kept track of who paid and made sure the bills for the banquet were paid. PJ Goldfinger arranged for the awards and the table centerpieces. These people (and others) helped make the banquet a success. (If you helped and didn't get mentioned, let us know.) ✧

Richard Roosman



Contributors to our banquet door prizes include the following vendors:

From Celestron: a First Scope

From NOAO: a coupon for a family membership.

From Scope City: four \$25.00 gift certificates

From Kendrick Astro Instruments: a \$50.00 gift certificate

From Kalmbach Publishing: a complementary 1 year subscription to Astronomy Magazine

From OPT: a 2" quartz star diagonal.

From Orion:

observer's backpack case

Starry Night screensaver

Atlas of the Sky DVD

Explorer Galaxy CD-Rom

Wheels on Mars DVD

Multi-Tool with Flashlight

AudioView 7x17 binocular



Griffith Observatory Public Star Party Procedure

When you arrive, show your LAAS badge or card to the traffic control person at the fork at the top of Vermont road just before you reach the tunnel. You'll be allowed to drive up East Observatory Rd. Once at the top of the road, temporarily park your car on the side nearest to the observatory and unload your equipment. Roger Keen should be available with a cart to facilitate moving your equipment if you need it. Once you've unloaded your equipment at the spot where you wish to set up, Roger will oversee your equipment while you park along East Observatory Rd. Then you can set up your equipment.

You can volunteer for the event without equipment to aid those with equipment so they can take breaks, help out with crowd control, et al. We especially need help with crowd control with the 26-inch telescope.

It should be understood by any LAAS member who volunteers their time towards the public star party that the main focus is to be of service to the patrons at Griffith Observatory and show them the delights of the nighttime sky. New Members are not expected to adhere to this policy.

Please check the LAAS website and Yahoo list for changes and updates in any LAAS event, as there are many communication mediums and some are missed.

We still need more members trained in moving the 26-inch, setting it up and preparing it for moving. If you're interested, please attend one of the Griffith public star party events. We normally bring the telescope out around one hour before sunset so we have enough light to do so, weather permitting. We'd like as many members to be trained and comfortable handling the telescope, so that it will always be available for viewing by the public.

Have fun and enjoy! ✧

PJ Goldfinger & David Nakamoto

The 2010 RTMC

This year's RTMC dates are :

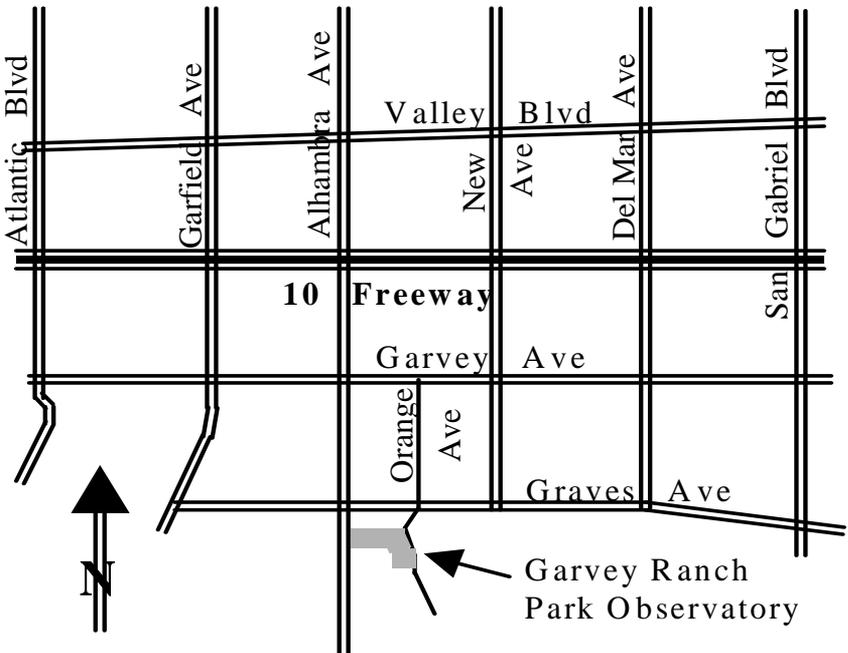
Friday May 14th through Sunday the 16th.

Note that this is a two-week shift in its traditional date of Memorial Day weekend. Make quick plans to attend if you intend to. In the past when I went, local inns and hotels are filled up by January, although since RTMC is not held on Memorial Day as it has in the past, it might be easier to find lodging. Still, don't delay. ✧

David Nakamoto

Map to Monterey Park Observatory

(The place to build your telescope)



LOANER CORNER

Despite the rain, the spring and summer star party season is sneaking up on us. Mars and Saturn are in view in the evening sky. Below are listed the telescopes that are currently available in the loaner program.

LAAS-1 - 4.5" f/8 Celestron reflector on a Polaris mount. This is an easily portable instrument that is still capable of good performance.

LAAS-5 - 6" f/6 Parks reflector on a Polaris clone equatorial mount with a clock drive.

LAAS-8 - 80mm Selsi refractor on an equatorial mount. This is a good telescope for planetary observation.

LAAS-9 - 80mm f/6.25 refractor with a University Optics objective on a heavy duty Celestron camera tripod with a pan-head mount. This RFT is good for the Messier marathon.

All telescopes are equipped with 3 eyepieces. Reflectors include a simple collimation tool and refractors come with a star diagonal

For more information call: David Sovereign at (626) 794—0646. ✧

David Sovereign

Lost and Found

Last year a power cord was left at a public star party at Griffith Observatory. It has a "cigarette lighter" connector one end and a DC connector on the other that looks as if it goes with a go-to telescope.

A few months ago, also after a public star party, a 9mm 1.25" eyepiece was found next to the curb where we load and unload.

For further information call David Sovereign at (626) 794-0646 ✧

EVENTS CALENDAR

| Date | Event | Location and Information |
|----------------|-------------------|--|
| Mar 3rd (Wed) | Board Meeting | Garvey Ranch Park Class Room. 8:00pm to 10:00pm |
| Mar 8th (Mon) | General Mtg | Griffith Observatory, Event Horizon Theater, 7:45pm to 9:45pm |
| Mar 13th (Sat) | Dark Sky Night | Lockwood Valley |
| Mar 20th (Sat) | Public Star Party | Griffith Observatory, 2:00pm to 10:00pm, See pg 12 for details on how to attend. |
| Apr 7th (Wed) | Board Meeting | Garvey Ranch Park Class Room. 8:00pm to 10:00pm |
| Apr 10th (Sat) | Dark Sky Night | Lockwood Valley |
| Apr 12th (Mon) | General Mtg | Griffith Observatory, Event Horizon Theater, 7:45pm to 9:45pm |
| Apr 24th (Sat) | Public Star Party | Griffith Observatory, 2:00pm to 10:00pm, See pg 12 for details on how to attend. |

Telescope for Sale !

Nancy Stannard is selling a Meade DS-2000 telescope, 3 years old, but never used! She can be reached at (719) 237 - 6547. Asking \$250 or best offer. ✧



LAAS Home Page: <http://www.laas.org>
 LAAS Bulletin Online: http://www.laas.org/Resources_Newsletter.htm

LAAS Yahoo Group—how to join

The group is private, and therefore does not come up in a search. To join, send email to: LAAS-subscribe@yahoogroups.com. Include your full name so the moderator can verify your LAAS membership. Your full name is necessary so we can check our records to see if you really are a LAAS member. If approved, you will receive further instructions via email. ✧

Sky and Telescope Subscriptions

Sky and Telescope subscriptions renewals should be sent directly to Sky Publishing. To start a Sky and Telescope subscription, contact the LAAS Treasurer (see the contact information on page 2) directly to get the club rates, then thereafter send the renewal bills directly to Sky Publishing. ✧

Astronomy Magazine Subscriptions

For those that subscribe to Astronomy Magazine through the LAAS, the rate is \$34 a year, \$60 for two years. ✧

AmSky

The on-line mega-magazine for amateur astronomy

www.amsky.com

Bob DuHamel

admin@amsky.com

Membership Annual Dues:

| | |
|----------------------------|-----------|
| Youth | \$ 20.00 |
| Regular (18-65) | \$ 45.00 |
| Senior Citizen (65 and up) | \$ 30.00 |
| Senior Family | \$ 40.00 |
| Family | \$ 60.00 |
| Life | \$ 500.00 |

Additional fees:

| | |
|-----------------------|----------|
| Charter Star member | \$ 30.00 |
| Star member, with pad | \$ 70.00 |
| Star member, no pad | \$ 60.00 |
| Printed Bulletin | \$ 15.00 |

(Membership due date is indicated on the mailing label)

HANDY PHONE LIST



| | |
|---|---------------------|
| LAAS Answering Machine | (213) 673-7355 |
| Griffith Observatory Program..... | (213) 473-0800 |
| Sky Report..... | unavailable for now |
| Lockwood Site | (661) 245-2106 |
| (not answered, arrange time with caller. Outgoing calls – collect or calling card) | |
| Mt. Wilson Institute..... | (626) 793-3100 |