their way out, back to their domiciles in the valleys below, waiting for another LAAS event in which to participate. Many thanks go out to the LAAS members without whom the banquet would not be possible, or at the very least, successful. PJ Goldfinger, for her service (an phenomenal amount of work) as the chair of the Banquet committee. Darrell Dooley, our Treasurer, arranged all of the finances around the banquet, ranging from keeping the Odyssey happily paid, to acquiring several of the company gifts. Alana Branson and Pamela Gonzales for their work in getting the table gifts and smaller details of the banquet handled. Minghua Nie for a great deal of background work on getting the names of the people and companies who donated gifts, matched to those gifts. Of course Tim Thompson, past president and returning board member, for his work in finding us an excellent speaker for the evening. Finally to the LAAS BOD and it’s officers for their working in making this the best LAAS Banquet in 2007. Until next year….

Peter De Hoff
LAAS Secretary

February 2007 marked the 20th anniversary of an astronomical event which is thought by many to be the single most significant event in the 20th century: Supernova 1987A (SN 1987A). This was the first naked eye supernova since Kepler’s Supernova in 1604, and the first cosmologically nearby supernova in the

(Continued on page 5)
Editor’s Message

Not much to write this time to make room for other things.

The deadline for submitting bulletin material is the 10th of each month. Please submit electronically, if possible, to BulletinEditor@laas.org. All other material may be sent to the address listed at the top of the column at left, but timely reception and publication cannot be guaranteed. ♦

David Nakamoto

LAAS Yahoo Group

Some have asked me how to join the LAAS Yahoo group. The group is private, and therefore does not come up in a search. You can join by sending email to:
LAAS-subscribe@yahoogroups.com
with your full name so the moderator can verify your membership in the LAAS. Your full name is necessary so we can check our records to see if you really are a member of the LAAS. If approved, you will receive further instructions via email. ♦

Mt Wilson 60” Nights

There are currently no more Mount Wilson 60” nights scheduled. Please send any suggestions for possible future nights to Secretary@laas.org ♦

EVENTS CALENDAR

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location and Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 12th (Mon)</td>
<td>General Meeting</td>
<td>Griffith Observatory Speaker TBD</td>
</tr>
<tr>
<td>Mar 17th (Sat)</td>
<td>Dark Sky Night</td>
<td>Lockwood Valley</td>
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<tr>
<td>Mar 24th (Sat)</td>
<td>Public Star Party</td>
<td>Griffith Observatory</td>
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The board meeting is held at 8pm on the Wednesday night prior to the general meeting, at Garvey Ranch Park. The Monday general meetings start at 7:30 pm

LAAS Home Page: http://www.laas.org
LAAS Bulletin Online: http://www.laas.org/bulletin.html

HANDY PHONE LIST

LAAS Answering Machine..... (213) 673-7355
Griffith Observatory
Program ..................... (213) 473-0800
Offices .......................... (213) 473-0800
Sky Report .......................... unavailable for now
Lockwood Site ..................... (661) 245-2106
(Outgoing calls – collect or calling card)
Mt. Wilson Institute .............. (626) 793-3100

Membership Annual Dues:
Youth $ 20.00
Regular (18-65) $ 35.00
Senior Citizen (65 and up) $ 20.00
Senior Family $ 30.00
Family $ 50.00
Group or Club $ 50.00
Life $ 500.00

Additional fees:
Charter Star member $ 30.00
Star member, with pad $ 70.00
Star member, no pad $ 60.00

(Membership due date is indicated on the mailing label)
This edition of the Loaner Corner will give a total rundown of the instruments and their status. All telescopes are fully equipped with three eyepieces and an accessory case. Reflectors also have a simple collimation tool. Refractors have a star diagonal.

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Outreach Program News

For more information, contact Don DeGregori at (818) 891—3087.

Date:  March 9th, Friday
Time:  Before Sunset (5:57 pm) till 8:30 pm  (No Moon till 11:37 pm)
Name of School:  Evergreen Baptist Church
Address: 1255 San Gabriel Blvd.  Rosemead, CA 91770
Contact Name:   Susan Eng
Phone #:  (626) 278-3511
Name of Organization:  Cub Scout Pack 362
Approximately 50 people attending, both kids and adults.  Kids age from 4-12.
AC available for power cords.
Parking is on school grounds close to setup.
Location to set up:  On church grounds
Security lights turned down...Yes
Food will be available
Map:  http://www.ebcla.org/contact.php

Date:  March 13th, Tuesday
Time:  Before Sunset (6:00 pm) till 8:30 pm  (No Moon)
Name of School:  Barnhart School
Address:  240 w. Colorado Blvd.  Arcadia, CA. 91107
Contact:  Grace Montgomery

(Continued on page 4)
Phone #:  626 574 3323  
Event of School:  Science Night  
Parking is on school grounds close to setup.  
Location to set up:  On school grounds  
Security lights turned down...Yes  
Food will be available  
Map:  http://www.barnhartschool.com/contactus.htm  

Date:  March 21, 2007  
Time:  We arrive before Sunset (6:07 pm) - you can come any time after 2:40, I will stay the whole afternoon/evening to help coordinate.  
Name of School:  Maurice Sendak Elementary  
Address of School:  11414 Tiara Street, North Hollywood, CA  91601  
Contact # Deborah Albin  818-800-0142 - cell or 818-509-3400 - school  
Exact location on school grounds to set up - I think you would be the best judge of this, but I believe it would be outside by the handball courts.  We also have use of the multi-purpose room if needed.  
We need parking within 50 yards of setup - YES  
Is AC power available nearby setup - YES  
Can security lights be dimmed of turned off - I'm not sure about this, but I will check.  
Snack food for the volunteers —— Absolutely  

Date:  March 22nd. Thursday  
Time:  Before Sunset (6:08 pm) till 8:30 pm  
Name of School:  Monterey Hills Elementary  
Address Of School:  1624 Via Del Rey, South Pasadena, 91030  
Contact Name:  Lourdes Nanato  
Phone #:  626-441-5860  
AC available for power cords...Yes  
Parking is on school grounds close to setup.  
Location to set up:  Middle of large upper playground  
Security lights turned down...Yes  
Food will be available  
Map:  http://maps.google.com/maps?oi=map&q=1624+Via+Del+Rey,+South+Pasadena,+CA  

Date:  March 23nd. Friday  
Time:  Before Sunset (6:08 pm) till 8:30 pm  
Name of School:  Helen Keller Elementary  
Address Of School:  3521 Palm Ave.  Lynwood, CA  90262  
Contact Name:  David Ramirez or Bambi Smith  
Phone #:  310-886-5700  
AC available for power cords...Yes  
Parking is on school grounds close to setup.  

Variations in the brightness of the SNR, consistent with the presence of a pulsar. This too remains controversial. Observations with the HST place severe limits on the brightness of any point source in the SNR, which would make this pulsar as unusual as the progenitor star was. Whether or not there is a pulsar or black hole at the heart of the SN 19087A SNR remains undetermined.  

SN 1987A lives on. It is our only ongoing supernova experiment, the only live example we can work with “close up”. It will be an obvious astronomical target for centuries to come. Continuous observing of SN 1987A confirms standard ideas about core collapse supernovae, but also teaches us more than we knew before.  

For Sale  
Meade 12-inch LX-200. Extras include — very nice cabinet, heavy-duty wedge, light extension shield, heavy duty tripod, canvas case, Meade l.p.i., Meade spotting scope.  

If interested contact Tav at (818) 362 - 5092.  

Map to Monterey Park Observatory  
(The place to build your telescope)  

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SN 1987A first became visible on February 24, 1987, and was independently spotted by Ian Shelton and Oscar Duhalde at Las Campanas Observatory, in Chile, and Albert Jones, in Nelson, New Zealand. Jones was an amateur astronomer, and a member of the American Association of Variable Star Observers (AAVSO). Shelton found the SN on a photographic plate, a 5th magnitude star where there was no star before, so he went outside and confirmed with his eyeball that it was really there. Duhalde, a telescope operator at Las Campanas, spotted it visually at about the same time. Jones was observing (Continued on page 6)
variable stars in the Large Magellanic Cloud (LMC) with a 12-inch Newtonian and found the SN as a new star in the field. He was able to estimate a visual magnitude of 5.1, and continued to observe SN 1987A for 4 hours. His observations were an important part of determining the early light curve of the supernova.

SN 1987A was a type II, core collapse supernova. These are the most energetic stellar events. Here is a very condensed version of what happens in a core collapse supernova. A core of iron forms in the center of a massive star. The core weighs in at about 1.3 solar masses, and is so dense that one cubic inch of it would weigh about 180,000 tons; a modern U.S. Navy Nimitz class aircraft carrier, fully loaded, weighs in at about 100,000 tons. The core temperature reaches 3 billion Kelvins and beyond. It is so hot that the iron nuclei fall apart and repack themselves into helium nuclei. The core collapses from something roughly the size of Earth,

(Continued on page 7)

The ring around SN 1987A, as seen by the Chandra X-ray Observatory and the Hubble Space Telescope. The X-ray image shows emission from super hot gas, over a million Kelvins. The HST image shows emission from gas that is not quite so hot, but is heated by the shock wave from the explosion, as illustrated in fig 5. The images were released in Feb, 2004.

The LAAS Annual Banquet is more than just a nice speaker and fine food. It is a place for various LAAS members to reunite under one roof for stimulating conversation, reliving some old shared memories, and making new friendships. Our intrepid LAAS President, Dave Sovereign, introduced our new LAAS Board of Directors (BOD), an exciting mixture of new blood, weathered veterans, and one ex-President. It is sure to be an interesting year in the boardroom of the LAAS. After the service awards and the main speaker’s presentation, the LAAS Banquet had its famous Annual Door Prize Giveaway. This event is always the final cap on a wonderful evening, and this year was no exception. We were especially fortunate this year to have generous LAAS member, as well as company support of this aspect of the banquet. It is this kind of generosity that is deserving of our gratitude to those members and our support of those companies. Although there is not enough space to list them all the door prizes donated by the members ranged from Shirley and Rick Sunada’s annual LAAS coffee mugs to Larry Steenhoek’s gorgeous Astronomy Calendars, all the way to Joe Addison’s Observer’s chair. There were of course many other members who generously contributed to the door prizes and the LAAS thanks them for their efforts. Various corporations made significant donations

(Continued on page 12)
The 2007 LAAS Banquet

The 2007 LAAS Annual Banquet held this past January 28th at the Odyssey Restaurant was a huge success. There were slightly in excess of 100 LAAS members and guests who attended this once-a-year event. Dr. Michael Brown, the world-renowned minor planet hunter from Caltech was there to give a speech on his ongoing efforts to find new and interesting members of our ever-expanding solar system. His fascinating talk discussed the various aspects of the types of telescopes he has employed and just what one must go through to get time on the Hubble and Keck telescope. Usually finding a minor planet larger than Pluto is one of them. Although a controversial, and somewhat sensitive topic for the LAAS, he did go into some detail as to why Pluto has been relegated from its status of planet to “dwarf planet.” Suffice it to say that this emotionally charged topic is still open for debate amongst many of the membership.

Dr. Brown also described his impressive arrays of imagers and techniques that he uses to find new planets. An interesting insight into the methods of modern science, to say the least. Fortunately, for those who were anxious to continue the discussion, Dr. Brown was gracious enough to remain behind to answer questions to the membership’s delight. A fine thing for such a well-

(Continued on page 11)
SN 1987A is the only supernova for which the progenitor star is well known, since it went off in a star field with a hundred years of observational record attached. In this case, the star progenitor was identified as Sk -69° 202, where “Sk” stands for “Sanduleak”, in the LMC. Subsequent study of the expanding supernova remnant (SNR) has established a distance of about 167,500 light years. Sk -69° 202 was found to be a triple system, blended together on the older ground based images, and we now know that the brightest star of the 3 is gone, replaced by the supernova. That star was a spectral class B3Iab blue supergiant, about 20 solar masses, shining about 100,000 times brighter than the sun, with a surface temperature about 16,000 Kelvins and stretching out about 43 solar radii. But supernova explosions are supposed to come from red giants & supergiants, not blue. It is now generally believed that this star was a close binary that actually merged into one star, about 20,000 years before the supernova. The merger event also explains the unusual distribution of circumstellar gas & dust, which hosts the peculiar triple ring light echoes that are so prominent in the Hubble Space Telescope (HST) images. But not everyone agrees. Some think the progenitor had been a luminous blue variable (like last month’s Eta Carinae, only smaller), which had lost mass in strong stellar winds before going supernova. This fact that the progenitor was blue, rather than red, remains perhaps the chief mystery of SN 1987A.

One noteworthy aspect of SN 1987A that is not a mystery is that it is the also the only supernova that has produced an observable burst of neutrinos. During the first few seconds of the core collapse, the material is so dense that even the elusive neutrinos (which can penetrate a wall of lead 7 light years thick) cannot get through it. But after those first few seconds, neutrinos are free to escape into the universe at large. The mechanical shock wave, however, must plow through the falling outer star, and can take a couple of hours to break out. So there should be a significant time lag between the arrival of the neutrinos, and the arrival of the first visible light. And that is exactly what happened with SN 1987A, a significant observational confirmation of a major feature in the theory of core collapse supernovae. The Japanese Kamioka neutrino detector, and the American Irvine-Michigan-Brookhaven collaboration simultaneously detected a burst of neutrinos about 12 seconds long, about 3 hours before the earliest photographic evidence of visible light from the supernova. Only core collapse supernova generate such bursts of neutrinos, and they indicate the formation of a compact object, either a neutron star or a black hole. A third neutrino burst was claimed by a French group, but nearly 4 hours before the other 2. That claim remains controversial, but if valid, would imply the formation of a neutron star, followed by further collapse to a black hole.

In 2000 a group of astronomers reported the indirect detection of an optical pulsar with a period of 2.14 milliseconds, buried in the remnant of SN 1987A. A pulsar is a rotating neutron star. They could not see it directly, but report

This figure shows how the ring around SN 1987A can be formed in the aftermath of a stellar merger. This is the primary explanation for the SN coming from a blue supergiant, rather than a red giant or red supergiant.

SN 1987A, before & after the explosion, from the Anglo-Australian Observatory.
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from gift certificates from Scope City, Firefly books was especially generous with contributions of several astronomy books, including a beautiful picture books of the universe. Sky Publishing (the publishers of Sky&Tel) also had some literature contributions, while New Mexico Skies gave away an astronomer’s dream of a night on some of their scopes.

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All in all, when the night was through, the LAAS members filed (Continued on page 16)
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Event of School: Science Night
Parking is on school grounds close to setup.
Location to set up: On school grounds
Security lights turned down...Yes
Food will be available
Map: http://www.barnhartschool.com/contactus.htm

Date: March 21, 2007
Time: We arrive before Sunset (6:07 pm) - you can come any time after 2:40, I will stay the whole afternoon/evening to help coordinate.
Name of School: Maurice Sendak Elementary
Address of School: 11414 Tiara Street, North Hollywood, CA 91601
Contact # Deborah Albin 818-800-0142 - cell or 818-509-3400 - school
Exact location on school grounds to set up - I think you would be the best judge of this, but I believe it would be outside by the handball courts. We also have use of the multi-purpose room if needed.
We need parking within 50 yards of setup - YES
Is AC power available nearby setup - YES
Can security lights be dimmed of turned off - I'm not sure about this, but I will check.
Snack food for the volunteers — Absolutely

Date: March 22nd, Thursday
Time: Before Sunset (6:08 pm) till 8:30 pm
Name of School: Monterey Hills Elementary
Address Of School: 1624 Via Del Rey, South Pasadena, 91030
Contact Name: Lourdes Nanato
Phone #: 626-441-5860
AC available for power cords...Yes
Parking is on school grounds close to setup.
Location to set up: Middle of large upper playground
Security lights turned down...Yes
Food will be available
Map: http://maps.google.com/maps?oi=map&q=1624+Via+Del+Rey,+South+Pasadena.+CA

Date: March 23nd, Friday
Time: Before Sunset (6:08 pm) till 8:30 pm
Name of School: Helen Keller Elementary
Address Of School: 3521 Palm Ave. Lynwood, CA 90262
Contact Name: David Ramirez or Bambi Smith
Phone #: 310-886-5700
AC available for power cords...Yes
Parking is on school grounds close to setup.

Variations in the brightness of the SNR, consistent with the presence of a pulsar. This too remains controversial. Observations with the HST place severe limits on the brightness of any point source in the SNR, which would make this pulsar as unusual as the progenitor star was. Whether or not there is a pulsar or black hole at the heart of the SN 19087A SNR remains undetermined.

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LAAS-7: 80mm Meade refractor on an Orion Sky View equatorial mount – Checked out

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For more information, contact Don DeGregori at (818) 891—3087.

Date: March 9th, Friday
Time: Before Sunset (5:57 pm) till 8:30 pm (No Moon till 11:37 pm)
Name of School: Evergreen Baptist Church
Address: 1255 San Gabriel Blvd. Rosemead, CA 91770
Contact Name: Susan Eng
Phone #: (626) 278-3511
Name of Organization: Cub Scout Pack 362
Approximately 50 people attending, both kids and adults. Kids age from 4-12.
AC available for power cords.
Parking is on school grounds close to setup.
Location to set up: On church grounds
Security lights turned down...Yes
Food will be available
Map: http://www.ebcla.org/contact.php

Date: March 13th, Tuesday
Time: Before Sunset (6:00 pm) till 8:30 pm (No Moon)
Name of School: Barnhart School
Address: 240 w. Colorado blvd. Arcadia, CA. 91107
Contact: Grace Montgomery

(Continued on page 4)
Editor's Message

Not much to write this time to make room for other things.

The deadline for submitting bulletin material is the 10th of each month. Please submit electronically, if possible, to BulletinEditor@laas.org. All other material may be sent to the address listed at the top of the column at left, but timely reception and publication cannot be guaranteed.

David Nakamoto

LAAS Yahoo Group

Some have asked me how to join the LAAS Yahoo group. The group is private, and therefore does not come up in a search. You can join by sending email to:

LAAS-subscribe@yahoogroups.com

with your full name so the moderator can verify your membership in the LAAS. Your full name is necessary so we can check our records to see if you really are a member of the LAAS. If approved, you will receive further instructions via email.

Mt Wilson 60” Nights

There are currently no more Mount Wilson 60” nights scheduled. Please send any suggestions for possible future nights to Secretary@laas.org

Membership Annual Dues:

- Youth: $20.00
- Regular (18-65): $35.00
- Senior Citizen (65 and up): $20.00
- Senior Family: $30.00
- Family: $50.00
- Group or Club: $50.00
- Life: $500.00

Additional fees:

- Charter Star member: $30.00
- Star member, with pad: $70.00
- Star member, no pad: $60.00

(Membership due date is indicated on the mailing label)

Membership due date is indicated on the mailing label.

EVENTS CALENDAR

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Location and Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 12th (Mon)</td>
<td>General Meeting</td>
<td>Griffith Observatory</td>
</tr>
<tr>
<td>Mar 17th (Sat)</td>
<td>Dark Sky Night</td>
<td>Lockwood Valley</td>
</tr>
<tr>
<td>Mar 24th (Sat)</td>
<td>Public Star Party</td>
<td>Griffith Observatory</td>
</tr>
<tr>
<td>Apr 9th (Mon)</td>
<td>General Meeting</td>
<td>Griffith Observatory</td>
</tr>
<tr>
<td>Apr 14th (Sat)</td>
<td>Dark Sky Night</td>
<td>Lockwood Valley</td>
</tr>
<tr>
<td>Apr 21st (Sat)</td>
<td>Public Star Party</td>
<td>Griffith Observatory</td>
</tr>
</tbody>
</table>

The board meeting is held at 8pm on the Wednesday night prior to the general meeting, at Garvey Ranch Park. The Monday general meetings start at 7:30 pm.
their way out, back to their domiciles in the valleys below, waiting for another LAAS event in which to participate. Many thanks go out to the LAAS members without whom the banquet would not be possible, or at the very least, successful. PJ Goldfinger, for her service (an phenomenal amount of work) as the chair of the Banquet committee. Darrell Dooley, our Treasurer, arranged all of the finances around the banquet, ranging from keeping the Odyssey happily paid, to acquiring several of the company gifts. Alana Branson and Pamela Gonzales for their work in getting the table gifts and smaller details of the banquet handled. Minghua Nie for a great deal of background work on getting the names of the people and companies who donated gifts, matched to those gifts. Of course Tim Thompson, past president and returning board member, for his work in finding us an excellent speaker for the evening. Finally to the LAAS BOD and its officers for their working in making this the best LAAS Banquet in 2007. Until next year....

Peter De Hoff
LAAS Secretary

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LOS ANGELES ASTRONOMICAL SOCIETY
BULLETIN
volume 81, issue 3  March 2007

Supernova 1987A
By Tim Thompson
February 2007 marked the 20th anniversary of an astronomical event which is thought by many to be the single most significant event in the 20th century: Supernova 1987A (SN 1987A). This was the first naked eye supernova since Kepler’s Supernova in 1604, and the first cosmologically nearby supernova in the (Continued on page 5)

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Notes, corrections, questions, ideas, articles? All are welcome at: BulletinEditor@laas.org.