

BULLETIN

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OUR 84th YEAR OF
ASTRONOMY IN LOS ANGELES
Los Angeles Astronomical Society
Griffith Observatory
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Los Angeles, CA 90027

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Editor's Corner

Starting with this issue, I will be publishing the names of our new members. The list's location will shift, and will replace for that month one of the always-the-same articles that populate the bulletin. This issue, the new members are listed on page 14.

If you're interested in learning how to move and setup the Society's 26-inch telescope currently stored at Griffith, please attend 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. 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.

Next year's RTMC dates are finally determined. They are May 14th through 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, but still, don't delay.

Information on the 2010 annual banquet to be held at the Monterey Hill Restaurant in the San Gabriel valley, Monterey Park, on January 24th Sunday is on page 11.

(Continued on page 3)

The Tai Chi class that was occupying the front lawn at Garvey Ranch Park on Wednesday nights is **GONE**, so that is no longer an impediment to those wishing to set up and use their own telescopes !

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. ✧

Outreach Program

School's now back in session, and that means outreach opportunities. In fact, 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

The Horse and Rider Stars

By Timothy Thompson

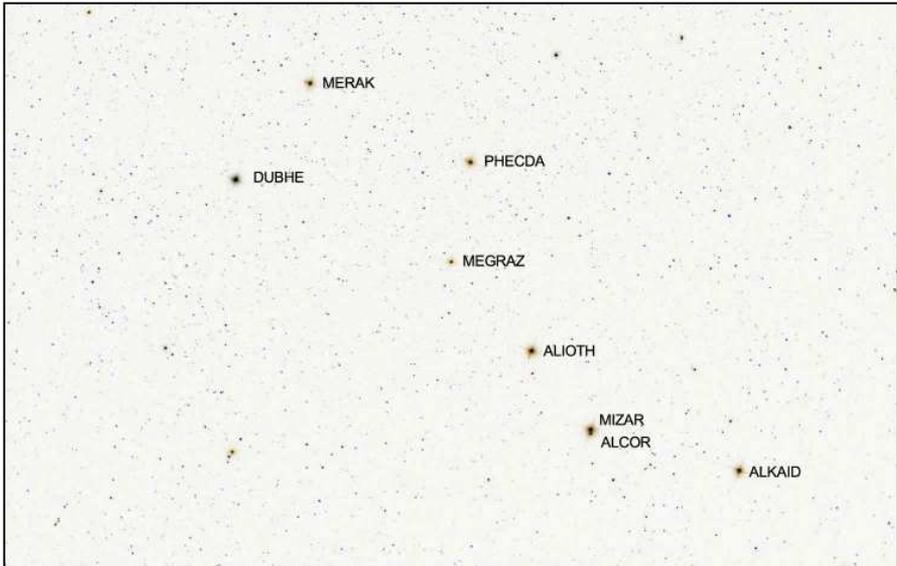


Fig #1 : This is The Big Dipper asterism in Ursa Major. I added the star names and inverted the original image to make it black on white. Credit Noel Carboni who made the original with a Canon EOS 20D with a 17-40 zoom lens at f/4 and 15 exposures (ISO 1600), 30 seconds each.

The pair of stars Mizar (ζ Ursae Majoris or 79 Ursae Majoris) and Alcor (80 Ursae Majoris) are conspicuously placed at the bend of the handle of the Big Dipper asterism in Ursa Major, as seen in figure 1. To the naked eye Mizar appears as the bright star in the handle at visual magnitude 2.06, while Alcor is 11.81 arcminutes away and a dimmer magnitude 3.99. Dubbed the “Horse” (Mizar) and “Rider” (Alcor) by old time Arab astronomers, the pair was allegedly used as a vision test for prospective archers who had to clearly distinguish Alcor from the brighter Mizar. But in fact it’s not all that hard to do and anyone with reasonable vision should be able to see both stars easily away from modern urban skies.

A telescopic view, as seen in figure 2 on page 6, reveals that what looks like the single star Mizar is actually two stars separated by 14 arcseconds, which are easy to distinguish even in a low power telescope. Mizar A, the brighter member

(Continued on page 5)

of the pair shines with visual magnitude 2.27, while Mizar B comes in at magnitude 3.95. But a detailed study of the spectra of Mizar A & B show that each stellar spectrum is actually two stellar spectra shifting with respect to each other periodically. So both Mizar A & B are themselves actually binary stars too close together to be separated by any normal telescope. This is a class of binary star called a “spectroscopic binary”. Mizar is not just a double star; it’s a double-double or quadruple star.

The Ursa Major Moving Group

Most of the bright stars of the Big Dipper are members of the Ursa Major Moving Group, also known as the Ursa Major Stream or the Ursa Major Stellar Kinematic Group or even Collinder 285. Mizar & Alcor, along with Merak, Phecda, Megrez and Alioth are all members of the group; only Dubhe & Alkaid are left out. This is unusual in that most constellations and asterisms are made up of otherwise unrelated stars.

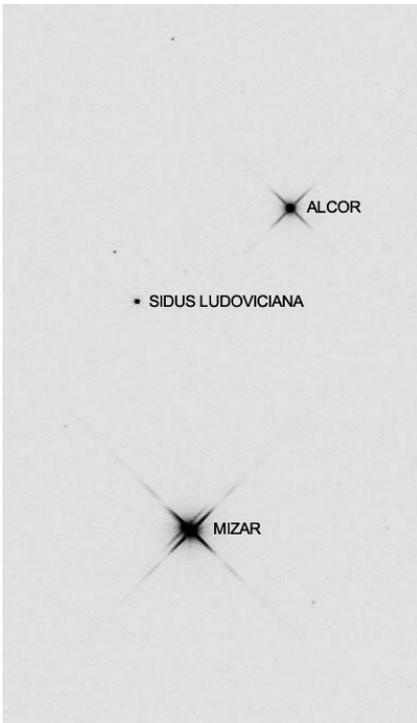
Open clusters, the Pleiades for example, usually do not survive as gravitationally bound structures for more than a few hundred million years. They are pulled apart by shear (cluster stars nearer the center of the galaxy orbit slightly faster than those farther out), by the tidal gravity of the Milky Way, and by collision with large molecular clouds. Only a handful of open clusters are known to be over a billion years old.

The Ursa Major Moving Group is made of stars that all move along with the same speed and direction, all share roughly the same metallicity, and all have roughly the same age of about 500,000,000 years. This is the remnant of what was once an open cluster. The core of the cluster still remains identifiable as a core of stars in the moving group. Mizar & Alcor, as well as Phecda, Megrez & Alioth are all members of the core stellar group. The nearest bone-fide open cluster to our solar system is the Pleiades, about 440 light years away. But the core of the Ursa Major Moving Group is only about 80 light years away, making it the nearest stellar association to us.

Mizar

While Mizar appears to the unaided eye as a single magnitude 2.06 star, figure 2 shows that it is a binary easily separated by even a small telescope. Mizar in fact has the historic precedence of being the first binary star ever discovered. It is commonly believed that the Italian astronomer Giovanni Battista Riccioli made this discovery about 1650, as reported for instance in Burnham’s *Celestial Handbook*. But the discovery was actually made by another Italian astronomer, Antonio Castelli (who adopted the name Benedetto Castelli upon entering the order of Benedictine monks), in 1617. Benedetto Castelli was an associate and

(Continued on page 6)



student of another Italian astronomer named Galileo Galilei, who verified the binarity of Mizar at Castelli's request, later that same year. The discovery that Mizar A is a spectroscopic binary came in 1889 at Harvard College Observatory. Our internet friend Wikipedia gives Edward Pickering credit for this discovery, but in reality he is only the one who announced the discovery that was actually made by his assistant Antonia Maury. While Mizar was the first binary star ever discovered, Mizar A was in turn the first spectroscopic binary star ever discovered. Mizar also became the first binary star ever to be photographed, by John A Whipple and George P. Bond, at Harvard College Observatory, on 27 April 1857, using a 15-inch refractor and wet collodion plates. So in the history of binary stars, Mizar is in first place all the way.

This is a low power field around Alcor & Mizar, which clearly shows Mizar as binary. I added the star names and inverted the original image to make it black on white. Credit Luc Pistorius (FB6QV) who made the original image with a Canon EOS 350D in a 30 second exposure at ASA 400 (as best I can read his original French).

Mizar may have played a more active role in the history of astronomy than most people know. When Galileo observed Mizar in 1617 he did not know about diffraction, Airy disks, and the subtleties of optics that we take for granted today. He thought that the "disk" that he saw in his telescope was in fact the disk of the star itself. And since the dimmer Mizar B presents a smaller disk to the eye than does Mizar A, he decided that it must be farther away. And by assuming that the physical size of the two stars was the same as the physical size of the Sun, he could determine how far away both stars were from us and from each other. Galileo decided that Mizar A was about 300 times more distant than the Sun, and Mizar B about 450 times more distant (as we would say today, 300 and 450 astronomical units or AU, respectively). Galileo did this by measuring the angular diameter of the two stellar disks; he recorded 6 arcseconds for Mizar A and 4 arcseconds for Mizar B, and a gap of 10 arcseconds between the stars, for a center-to-center distance of

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15 arcseconds. This is consistent with the modern value of 14.4 arcseconds between the two Mizar and CCD imagery through a replica of Galileo's telescope shows that measurements so precise can be made by a careful observer.

Galileo knew that if his heliocentric theory for the solar system were correct, then distant stars should show parallax as Earth orbits the Sun. And he correctly realized that if his distances to Mizar A & B were correct, then he should see about 11 arcminutes of parallax in Mizar, which would have been very obvious. So he set about a careful program of observing Mizar to determine its parallactic motion. As you might guess, he correctly observed that there was no visible parallactic motion at all. He also correctly realized that the absence of parallax was positive evidence against his heliocentric theory for the solar system. He also correctly realized that while the phases of Venus ruled out the old Aristotelian geocentric solar system, they did not rule out the then "modern" geocentric system of Tycho Brahe, which had Venus orbiting the Sun. So Galileo did the only thing he thought he could do. He kept his mouth shut and apparently did not reveal his Mizar observations to anyone. How might the history of astronomy been different had Galileo published his observations despite their inconsistency with his own theory? Interesting question.

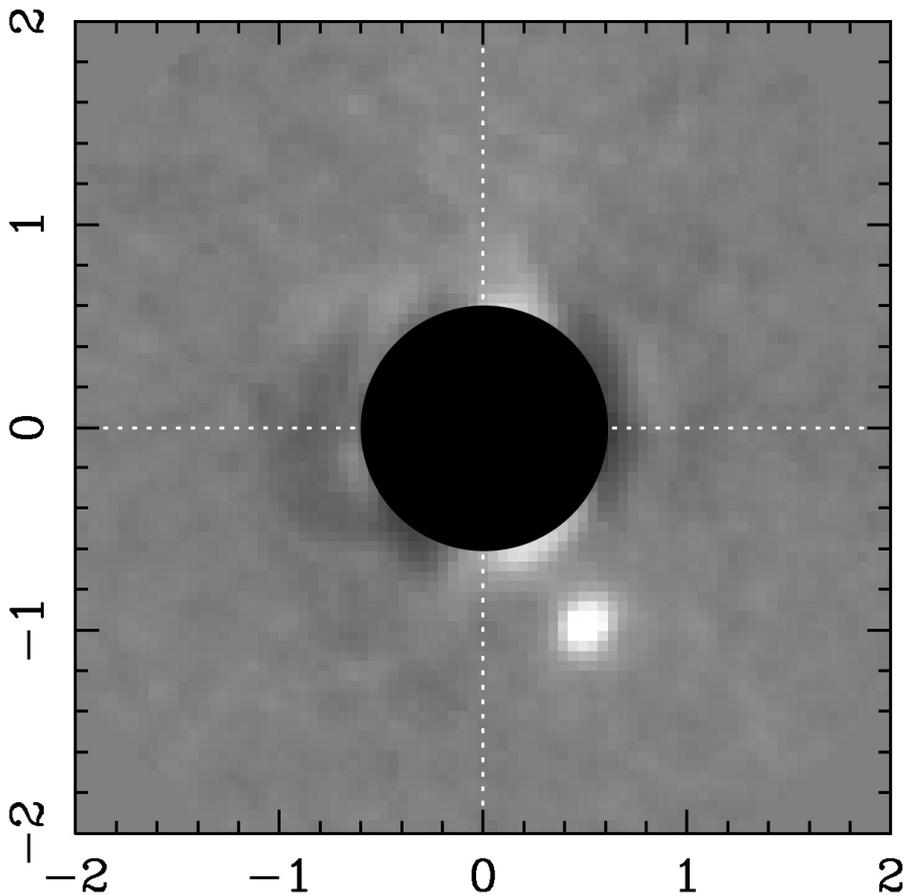
Mizar A is an equal-mass spectroscopic binary with a period of 20.54 days and an orbital eccentricity of 0.53. With a total mass of 4.9 solar masses, then the two components of Mizar A must be about 2.45 solar masses each. Mizar B is a spectroscopic binary with a more leisurely period of 175.57 days and an orbital eccentricity of 0.46. With a total mass of 3.9 solar masses one might guess that each component carries about 1.95 solar masses, but it is not clear if Mizar B is an equal mass binary. Mizar is 78 light years away.

Alcor

Alcor is not quite so historic as Mizar. It looks to be a single star, spectral class A5V, apparent magnitude 3.99, temperature 8050 Kelvins (compared to 5800 Kelvins for the Sun), about 1.8 solar masses and 81.7 light years away. With a projected distance from Mizar of at least 3.7 light years, Alcor and Mizar are not a gravitationally bound double star, although they are clearly physically associated by virtue of membership in the core of the Ursa Major Moving Group.

But Alcor does have one claim to fame. There has been a long running argument amongst astronomers as to whether or not Alcor has a companion and is a binary star. The root of the argument has been the seemingly aperiodic and random variation on Alcor's radial velocity relative to Earth. The lack of periodicity has lead many astronomers to doubt the existence of the "ghost

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This yet to be published image is cropped from a preprint of the paper “Discovery of a Faint Companion to Alcor using MMT/AO 5 μ m Imaging” by Mamjek, et al., and submitted to the *Astronomical Journal*. The image was made by subtracting the point spread function of Alcor, which is where the “black hole” in the middle of the image is found. The result is a clear view of the companion star, separated from Alcor by 1.1095 arcseconds or 27.8 AU. The image scale is in arcseconds.

star”.

Well, the long running argument is now settled: Alcor is a binary star. Observations made in 2007 and submitted to the *Astronomical Journal* on 26 November 2009 directly image the “ghost star” companion to Alcor. The observations were made with the 6.5-meter Multi-Mirror Telescope using adaptive optics and the Clio 3-5 micron imager on 8 April 2007. The results, shown here in figure 3 above (not yet published) show that Alcor has a

companion star with an apparent magnitude of 8.82, separated from Alcor by 1.1 arcseconds, corresponding to 27.8 AU at 81.7 light years distant. The companion star is small, about 0.3 solar masses, spectral class M2V and effective temperature about 3440 Kelvins. This companion star can explain the unusual velocity variations of Alcor, as well as the peculiar velocity of Alcor compared to the rest of the Ursa Major Moving Group. And it explains another peculiarity of Alcor, namely that it emits X-rays, which are unusual in A-class stars but quite ordinary in active M-class dwarfs.

Sidus Ludoviciana

As you can see in any telescope, and here in figure 2, there is a third ordinary looking, dim star off to the side, between Mizar & Alcor. It's a rare 8th magnitude star that actually gets a proper name, so there is also a story behind this star, known as Sidus (or more properly "Stella") Ludoviciana.

Johann Georg Liebknecht (1769-1749) was a professor of mathematics at the University of Giesen in Germany. He observed this star in December 1722 with a 6-foot long non-achromatic telescope and believed that he could detect proper motion with respect to the background stars. Convinced that he had found a new planet, he published a pamphlet in 1723 naming the star Sidus Ludoviciana ("Ludwig's Star"), in honor of his patron Landgrave Ludwig of Hessen-Darmstadt. Needless to say, Johann had not found a new planet, and was sharply criticized by contemporary astronomers who also knew that he had not found a new planet. In fact, Sidus Ludoviciana is just what it looks like, a non-descript background star; HD 116798, TYC 3850-257-1 (the Tycho Catalog is a product of the Hipparcos Space Astrometry mission); Johnson visual magnitude 7.58, with an Hipparcos measured parallax of 0.0083 arcseconds, which corresponds to a distance of 392.8 light years. It is much to far away to be at all associated with the nearby Ursa Major Moving Group. Lucky for this star that it was close enough to Mizar & Alcor to find its way into history by being mistaken for a planet.

It's an interesting field of view in a small telescope. A binary that turns out to be a quadruple, a loner that turns out to be a binary, and a background star that is not a foreground planet. There's a story behind all of them. ✧

2009 Ballot

You may checkmark those members below to cast your vote by mail, or write in the name of an LAAS member who meets the qualifications to be a board member; such names need to be verified by the board. Writing in a name constitutes voting for that person on ballots returned by mail.

Mail to the LAAS address on page 2 care of the Secretary, by email to the Secretary (also on page 2), or you can show up to the December General Meeting and hand it to the same.

(Vote for one only)

President: David Sovereign _____

Timothy Thompson _____

(write in) _____

(Vote for one only)

Vice President: Mary Brown _____

David Nakamoto _____

(write in) _____

(Vote for one only)

Secretary: Stephen Dashiell _____

(write in) _____

(Vote for one only)

Treasurer: Herbert Kraus..... _____

(write in) _____

(Vote for eight only)

Directors: Don DeGregori _____

Carla Johns..... _____

Herman Meyerdierks..... _____

John O'Bryan..... _____

Richard Roosman _____

Michael Rudy _____

Timothy Thompson _____

Michael White..... _____

Mary Brown _____

David Nakamoto _____

2010 Annual Banquet

Here are the current details for the 2010 annual banquet. Please check future bulletins for any updates and changes.

Date : Sunday, Jan 24th

Time : 5:00pm for the bar
6:00pm for dinner

Location : Monterey Hill Restaurant
3700 Ramona Blvd., Monterey Park
<http://www.montereyhillrestaurant.com/>

Cost : \$45 per person
\$20 for children under 13

The speaker is Dr. McAlister, the Director & CEO of the Mt. Wilson Institute, Director of the Center for High Angular Resolution Astronomy at Georgia State University, and Regents' Professor of Astronomy at Georgia State University. He will talk to us about Mt. Wilson Observatory, including ambitious plans for future expansion of public outreach and education at the observatory.

Mail reservations and checks to LAAS Treasurer at
P.O. Box 56084
Sherman Oaks, CA 91413

Make checks out to

Los Angeles Astronomical Society.

On the note line, write "**2010 banquet reservation**".

See ya there !

David Nakamoto

Griffith Observatory Public Star Party Procedure

Signups are no longer required.

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.

Have fun and enjoy! ✧

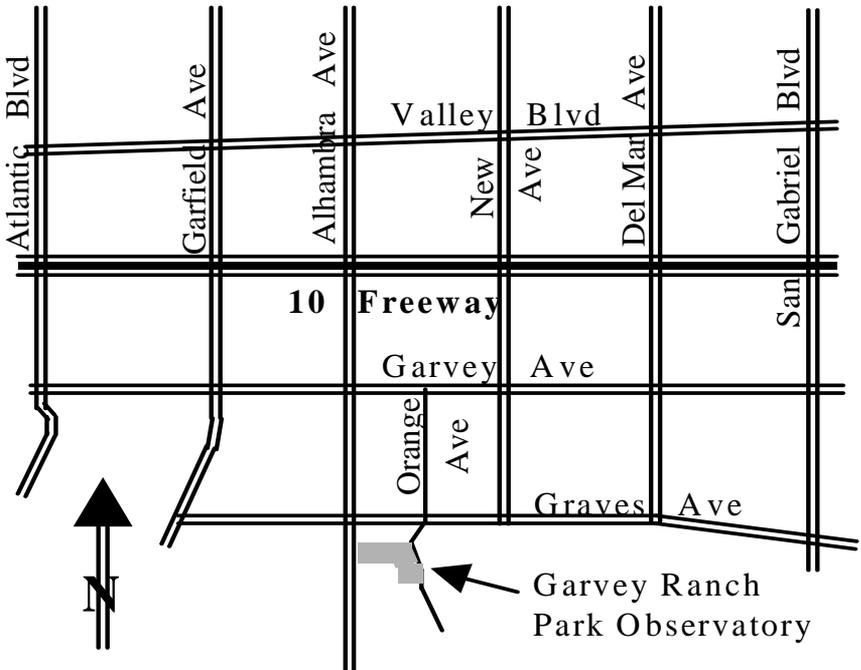
PJ Goldfinger & David Nakamoto

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.

Map to Monterey Park Observatory

(The place to build your telescope)



LOANER CORNER

There have been some minor changes to the accessories for the instruments in the loaner program. All telescopes are equipped with three eyepieces. Reflectors come with a simple collimation tool and refractors come with a star diagonal.

LAAS-1: 4.5" f/8 Celestron reflector on a Polaris equatorial mount

LAAS-2; 4.5" f/8 upgraded Tasco reflector on a driven Edmund equatorial mount

LAAS-4: 6" f/5 Telescopic reflector on a short Dobsonian mount

LAAS-6: 10" f/4.5 Discovery reflector on a Dobsonian mount. This is the largest telescope in the collection.

LAAS-9: 80mm F/6.25 refractor which has been re-mounted on a heavy-duty Celestron camera tripod. This alt-azimuth style mount is good for this fine Rich Field Telescope.

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

David Sovereign

Our new members for December are:

- Christine and Larry Glenn (renewal)
- Peter Ong (renewal)
- Leah Stephens (renewal)
- Tre Gibbs III (renewal)
- Stephen Confer
- Robert Egan
- Bertha and Valerie Lepe
- Ali Allison
- Angela and Rick Barker
- Milton and Dorothy Johnson
- Ethan Spector
- David Barnard
- Everardo Hernandez

Please join me in welcoming these people to our Society ! ✧

EVENTS CALENDAR

Date	Event	Location and Information
Jan 4th (Mon)	General Mtg	Griffith Observatory, Event Horizon Theater, 7:45 pm to 9:45 pm, Election and member Show and Tell
Jan 6th (Wed) (tentatively)	Board Meeting	Garvey Ranch Park Class Room. 8:00 pm to 10:00 pm
Jan 16th (Sat)	Dark Sky Night	Lockwood Valley
Jan 23rd (Sat)	Public Star Party	Griffith Observatory, 2:00 pm to 10:00 pm, See pg 12 for details on how to attend.
Jan 24th (Sun)	ANNUAL BANQUET	<p><i>Details on page 11</i> <i>The speaker for the annual awards banquet on January 24 is Dr. Harold ("Hal") McAlister, the Director & CEO of the Mt. Wilson Institute, Director of the Center for High Angular Resolution Astronomy at Georgia State University, and Regents' Professor of Astronomy at Georgia State University. He will talk to us about Mt. Wilson Observatory, including ambitious plans for future expansion of public outreach and education at the observatory.</i></p>
Feb 3rd (Wed)	Board Meeting	Garvey Ranch Park Class Room. 8:00 pm to 10:00 pm
Feb 8th (Mon)	General Mtg	Griffith Observatory, Event Horizon Theater, 7:45 pm to 9:45 pm
Feb 13th (Sat)	Dark Sky Night	Lockwood Valley
Feb 20th (Sat)	Public Star Party	Griffith Observatory, 2:00 pm to 10:00 pm, See pg 12 for details on how to attend.

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@yahoo.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. ✧



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

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
<i>Additional fees:</i>	
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