

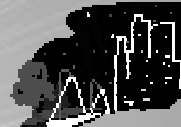


North Central Florida's
Amateur Astronomy Club
29°39' North, 82°21' West

January / February 2008
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Member
Astronomical



Member
International

FirstLight

Newsletter of the Alachua Astronomy Club

Total Lunar Eclipse - February 20-21 2008

The Alachua Astronomy Club's Lunar Observing Group will join Santa Fe Community College's Astronomy Department for public viewing of the February 20-21, 2008 Total Lunar Eclipse on the Northwest Campus, 3000 NW 83rd Street. All AAC members are encouraged to attend and bring their telescopes. Dr. Sally Hoffman recommends bringing a 100 foot extension cord if your telescope has a clock drive.

Telescopes will be set up in parking lot 5 off of North Road near the Santa Fe Police Department Office, building T – see link to the campus map:

<http://admin.sfcc.edu/~sfccpd/mapslots.htm>.

The partial eclipse begins at 8:43 pm EST, Wednesday, December 20 (not including the penumbral phases). Total eclipse begins at 10:01 pm. Mid-eclipse occurs at 10:26 pm and the total eclipse ends at 10:51 pm. Please see this NASA webpage for additional information:

<http://sunearth.gsfc.nasa.gov/eclipse/LEmono/TLE2008Feb21/TLE2008Feb21.html>

This will be the last total lunar eclipse visible from North America until December 21, 2010. Please check the AAC website for the latest updates.

Bob O'Connell
thestardoggemoo
@gmail.com

Photo of 2007 Hickory
Ranch Star Party, by
JulieAnne Tabone





The year 2008 presents some excellent observing opportunities. As January 2008 dawns, Mars will be bright and high in the evening sky. The glorious winter constellations of Taurus, Auriga, Orion and Gemini are rising in the early evening, bringing the Pleiades, Hyades, and the Orion Nebula. In February, we enjoy a total lunar eclipse, beginning at 8:43 EST and lasting until well after midnight. Midpoint will be 10:26 EST. We have not been favored with a prime time eclipse in several years. Saturn will come into opposition with the Sun in late February, and be visible all night. In March, all five naked eye planets will be visible sometime during the night, and will bring an opportunity for Messier marathoners to run the table of all 109 faint fuzzies. In addition, Spring deep

sky wonders such as the Eskimo Nebula, the Beehive Cluster, and Kimble's Cascade will be well placed.

April treats us to a lunar crescent occulting the Pleiades near dusk. On April 17, we will again cooperate with the Florida Museum of Natural History and the University of Florida Astronomy Department for Starry Night. We will bring our telescopes and show the public the wonders of the night sky. May brings a Martian invasion of the Beehive Cluster, the Realm of the Galaxies in Virgo, the Owl and the Whirlpool Galaxy. In June, we enjoy shirtsleeve observing, more of Saturn, and Jupiter rising in the East. A fairly rare double shadow transit across the face of Jupiter occurs the night of June 23. M13 in Hercules ushers in our window perpendicular to the galactic plane, and the season of globular clusters.

July is dominated by Jupiter, dawn to dusk, with Jovian moon transits, eclipses, and occultations, the equatorial bands, the Great Red Spot, and Red Spot Junior. Scorpius and Sagittarius loom above the southern horizon, and we can gaze into the heart of our own galaxy. August brings a solar eclipse, visible in parts of the Arctic and Asia. Mars, Saturn, and Venus hang above the western horizon at dusk. In the Deep Sky we have the Butterfly, the Lagoon, the Sagittarius star clouds, the Wild Duck, the Great Rift in Cygnus, and the Northern Coal Sack. September ushers Uranus and Neptune back into the evening sky, and gives us a shot at the Dumbbell and Ring Nebulae, the Blinking Planetary, and colorful Albireo.

October brings cooler evenings, and we move to more subtle constellation deep sky sights. Our galactic window is closing, with M2 and M15 ending the show. November brings Jupiter and Venus into close proximity with the Moon at the month's beginning and end. Jupiter is departing, and Venus has re-entered the evening sky. The Deep Sky features the Helix, the Andromeda Galaxy, and the Blue Snowball. December begins with the crescent Moon hanging just above bright Jupiter and Venus at dusk. By month's end, Venus has climbed higher, Jupiter has descended to join Mercury, and on December 31, the crescent Moon splits the difference between that pair and Venus. Don't miss this naked eye dance of the Moon and planets to close out the observing year.

I wish you the clear, dark, and steady skies, and a very Happy New Year.

Bill Helms
January 2008

Alachua Astronomy Club,
President@FloridaStars.org

AAC Meeting Location

AAC regular meetings are held on the second Tuesday of each month at 7:00 p.m. at the Florida Museum of Natural History, **Powell Hall**, in the Lucille T. Maloney Classroom, on UF campus, unless otherwise announced. All meetings are free and open to the public. Join us for some great discussions and stargazing afterwards. Please visit our website for more information (floridastars.org). There will be no monthly meeting in December.

Alachua Astronomy Club, Inc.

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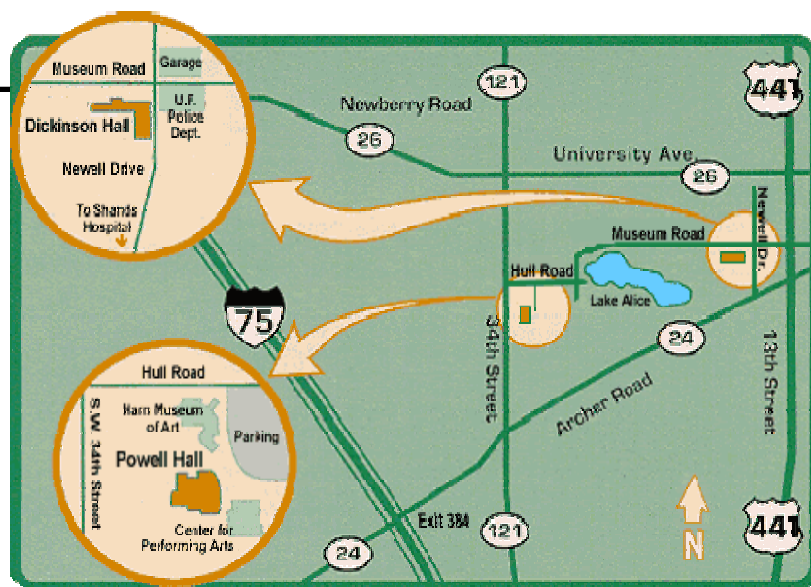
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Submitting Articles to FirstLight

The AAC encourages readers to submit articles and letters for inclusion in *FirstLight*. The AAC reserves the right review and edit all articles and letters before publication. Send all materials directly to the *FirstLight* Editor.

Materials must reach the *FirstLight* Editor at least 30 days prior to the publication date.

Submission of articles are accepted **by e-mail or on a CD**. Submit as either a plain text or Microsoft Word file. (In addition, you can also send a copy as a pdf file but you also need to send your text or Word file too.) Send pictures, figures or diagrams as separate gif or jpg file.

Mailing Address for Hard Copies or CDs

Note: Since our mailbox is *not* checked daily, mail materials well before the deadline date. (Hence, submission by e-mail is much preferred!)

c/o FirstLight Editor
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January Club Meeting

Tuesday, January 8, 2008, 7:00 p.m. EST

Speakers: Chuck Broward & Bob O'Connell

Title: *The New "Golden Age" of Lunar Exploration*

Location: Powell Hall, Florida Museum of Natural History
(*Lucille T. Maloney Classroom*), UF Campus, Gainesville FL



Chuck Broward

Preview: Chuck Broward and Bob O'Connell will give a PowerPoint presentation on four current lunar spacecraft missions. Chuck will discuss Japan's **SELENE** lunar orbiter (nickname **Kaguya**) launched September 14, 2007 and China's **Chang'e 1** lunar orbiter launched October 24, 2007. Bob will cover India's **Chandrayaan-1** orbiter, set for launch April 9, 2008 and the United States' **Lunar Reconnaissance Orbiter (LRO)** to be launched October 31, 2008. Chuck and Bob will cover spacecraft instrumentation, mission goals as well as the most recent data and findings from the two spacecraft already in lunar orbit. These four probes are just the beginning of a new international "Golden Age" of lunar exploration.

About the Speakers: Bob O'Connell has a Bachelor's degree in Political Science from the University of Colorado at Denver and nursing degree from Santa Fe Community College. He is currently a registered nurse at Shands at AGH. Bob got his first telescope at age 5, a Sears 2.4" refractor, and the first object he observed was the Moon. During the ensuing 40+ years, he has owned several other telescopes and currently uses an Orion 7.1" Maksutov-Cassegrain telescope in his lunar studies. His interest for the past several years has been researching the controversial issue of *Transient Lunar Phenomena*, on which he gave a presentation at the 2006 August AAC meeting with Don Loftus. Bob also gave a presentation to the club on *Why and How to Observe the Moon* in 2007 August.



Bob O'Connell

Charles (Chuck) Broward is the AAC's Astronomical League Correspondent (ALCOR), and Amateur Telescope-Making (ATM) Coordinator, as well as an avid amateur observer and telescope maker. He is also our Astronomical League club coordinator. Chuck is one of the AAC's earliest members, was the club's first newsletter editor, a post he held for about seven years, and was the original designer of the AAC logo. (For more information on the club's history, see the AAC's 20th *FirstLight* Anniversary issue, 2007 December.) Chuck has been a frequent speaker at AAC meetings. Talks include October 1996 and 1997 November on purchasing a telescope; 1998 August on *How to Make Your Own Telescope*; 2000 October on *The RLT ("Rather Large Telescope")*; 2001 June as part of a *Members' Medley* of observing experiences; in 2002 March on *The Messier Marathon*; and 2005 June on *The 2005 Winter Star Party / The Astronomical League*.

Please check the club website for the February meeting agenda (floridastars.org).

Marianne Gamble did a superb job on refreshments last year, but has moved on to other things. We need someone to take over for 2008, or we shall go unrefreshed.

It's pretty simple. Using club money, you buy some soft drinks (regular and diet) in a cooler and some chips/cookie/crackers of your choice to feed the estimated attendance at break time. Marianne and I can make suggestions, if needed. We take up donations each month, which pay for the next month's goodies.

I hope some of you will step up and volunteer for this. If so, please email me ASAP at the address below. Thanks.

Bill Helms
Alachua Astronomy Club
President@FloridaStars.org

STAR PARTY SCHEDULE: Upcoming Events - 2007-2008

Star Party	Date 2008	Location Check the website for directions and map	Start/End Time
AAC January Star Party	Saturday, January 5th	Chiefland Astronomy Village	Sunset 5:44 pm EST
Starry, Starry Night at The Villages	Saturday, January 12th	The Villages Sign up with Mike Toomey to participate	6-9pm (Club members & guests till 10pm) Sunset 5:50 pm EST
Stargazing at Hickory Ranch	Saturday, January 26th (Rain Date: February 9th)	Hickory Ranch at Paynes Prairie Sign up to participate.	6:30 pm - 9:00 pm EST Sunset 6:02 pm EST
AAC February Star Party	February 2nd	Bob Jacobs Observing Site Alachua, Florida	Sunset 6:08 pm EST
Southern Cross Astronomical Society Winter Star Party	February 4-10, 2008	West Summerland Key, Florida	See www.scas.org/wsp.htm for details
Total Lunar Eclipse	February 20th	Santa Fe Community College North Campus - Parking Lot 5	Sunset 6:22 pm EST
AAC March Star Party	March 1st	Gary Cook's Residence - Little Orange Lake	Sunset 6:29 pm EST

Photos below of 2007 Hickory Ranch Star Party, by JulieAnne Tabone



Dark Sites for Deep-Sky

Mike Toomey

The first quarter of 2008 will be highlighted by Mars and Saturn, and punctuated with another near-sky event, a total lunar eclipse (Wednesday, February 20). Each of these targets are readily available to the city observer. While the club shifts its attention to sidewalk astronomy, especially among the ATM and lunar observers, our monthly star parties will try to cater to the dark-sky (and deep-sky) enthusiasts.

We'll make a return to Chiefland, our first visit in a number of years. Along with Moondance Hill, Stargate Observatory and Gold Head Branch, these will be our flagship dark-sky star parties. Most of our traditional sites near Gainesville will remain on the 2008 calendar but as more distant (and presumably darker) sites become available, you may see some supplanted. If you have ideas as to where we can find dark skies (preferably with some amenities like electric and restroom), please let me know.

Even with an emphasis on deep-sky, our star parties are not the sole domain of the experts. On the contrary, AAC star parties are intended for the beginner and intermediate observers who want to improve their observing skills and knowledge of the night sky with hands-on experiences.

January 5 will mark the debut of Bob Duval's observing site adjacent the Chiefland Astronomy Village. The site has electric and restroom. Please study the map closely before arriving. Bob's site is located on CR 330, *before* the turn to CAV and the main observing field. Please try to arrive before dark if possible.

At the January star party, we should be able to find comet 8P/Tuttle (naked eye?) as it makes a close approach to Earth – just 23 million miles away! This comet is responsible for the Ursid meteor shower, which peaks around December 22 of each year. Speaking of meteors, we may see a few stragglers of the Quadrantid meteor shower which peaks about 48 hours earlier. Mira, a variable star, will be near its maxima, and Mars will be well positioned almost all night.

On February 2, Bob Jacob's will host our star party, just south of the City of Alachua. Electric and restroom is available. Many of the highlights will be same as January but we'll add Saturn to the mix a couple hours after sundown.

At each of our star parties, there will be a brief orientation to the night sky – a laser guided tour of the prominent stars and constellations. As always, those interested in pursuing an Astronomical League observing list can meet with me before dark where I can provide you with materials to get you started.

January Outreach Events

In January, the AAC will be engaged in a pair of important outreach events – The Villages Starry, Starry Night and Stargazing at Hickory Ranch. You can sign up for either of these events at the January meeting, or call/email me. Please be certain I have your contact information for the day of the event in case there is a cancellation.

Last year's Villages star party received 600 enthusiastic visitors. The AAC provided 9 telescopes and operators – and we sure needed them! I hope we can match that success again. As always, the Villages committee expressed their gratitude along with a donation to the club.

This year's Villages star party will be on Saturday, January 12. A rain-date is penciled in for February 9. The public event will run from 6pm until 9pm. We are welcome to stay until 10pm and enjoy the sky for ourselves. Please arrive at least one hour early to find your spot and set up. There will not be electricity available.

Our second date is January 26 at Hickory Ranch. Friends of Paynes Prairie and the AAC may drum up some more advertising, so hopefully we'll see at least a couple hundred visitors. My understanding is that a hayride will be added, along with live music at the campfire.

Start time is 6:30pm. Please try to arrive one hour early. I will try to assign each member a spot with consideration to electrical needs and operator experience. We will also employ a target list so that we are not all looking at the same thing. Please respect the fact that aperture and focal-length are considered when assigning targets.

As of now, we have only 3 or 4 public outings scheduled for all of 2008, so please help make these first two a grand success. For those of you that do not feel confident enough to present a celestial object or two, please attend the monthly star parties. They are intended to help you get comfortable with the night sky!

Now that the Alachua Astronomy Club has celebrated its 20th anniversary, it seems appropriate to consider what issues are on the astronomical "horizon" which will be of interest to the general public, attract new members and stimulate a more active membership. In this regard, two of our closest astronomical neighbors warrant special consideration.

Our Sun and Moon are now taking center stage in the world's scientific community and will remain there during the next several decades. While star parties will always be the mainstay of our public outreach, not since Sputnik and Apollo has there been a better opportunity for astronomy clubs to devise public outreach programs and build a more actively engaged membership. In the near future, both the Sun and the Moon will become front-page news and the AAC should be prepared.

Consider the Sun. Currently, there are 16 spacecraft studying the Sun, six more in development and five others under consideration (1). For example, SOHO, the Solar & Heliospheric Observatory was launched in December 1995 as a joint effort of NASA and the ESA. Its mission is ". . . to study the Sun from its deep core to the outer corona and the solar wind." Anyone who ventures to the "Best of SOHO Gallery" section of this mission's website will be treated to stunning images and movies of the sun's explosive power unimagined 20 years ago. (2)

Analysis of the voluminous data returned from solar spacecraft has forced a major (and contentious) paradigm shift in solar physics. Scientists now realize that "the Earth-directed Coronal Mass Ejections (CMEs) are the primary driver of disastrous space weather," (3) **not** solar flares as previously assumed. (4)

"Coronal mass ejections (CMEs), are powerful eruptions that can blow up to 10 billion tons of the Sun's atmosphere into interplanetary space. Traveling away from the Sun at speeds of approximately one million mph), CMEs can create major disturbances in the interplanetary medium and trigger severe magnetic storms when they collide with Earth's magnetosphere. Large geomagnetic storms directed towards Earth can damage and even destroy satellites, are extremely hazardous to Astronauts when outside of the protection of . . . (spacecraft)) . . . , and they have been known to cause electrical power outages." (5)

The twin STEREO spacecraft (Solar TERrestrial RELations Observatory), were launched in October 2006, and are now taking up positions around the Sun. The STEREO mission is specifically designed to track Earth-directed CMEs in real time, providing far more accurate space weather forecasting in anticipation of the next solar cycle. (6)

CMEs, aka "solar hurricanes," were only discovered in 1971 and can have profound effects on our everyday lives. It is now believed that the most massive solar storm ever known to impact Earth occurred on September 1859 and was caused by a CME. "Within hours (of its arrival), telegraph wires in both the United States and Europe spontaneously shorted out, causing numerous fires." (7)

Among other effects, it is now known the CMEs corrode the linings in oil and gas pipelines because these storms ". . . can cause voltage differences between the pipes and the surrounding soil, which accelerate corrosion." (8). One NASA educational resource guide titled "Solar Storms and You!" for grades 5-8 even states that due to a solar storm "A gas pipeline in Russia explode(ed) killing hundreds of people." (9)

The interaction of CME's with Earth's magnetosphere is now also suspected of causing significant earthquake activity. Scientists in India suspect the 7.9 earthquake that occurred on January 26, 2001 in Gujarat, India was triggered by a CME which exploded off the Sun two days earlier. Scientists hypothesize that the CME's impact with the Earth's magnetosphere triggered fault lines near Gujarat and was also responsible for 65 other earthquakes occurring on that same day. (10)

NASA recently announced that CMEs also generate another type of ". . . newly discovered space weather . . . ion plumes . . . which are made of electrified gas floating so high above the ground they come in contact with space itself." For example, in 2003, one ion plume formed over Florida when a CME hit the magnetosphere and then traveled up to Canada at a speed of 2200 mph. These ion plumes can ". . . interfere with satellite transmissions, airline navigation and radio communications." (11)

During the past several years, as the sun slumbered into a quiet period, the world's production of and the public's reliance on advanced electronic devices has increased exponentially. Today, the whole world is dependent on all manner of advanced electronic gadgetry -- from Ipods to cell phones --all vulnerable to CME effects.

Solar Cycle 24 is expected to begin in a few months -- March 2008 -- and peak around 2012. (12) While scientific opinion is split on just how active this cycle will be, many scientists believe it will be among the most active cycle (13) since continuous records of solar activity have been kept, starting in 1849. (14)

Technology will soon collide head on with the next solar maximum and CMEs will make headlines. It is no mystery why the two STEREO spacecraft were launched to keep watchful eyes on the Sun.

A few AAC members are now preparing for the anticipated increasing public awareness and interest in our Sun and space weather. The club recently purchased a new Coronado solar telescope to show the public solar prominences and to afford interested club members the opportunity to develop a well thought out solar outreach program. Our solar telescope is currently being evaluated and member training on its use will begin soon.

Some solar spacecraft websites have a "Public Outreach" page with ideas on how schools and local astronomy clubs can help educate the public. AAC members interested in the Sun should assess the products available on the STEREO Spacecraft website including posters, fact sheets, booklets and 3-D glasses – (because STEREO provides three dimensional views of the Sun). (15) If ever there were an opportunity to renew our school outreach program – here it is – but it will take a more active membership.

What about Selene, that "annoying" object that blots out deep sky objects many nights each month? Well, like the Sun, the Moon will be of increasing interest to the general public as well because it is expecting visitors. The U.S. plans to return humans to the lunar surface no later than 2020. But even now, international unmanned lunar scientific exploration has just entered a new "Golden Age," as Chuck Wood has characterized it on his Lunar Photo of the Day website. (16)

Japan's lunar explorer "KAGUYA" (SELENE,) was injected into a lunar orbit at an altitude of approximately 60 miles on October 18, 2007 and has already returned the first HDTV images of the lunar surface as well as a stunning HDTV Earthrise video. (17)

China's Chang'e I lunar probe blasted off on October 24, 2007 and is now in lunar orbit. The spacecraft is part of China's three phase program to eventually land astronauts (taikonauts) on the moon, perhaps by 2020. (18)

At the AAC November 2007 general meeting, guest speaker, Dr. Patrick Simpkins, D.B.A., Director, Engineering, NASA Kennedy Space Center, pointed out that China may be intending to eventually unseat the U.S. as the world's leader in space, and exploration of the Moon is an important step. International competition in space will make the Moon all the more interesting to the general public – Apollo deja-vu?

India's first unmanned lunar probe, Chandrayaan-1, is now scheduled for launch in April this year onboard India's Polar Satellite Launch Vehicle. On November 12, 2007 in Moscow, The Indian Space Research Organization (ISRO) and Russia's Federal Space Agency (Roskosmos) signed an agreement on joint lunar research and exploration with a mission intended for launch in 2011 or 2012. The mission will include a lunar orbiting spacecraft and a lander/rover. (19) In addition to sending humans back to the Moon, the United States is scheduled to launch the Lunar Reconnaissance Orbiter (LRO) on October 31, 2008. This probe will:

“. . . explore the lunar surface in exceptional detail. . . In its first year of operation, LRO's suite of instruments will produce 300 Terabytes of data — more than all other U.S. planetary missions combined, including the Mars Reconnaissance Orbiter.” (20)

The Planetary Society, realizing a new age of lunar exploration is underway, is presenting a proposal to the United Nations to name the next 10 years as "The International Lunar Decade: 2007-2019." (21)

Based on personal interest in lunar observing and an awareness of the renaissance in lunar exploration now upon us, some members of the AAC have initiated the Lunar Observing Group. The first meeting was held on November 20th last year and focused on the Mare Imbrium impact basin. The LOG is attempting to help interested amateurs move beyond simple "gee-whiz" lunar observing to a more serious and scientific approach by actively observing and trying decipher and more fully appreciate the moon's geologic history. In January, two members will give a presentation at the AAC general meeting updating the club on the current armada of unmanned spacecraft now in lunar orbit or soon to be launched to the moon. As for direct public outreach, the AAC LOG is coordinating with Santa Fe Community College for public viewing of the February 2008 total lunar eclipse on the Santa Fe Campus.

The future of the AAC during the next 20 years will depend in part on decisions and actions taken by its membership regarding the opportunities now before us. So what can you do? Come to meetings and volunteer for activities. Become more informed; look at some of the links in this article. Become involved in club discussions on how we can take advantage of the Solar and lunar opportunities at hand.

No one member can know it all or do it all, but individual members can become knowledgeable in specific areas of solar and lunar science and then share that information with members and with the public during meetings and observing events

Finally, look around at the next AAC general meeting – our club is small with an aging demographic. Currently only 10% of our membership does 90% of the work. We need a more active membership. More precisely, we need more younger, enthusiastic and active members. Hopefully the Sun and the Moon will generate sufficient interest and excitement to attract new members and to help make the AAC's next 20 years even better than the first.

Reference Web Links:

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- (2) SOHO Gallery webpage <http://soho.nascom.nasa.gov/gallery/>
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<http://www.astronomy.com/ASY/CS/blogs/astronomy/archive/2006/12/13/318339.aspx>
- (14) Marshall Space Flight Center, Solar Physics web page "The Sun Spot Cycle", Last Updated: November 15, 2007 <http://solarscience.msfc.nasa.gov/SunspotCycle.shtml>
- (15) STEREO Mission webpage "Welcome to the STEREO Learning Center" products web page
<http://stereo.gsfc.nasa.gov/classroom/products.shtml>
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<http://www.lpod.org/?m=20070801>
- (17) Japan Aerospace Exploration Agency press release, November 7, 2007
http://www.jaxa.jp/press/2007/11/20071107_kaguya_e.html
- (18) AHN news, *China's First Lunar Probe Chang'e-1 Successfully Enters Moon's Orbit*, November 5, 2007
<http://www.feedsyndicate.com/articles/7009064562>
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<http://www.lpi.usra.edu/publications/newsletters/lpib/lpib110.pdf>
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Unlike Florida's two prior total lunar eclipses, which could only be partially seen, February's eclipsed Moon remains above the Florida horizon for the entire event. In addition, large brightness variations across the eclipsed lunar disk should make this eclipse especially colorful and intriguing. Brightness estimates during totality can help establish a history of optical thickness of volcanic dust layers in Earth's atmosphere

At least twice each year the Moon passes through all or a part of Earth's shadow—a shadow cast by our planet blocking solar rays. This results in at least two eclipses of the Moon of some type every calendar year. In addition, about two weeks before or after these lunar eclipses, the Moon passes partially or fully in front of the Sun. This also produces a minimum of two solar eclipses of some type per year.

Two lunar eclipses and two solar eclipses occur in 2008, the minimum number for each type in any given calendar year. These eclipses include a total and partial lunar eclipse, and an annular and total solar eclipse. However, only the first, a total eclipse of the Moon, on February 20/21, is visible from Florida.

(The most significant and dramatic eclipse of 2008, of course, is the total solar eclipse of August 1 but is only visible from extreme northeastern Canada, northern Greenland, the Arctic, central Russia, Mongolia, and parts of northern China.)

The Lunar Eclipse

Florida must, therefore, settle for February's total eclipse of the Moon. Still, this eclipse is special since *the entire eclipse is visible from the eastern United States*. The previous two total lunar eclipses (2007 March 3 and 2007 August 28) were only partially seen from North Florida since the Moon rose or set during these eclipses, respectively. However, the upcoming total lunar eclipse is conveniently timed for Florida beginning in early evening on Wednesday, February 20 and concluding shortly after midnight on Thursday, February 21.

In fact, this eclipse is well-placed throughout most of the Americas and western Europe. (Observers in western North America miss the first part since the Moon will not rise until after the eclipse begins.) Furthermore, in Gainesville, Florida, the Moon's position on the sky at mid-eclipse is near-perfect, about a 52-degree altitude above the southeastern horizon. This is high enough to clear horizon obstacles but not too high that necks must painfully bend to view the Moon!

Table 1 lists Eastern Standard Times for stages of this eclipse. Notice *mid-eclipse* occurs at 10:26 p.m. EST on the evening of February 20. This corresponds to February 21, 03:26 UT (*Universal Time*). Since UT is five hours *ahead* of EST, eclipse announcements may give the "date of occurrence" as February 21 but the eclipse really begins the evening of February 20, a Wednesday night for us on the East Coast. Table 1 also gives the altitude

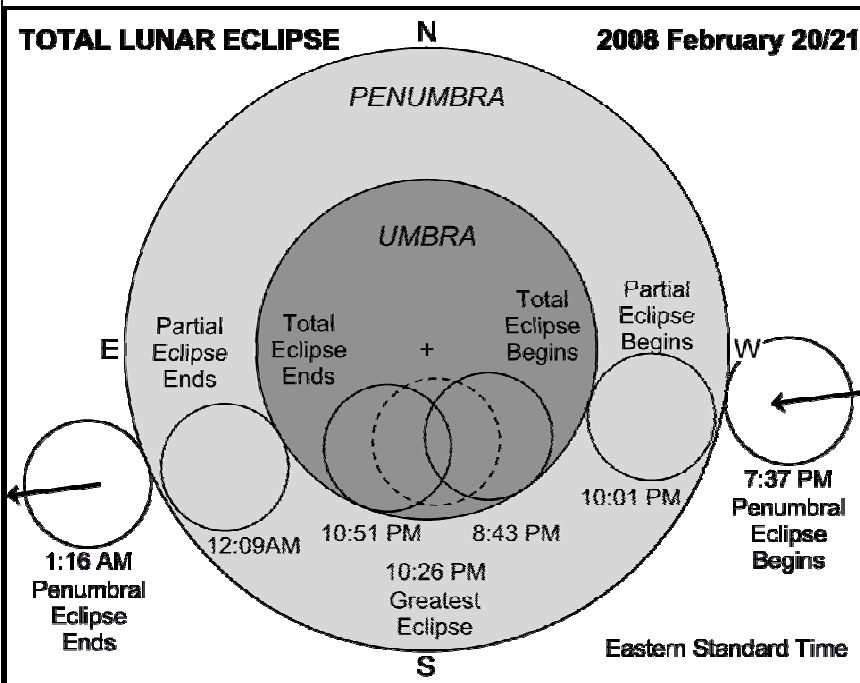
of the Moon above the horizon for each stage as viewed from Gainesville. (Altitudes will be similar to the tabular values for other locations in North Florida.)

Public Viewing Session: The AAC with Santa Fe Community College will hold a public viewing event for this eclipse at the SFCC NW campus. More details can be found elsewhere in the January/February issue of *FirstLight*. Also consult the AAC web site (floridastars.org) for details as the eclipse date approaches. In addition, subscribers to the AAC e-mail list (AAC-L) will get reminders.

Table 1. Lunar Eclipse Time Table: 2008 February 20/21 (Times Eastern Standard)

Event	Time of Event (EST)	Moon's Altitude (Gainesville)
Penumbral Eclipse Begins	07:37 p.m.	17°
Partial Eclipse Begins (Moon Enters Umbra)	08:43 p.m.	31°
Total Eclipse Begins (Moon Entirely within Umbra)	10:01 p.m.	47°
Mid-Eclipse (Greatest Eclipse)	10:26 p.m.	52°
Total Eclipse Ends	10:51 p.m.	57°
Partial Eclipse Ends (Moon Leaves Umbra)	12:09 a.m.	68°
Penumbral Eclipse Ends	01:16 a.m.	69°

During this eclipse the Moon will spend three hours and twenty-six minutes passing through Earth's *umbral shadow* (darkest portion). Coincidentally, notice this time (3h26m) is the same as the UT of mid-eclipse (03:26)! Although the Moon begins to enter the brighter, outer portion of Earth's shadow (the *penumbra* or partial shadow) slightly more than one hour before first contacting the umbra, this event is difficult to see. *Still, vigilant observers can attempt to detect at what point within the penumbral shadow slight darkening on the Moon first becomes detectible.*



Also, during this eclipse the Moon does not pass centrally through the Earth's umbra but passes very close to the southern edge of the umbral portion with totality lasting only about 50 minutes (Fig. 1). *Brightness and color variations can vary significantly from one lunar eclipse to another due to factors as the Moon's position with the Earth's shadow and conditions within Earth's atmosphere.* Although one might expect the Earth's umbral shadow to be very dark, sunlight scattered by Earth's atmosphere into the shadow can sometimes produce bright eclipses.

Fig. 1. Projection of the Earth's shadow on the sky showing the position of the Moon during the total lunar eclipse of 2007 February 20/21 for Florida (all times Eastern Standard). Although the daily motion of the sky will cause the Moon to move westward across the sky during the eclipse, the eastern side (*limb*) of the Moon will first enter the Earth's shadow since the Moon also moves eastward *among the stars* due to its orbital motion around Earth. (Diagram based on data from SkyMap Pro 11 software by C.A. Marriott.)

The shorter duration of totality (50 min.) compared with last August's eclipse (90 min.) results from the Moon's passage close to the edge of the umbra (Fig. 1) rather than near the umbra's center as it did during the last total eclipse. (Longest total lunar eclipse durations are approximately 107 minutes. The last was 2000 July 16, 106.4 minutes, the next 2123 June 9, 106.1 minutes.)

Since the southern edge (*limb*) of the Moon will remain very close to the edge of the umbra, one can expect *large differences in brightness across the lunar disk* for the upcoming eclipse between the Moon's southern limb, which may remain relatively bright, and the northern limb, which may appear much darker due to its much deeper immersion in the umbra. In addition, color variations often depend strongly on dust, especially volcanic dust in our atmosphere, which can block sunlight from entering the Earth's umbra. This can cause eclipses to vary from bright orange to bloody red to even dark brownish or grayish. However, major volcanic eruptions have not occurred recently which may help make this eclipse brighter and more colorful than usual.

Observers who wish to evaluate the visual appearance and brightness of the Moon during this lunar eclipse can use the five-point **Danjon Scale**. The following description and use of this scale are adapted from the *RAS Observer's Handbook 2008*, pg.130:

- L = 0** Very dark eclipse
(Moon almost invisible, especially at mid-totality)
- L = 1** Dark eclipse, grey or brownish
(Details distinguishable only with difficulty)
- L = 2** Deep red or rust-colored
(Very dark central shadow, while outer umbra relatively bright)
- L = 3** Brick-red
(Umbral shadow usually has bright or yellow rim)
- L = 4** Very bright copper-red or orange
(Umbral shadow has bluish, very bright rim)

Judge "L values" with naked eye, binoculars or small telescope every ten minutes especially near mid-totality. Also examine the Moon's appearance just after totality begins and ends to provide an "L-value" for the outer umbra. Note any variations in color and brightness through the umbra including the apparent sharpness of the shadow's edge. Finally, note the visibility of lunar features within the umbra. Make notes and sketches. Report results to *Sky & Telescope* and to Dr. Richard Keen, Department of Atmospheric and Oceanic Sciences at the University of Colorado (richard.keen@colorado.edu). Dr. Keen has a strong interest in lunar eclipse brightness, which he uses to calculate a history of optical thicknesses of volcanic dust layers in our atmosphere.

Andre Danjon (1890–1967), a French astronomer, devised the above scale and thought the "L-value" was related to the 11-year solar cycle. (See Meeus 1997). Low values of "L" were believed to occur during the first two years after solar minimum. Then the brightness of the Moon was supposed to increase till the next solar minimum. Finally, eclipse luminosity was expected to drop dramatically with the cycle then repeating. However, more recent analysis by Jean Meeus (1997) has cast doubt on the "Danjon Law." Still, future observations should further help resolve whether sunspot activity plays a role in determining lunar eclipse brightness.

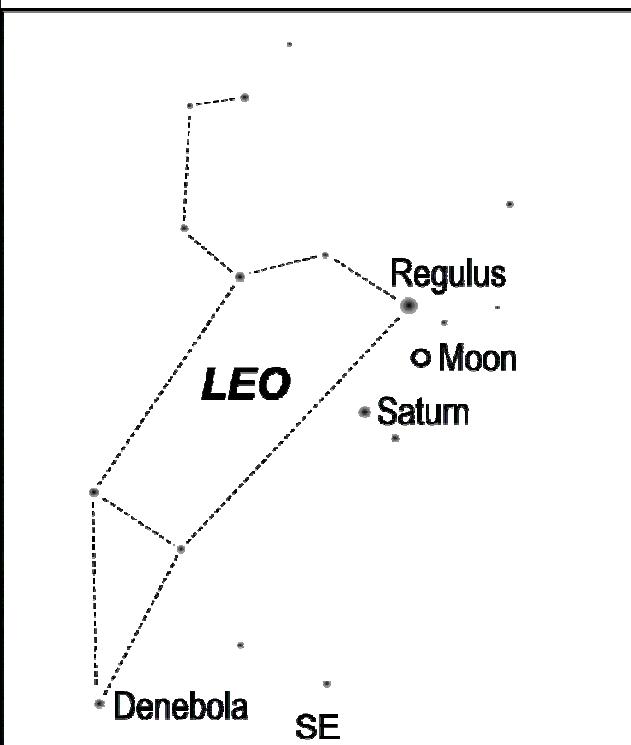


Fig. 2. The eclipsed Moon will lie in *Leo* with bright Regulus and Saturn close neighbors. (Diagram based on data from SkyMap Pro 11 software by C.A. Marriott.)

The Lunar Eclipse Sky

During this eclipse, the Moon will lie in the constellation of *Leo*, less than three degrees south of bright Regulus (magnitude +1.4). Saturn, too, will lie nearby, less than four degrees to the south and east of the eclipsed Moon (Fig. 2.)! Indeed, Saturn will be near maximum brightness shining at magnitude +0.2 since *the ringed planet comes to opposition with the Sun only a few days later*, on February 24. A wide-angle photo of this scene would make an electrifying picture. (Telescopic views of Saturn should show a disk 20 arc seconds across with the rings spanning about 45 arc seconds.)

Total lunar eclipses no longer have major scientific value and do not have the breathtaking power of a total eclipse of the Sun. However, no two lunar eclipses are quite alike, are intriguing to watch, stimulate imaginations and interest in nature, especially among our young, and are a tes-

tament to our ability to predict at least some cosmic events.

The Future

Total eclipses of the Moon occur every few years *on the average*. In fact 87 occur in the period 2000–2099 according to Jean Meeus (2004). However, the Moon must obviously be above one's horizon at the time of the eclipse to be observed. Also, weather can ruin chances to see one of nature's beautiful, elegant displays. So you can ignore the February eclipse and hope to see the next, three years later, on December 21, 2010. Then, it will not be until April 15, 2014 when another total lunar eclipse can be seen from Florida. Better to take them as they come. Mark your calendars for February 20 and don't lose a chance to spend an evening with the Moon as she performs her ancient graceful and colorful ritual.

For those interested in still other future eclipse events, know that *six eclipses occur in 2009*, four eclipses of the Moon and two of the Sun! This is close to the maximum number of eclipses possible in a calendar year—seven, a rare event. (At least two must be lunar and two solar of some type, with the remaining three lunar or solar.) The next year seven eclipse year occurs in 2038 with three of the Sun (two annular, one total) and four of the Moon (all penumbral).

Although four lunar eclipses occur in 2009, the first three are all penumbral and will hardly be noticed since the Moon barely darkens during this type of eclipse. (In any case, the first penumbral eclipse is not visible from Florida, and the latter two only partially visible.) The last lunar eclipse of 2009 is a partial eclipse but is not visible from Florida.

The two solar eclipses include an annular and total but, again, neither is visible from the USA. So, unfortunately, *none of the six 2009 eclipses are suitable for viewing from the Florida peninsula*.

Still, the latter solar eclipse, is worth keeping in mind since *this eclipse has the longest duration of totality for any total eclipse of the Sun in the 21st Century* (6m39s in the Pacific Ocean south of Tokyo). The total eclipse path begins on the west coast of India and crosses southern China (including Shanghai) where maximum duration of totality is more than five minutes. Finally, the Moon's shadow moves out over the Pacific Ocean south of Japan through Iwo Jima and ends in the mid South Pacific Ocean between Australia and South America.

Some readers may remember the last very long solar eclipse, on July 11, 1991, with a maximum duration of nearly seven minutes east of Baja California Sur. Both the 1991 and 2009 total solar eclipses are, in fact, related, belonging to the same eighteen-year eclipse cycle called the *Saros* (about 6585.3 days). This Saros cycle (numbered 136), produced the longest eclipses of the last century and will continue to produce the longest eclipses of the present century. However, total eclipse maximum durations are now waning for this cycle. (The next after the 2009 eclipse occurs in 2027 with a maximum duration of 6m23s in Egypt.)

Note: Interested in seeing the 2009 total solar eclipse? Contact the author (cohen@astro.ufl.edu), who is currently planning a tour to China and the great 2009 solar eclipse.

Interested readers wanting to know more about February's lunar eclipse, including how to observe and photograph lunar eclipses, and how to judge eclipse brightness, should see the Espenak (2007) and the Deans & MacRobert (2007) references below.

References

- Deans, P. and Alan M. MacRobert, A.M. 2007, *Observing and Photographing Lunar Eclipses*, (<http://www.skyandtelescope.com/observing/objects/eclipses/3304036.html>).
- Espenak, Fred 2007, *Total Lunar Eclipse: February 20, 2008* (<http://sunearth.gsfc.nasa.gov/eclipse/LEmono/TLE2008Feb21/TLE2008Feb21.html>)
- Meeus, Jean 1997, *Mathematical Morsels* (Willmann-Bell, Inc.: Richmond).
- Meeus, Jean 2004, *Mathematical Morsels III* (Willmann-Bell, Inc.: Richmond).
- Observer's Handbook 2008*, (Royal Astronomical Society of Canada: Toronto).

Executive Council Meeting Minutes

November 6, 2007, Napolitano's Restaurant

1. Presence of a Quorum; a. TC reported that there was a quorum present; i. There were nine (9) members present
2. Call to order; a. BH called the meeting to order at 6:43 PM
3. Roll Call; a. TC reported that the following members were present; i. Bill Helms (BH), Howard Cohen (HC), Larry Friedberg (LF), Tandy Carter (TC), Pamela Mydock (PM), Bob O'Connell (BO'C), Thomas Olmsted (TO), Michael Toomey (MT), Scott McCartney (SM); b. TC reported that the following Club Members attended i. Marian Cohen (MC), Rich Russin (RR)
4. Reading and approval of the minutes of last meeting; a. Corrections; i. MC reported that MC was listed twice in the roll call section ii. TO reported that GC name was misspelled in the telescope status section; b. Approval; i. TO moved and HC seconded to approve the minutes as corrected; ii. The motion passed on a voice vote; iii. The minutes were approved as corrected
5. Officer, board and standing committee reports; a. LF distributed the Treasurer's report; b. TC reported on the status of club Telescopes i. SkyQuest XT-8 – Larry Friedberg (C) 1. with custodian; ii. Museum telescope (6" equatorial Newtonian) – Don Loftus (C) 1. with custodian; iii. Celestron C8 – Gary Cook (C); 1. with custodian; iv. 4 ½" Reflector – Marianne Gamble (C) - 1. with custodian; v. 8" Parks Dobsonian – Don Loftus (C) - 1. with custodian; vi. RLT – Chuck Broward (C) - 1. with custodian c. MT reported on Star Parties: i. MT reported that the club star party schedule has been established; ii. MT reported that the schedule has been passed to the webmasters to be posted; d. SM reported on the speaker schedule; i. SM reported that the speakers for January, February and March 2008 have been confirmed; ii. SM reported that nine of the eleven speaking positions have been filled
6. Special committee reports: a. PM reported on the status and murals at the Royal Park Stadium Theater i. PM reported that there was nothing to report; ii. TO suggested that the murals be removed by either the Florida Museum of Natural History or the Harn Museum; iii. HC suggested that the murals be offered to the school district; iv. BH suggested that the murals be offered to the Santa Fe Community College; b. PM reported on the 20th anniversary FirstLight issue; i. PM reported that HC would handle the first 10 years; c. LF reported on the club holiday party; i. LF reported that Mark and Cindy Barnett have volunteered to host the holiday party again this year; ii. LF reported that he would pass around a sign-up sheet at the general meeting
7. Special orders: a. BH in lieu of the nominating committee consisting of Don Loftus, Bob O'Connell, and Thomas Olmsted presented the following slate of officers at the AAC October general meeting
 - i. President: Bill Helms
 - ii. Vice President: David Liles
 - iii. Secretary: Tandy Carter
 - iv. Treasurer: Larry Friedberg
 - v. At Large: Howard Cohen, Pam Mydock, Bob O'Connell
8. Old Business: a. BH reported on posting club policies to the club webpage; i. BH reported the posting was in work; ii. OPEN b. LF reported on the club's tax exempt status; i. LF reported that the club's tax exempt status was in work; ii. TC asked if it would be quicker to start the entire process over; iii. LF replied that restarting the process would not be quicker; iv. OPEN c. BH reported on new dues structure; i. Deferred to February d. HC reported on sharing FirstLight articles and copyright policies; i. HC moved and TC seconded to have JO add a copyright statement to the masthead of the FirstLight; ii. The motion passed on a voice vote; iii. CLOSED
9. General orders: a. None
10. New Business: a. BH requested a discussion of the club acceptance of an Apogee AP-6 EP CCD camera; i. TC reported that the cost of the camera would be prohibitive; ii. TO moved and BO'C seconded to accept the camera; iii. The motion passed 6 – 1 iv. CLOSED b. TC requested a discussion of Nominations for the AAC Achievement Award i. HC reported that nominations for the AAC Achievement Award are handled by previous recipients ii. PM volunteered to compile a list of past recipients c. BH requested a discussion of having an outreach program for the 2008 YMCA Florida State Wide Pow Wow i. BH reported that the pow wow would be held at the Spirit of the Suwannee Park ii. BH reported that he would request a volunteer to head up the program at the general meeting; iii. OPEN d. BO'C reported that the Lunar Observers Group would run the outreach program for the Total lunar eclipse on February 20, 2008 i. BO'C reported that the eclipse program would be at Santa Fe Community College
11. Good of the Order: a. None
12. Announcements: a. HC reported that the Solar Walk would be discussed at the December meeting
13. BH Time and location of next meeting: a. BH reported that the next meeting would be at 6:30 PM on December 4, 2007 at Grill Masters
14. BH Adjournment: a. TO moved and LF seconded adjourn the meeting; b. The motion passed on a voice vote c. The meeting was adjourned at 8:35 PM

Respectfully Submitted
Tandy W Carter Jr.
AAC Secretary

Executive Council Meeting Minutes

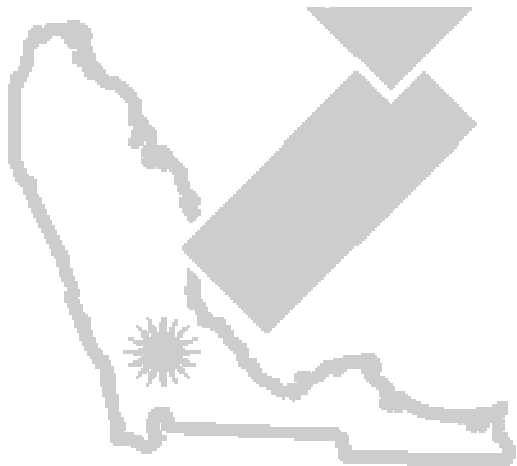
December 4, 2007, Grill Masters Restaurant

1. Presence of a Quorum: a. TC reported the presence of a quorum; i. There were five (5) board members present
2. Call to order: a. BH called the meeting to order at 6:41 PM on December 4, 2007
3. Roll Call: a. TC President and Secretary present; i. BH present as president; ii. TC present as secretary; b. TC Board members present: i. Bill Helms (BH), Howard Cohen (HC), Tandy Carter (TC), Bob O'Connell (BO'C), Thomas Olmsted (TO), Michael Toomey (MT); c. TC Board members absent; i. Larry Friedberg, Pamela Mydock, Charles Broward, Scott McCartney, Jackie Owens
- d. TC Club members attending; i. Marian Cohen; e. TC Board members that came late or left early; i. None
4. Reading and approval of the minutes of last meeting: a. Corrections; i. HC stated that item 11a should be item 7a
- b. HC moved and TO seconded to accept the minutes as corrected; i. The motion passed; ii. The minutes were accepted as corrected
5. Officer, board and standing committee reports: a. HC in lieu of LF distributed the Treasurer's report Income/Expense by Category
- b. TC reported on the status of club Telescopes: i. SkyQuest XT-8 – Larry Friedberg (C) - 1. with MT custodian
- ii. Museum telescope (6" equatorial Newtonian) – Don Loftus (C) - 1. with custodian
- iii. Celestron C8 – Gary Cook (C) - 1. with custodian; iv. 4 ½" Reflector – Marianne Gamble (C) - 1. with custodian
- v. 8" Parks Dobsonian – Don Loftus (C) - 1. with custodian; vi. RLT – Chuck Broward (C) - 1. with custodian
- vii. PST – Scott McCartney (C) - 1. with custodian; viii. Collimation Tools – Michael Toomey (C) - 1. with custodian
- c. MT reported on Star Parties: i. The Villages Starry Night Star party will be January 12, 2008; ii. The Friends of Paynes Prairie Star Party will be January 26, 2008; d. SM There was no report on the speaker schedule
6. Special committee reports: a. PM There was no report on the plaque and murals at the Royal Park Stadium 16 Theater
- i. OPEN; b. PM There was no report on the 20th anniversary FirstLight issue; i. CLOSED
- c. HC in lieu of LF reported on the Holiday Party; i. Holiday party preparations were in progress; ii. CLOSED
7. Special orders: a. BH in lieu of the nominating committee consisting of Don Loftus, Bob O'Connell and Thomas Olmsted introduced the following slate of 2008 AAC Officers at the November AAC general meeting
- i. President: Bill Helms; ii. Vice President: David Liles; iii. Secretary: Tandy Carter; iv. Treasurer: Larry Friedberg
- v. At Large: Howard Cohen, Pam Mydock, Bob O'Connell
- vi. SM/BH determined there was a quorum of the general membership were present; vii. BH introduced the 2008 slate of officers
- viii. TC moved and SM seconded to close the nominations; 1. The motion carried on a unanimous voice vote
- ix. TO moved and SM seconded to accept the offered slate of 2008 officers; 1. The motion carried on a unanimous voice vote
8. Old Business: a. BH reported that there was no progress on posting club policies to the club website; i. OPEN
- b. LF there was no report on the tax exempt status of the AAC; i. OPEN
- c. BH reported on the YMCA State Wide Pow-Wow outreach program; i. As of yet, there has not been an AAC member that wants to be in charge of this event; ii. OPEN; d. BO'C reported on the Lunar Eclipse outreach program; i. BO'C reported that the AAC would be welcome at the Santa Fe Community College; ii. BO'C volunteered the LOG to be in charge; iii. OPEN
9. General orders: a. None
10. New Business: a. HC requested a discussion of the disposition of NEFAS telescopes
- i. MT suggested that some of the telescopes be removed from their mounts and be used as reference items for school outreach
- ii. TC suggested that the telescopes be given to an organization that donates toys to needy children; iii. BO'C suggested that some of the telescopes be donated to local high schools for dissection; iv. TO and HC both expressed serious concerns about donating the telescopes; v. BO'C volunteered to be in charge of disposing of the telescopes
- vi. OPEN; b. BO'C reported on the first meeting of the LOG on November 20, 2007; i. BO'C reported that the meeting was a success; ii. There will be more meetings at ATM meetings when the moon is in a favorable position
- iii. CLOSED; c. HC requested a discussion of the AAC Service Award; i. BH reminded the board that only the previous award recipients could determine the current recipient; ii. BH requested MC be in charge of this year's Award; iii. BH requested HC and MT assist MC; iv. CLOSED
11. Good of the Order: a. TC suggested that the people that produced the 20th anniversary issue of FirstLight be praised
- i. TC moved and TO seconded that Howard Cohen, Marian Cohen, Pam Mydock and Jackie Owens be praised for the exemplary 20th anniversary issue of FirstLight; ii. The motion passed on a voice vote; iii. CLOSED
- b. HC suggested that board and committee chairs be reminded to tell the president of the board if they will not be at the meeting
- i. HC also suggested that anyone that can't make the meeting transmit their reports to the president for dissemination; ii. CLOSED
- c. HC suggested that all board members refresh their memories on "Robert's Rules of Order"
- i. HC suggested that the AAC purchase a copy of "Robert's Rules of Order" to be placed in the club library for future reference
- ii. CLOSED
- d. BO'C suggested that board members be more sensitive to new members' needs; i. TC suggested that the AAC resume using the guest sign-in sheets; ii. TC suggested that guests not be asked as many questions at their first meeting; iii. MT suggested that temporary name tags be used for guests and new members; iv. BH suggested that new members only be asked to stand and introduce themselves; v. BO'C suggested that new members be allowed to return to their seats to tell about themselves; vi. OPEN
12. Announcements: a. HC announced that the City of Gainesville Art in Public Places Trust will meet on December 5, 2007 at 3:30 PM at the Thomas Center; i. The Solar Walk will be on the agenda
13. BH Time and location of next meeting: a. January 2, 2008 at 6:30 PM at Grill Masters; b. MC asked if the meetings would be held at Grill Masters for the foreseeable future; i. MT stated that the general opinion of the board members was that Grill Masters was superior to Napolitano's
14. BH Adjournment: a. TC moved and TO seconded to adjourn the meeting; b. The motion passed on a voice vote
- c. The meeting was adjourned at 8:27 PM December 4, 2007

FirstLight

January / February
2008

A Jupiter-Io Montage from New Horizons
Credit: NASA, Johns Hopkins U. APL, SWRI
Explanation: As the New Horizons spacecraft sweeps through the Solar System, it is taking breathtaking images of the planets. In February of last year, New Horizons passed Jupiter and the ever-active Jovian moon Io. In this montage, Jupiter was captured in three bands of infrared light making the Great Red Spot look white. Complex hurricane-like ovals, swirls, and planet-ringing bands are visible in Jupiter's complex atmosphere. Io is digitally superposed. A plume was emanating from Io's volcano Tvashtar.



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