



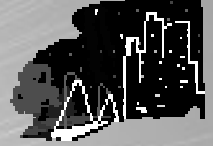
North Central Florida's
Amateur Astronomy Club
29°39' North, 82°21' West

January / February 2009

Issue 77.1/78.1



Member
Astronomical
League



Member
International
Dark-Sky Association

FirstLight

Newsletter of the Alachua Astronomy Club

Big Hugs to Mark & Cindy Barnett for a Great Holiday Party!

Coinciding with the SEC Championship Game this year, we all celebrated the AAC's 21st year and a huge win by the Gators.

Thanks again to our gracious hosts Mark and Cindy.

More pics on pages 18 and 19.





In January 2009, the United States will inaugurate a new president and the 111th Congress. They face a number of immediate challenges and crucial decisions. Among these will be economic stimulus plans, bailouts, and foreign policy decisions. But some crucial decisions regarding NASA and the civilian space program must be made very soon, also.

During his campaign, in 2007, Barack Obama proposed to delay NASA's Constellation program for a return to exploration of the Moon by five years, and use the money as part of an \$18 billion education program. This threatened to gut the U.S. human space flight program, and severely affect the Kennedy, Marshall, Stennis, and Johnson Space Centers. By January 2008, he had promised to complete the International Space Station, retire the shuttle, and replace it with Ares and Orion "sooner rather than later." This brought his policies into fairly close agreement

with the Bush administration's current plans. In August, he formalized these plans in a seven-page policy statement titled "Advancing the Frontiers of Space Exploration."

Following the Russian invasion of Georgia, there was an attendant chill in relations with the United States. As the Florida presidential race tightened, Obama and Biden announced they would spend \$2B to narrow the five year gap between retirement of the space shuttle and operational use of the Orion/Ares to transport crews to the ISS. During that gap, the United States will be totally dependent on Russia for all human space flight, and for access to the International Space Station.

Obama's primary focus will, of necessity, be on the economy and national security. But Congress's Government Accountability Office listed shuttle retirement and transition as one to the thirteen urgent issues Congress and the new president must face. NASA has been trying to continue to fly the shuttle and operate the Space Station as well as fund the new Orion/Ares/Constellation project without significant additional funding. It has been estimated that an additional \$2B annually would be required to cover the shortfall. There is some speculation that at least one year's worth of funding could come from an economic stimulus package likely to be requested soon after inauguration.

Money alone will not solve all the difficulties. The STS-125 Hubble upgrade and repair mission cannot be launched before May 2009. It was delayed by serious problems aboard HST itself, as well as difficulty in checking out decades old spare electronics assemblies (imagine 1980s era IBM PC's or TV sets) slated for installation on HST to enable it to continue to function. The Hubble mission requires two shuttles be prepared on adjacent launch pads, so the second could rescue the crew of the first in case of on-orbit problems. The orbital trajectory of Hubble precludes use of the International Space Station as a lifeboat. An unmanned test flight of the new Ares solid rocket booster, with a mockup spacecraft and upper stage had been planned for March 2009. However, launch pad and mobile launcher modifications cannot be completed until after the Hubble mission is launched, due to the requirement to ready shuttles on both Launch Pad 39A and 39B. The test flight will likely be delayed until at least the last half of 2009.

Going in, it appears that a number of options are on the table. Here is a partial list of topics the Obama transition team has requested NASA to address:

- ◆ Shuttle retirement actions already taken, and cost to reverse
- ◆ Additional costs to fly one or two Alpha Magnetic Spectrometer missions to search for antimatter, and two additional ISS crew rotation and supply missions above current plans
- ◆ Costs and issues to fly shuttle through 2015, including recertification if necessary
- ◆ Costs and issues to extend use of ISS through 2020.
- ◆ Costs and issues to raise ISS to higher, more human exploration-useful orbit

(Continued on page 4)

Alachua Astronomy Club, Inc.
2009 Officers

President: Bill Helms
Phone: 352-542-8227
Email: president@floridastars.org

Acting Vice-President: Rich Russin
Phone: 352-333-3012
Email: vicepresident@floridastars.org

Treasurer: Larry Friedberg
Phone: 954-290-6872
Email: treasurer@floridastars.org

Secretary: Tandy Carter
Phone: 386-719-9706
Email: sec@floridastars.org

Board of Directors

Howard Cohen
Pamela Mydock
Fred Palgon

Chairs and Committees:

Star Parties: Marianne Gamble
Phone: 352-379-0653
Thomas Hettinger - Assist. Coordinator
Phone: 407-252-0567
Sandon Flowers - Assist. Coordinator
Email: starparty@floridastars.org

Programs/Promotions: Tim Malles
Phone: 352-371-7192
Rich Russin - Assistant Chair
Email: programs@floridastars.org

School Liaison & Outreach:
Tandy Carter
Email: outreach@floridastars.org

ATM SIG: Chuck Broward
Phone: 352-373-7527
Email: ATM@floridastars.org

Astronomical League Correspondent:
Charles S. Broward
Phone: 352-373-7527

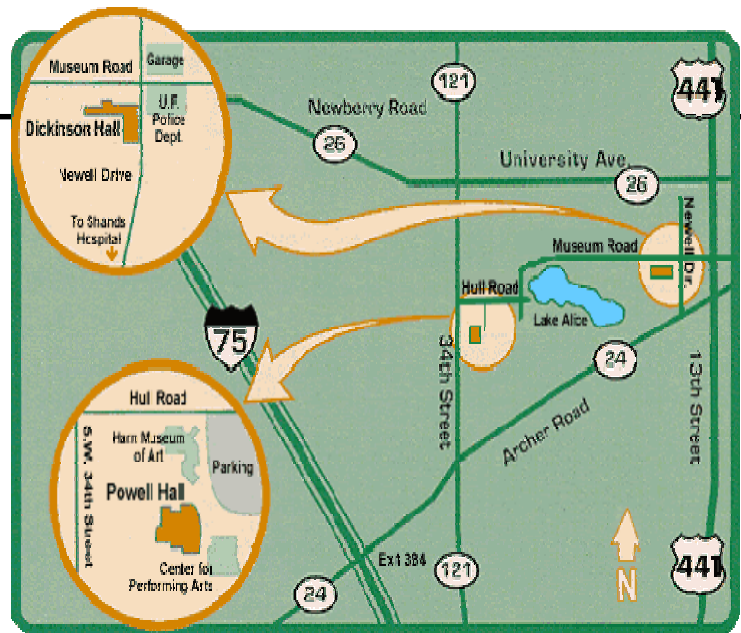
Telescope Custodian: Tandy Carter
Email: telescopes@floridastars.org

Lunar Observing/SIG: Bob O'Connell
Phone: 352-475-1586
Email: lunar@floridastars.org

Webmasters: Howard L. Cohen
Sandon Flowers, Assistant Webmaster
Email: webmaster@floridastars.org

FirstLight Editor: Jackie Owens
Phone: 386-462-7366
Email: firstlight@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 is no monthly meeting in December.



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
The Alachua Astronomy Club, Inc.
P.O. Box 13744
Gainesville, FL 32604-1744 USA

By E-Mail; Send e-mail with your attached files to **FirstLight@floridastars.org**.

FirstLight is the bi-monthly publication of the Alachua Astronomy Club, Inc., Gainesville, Florida. © Copyright 2009, Alachua Astronomy Club, Inc. *FirstLight* is copyright by the AAC. No part of *FirstLight* may be reproduced by any means, nor stored in retrieval systems, transmitted or otherwise copied without written permission from the AAC.

- ◆ Costs and goals of the Ares IX test flight, including costs and savings to cancel
- ◆ Status, technical challenges, schedule and costs to develop the Ares I, including first crewed flight, first flight to ISS, and first lunar-capable flight
- ◆ Projected annual and per launch costs for Ares I-to-ISS missions, vs. using existing US expendable launch vehicles (Delta 4 and Atlas 5), French Ariane 5, or Japanese H2A (including human-rating these vehicles)
- ◆ Status, technical challenges, schedule and costs to develop the Orion Crew Exploration Vehicle (launched by the Ares I), including cost and savings to cancel
- ◆ Status, technical challenges, schedule and cost to develop the Ares V heavy lift vehicle, including cost and savings to cancel
- ◆ Cost to implement a suite of 15 or more Earth Science Missions recommended by National Research Council

Among the missions not questioned by the transition team are the over weight, over budget, and behind schedule Mars Science Laboratory, and the James Webb Space Telescope.

Closer to home, job losses at Kennedy Space Center from shuttle retirement have been estimated as high as 6,400, though more recent estimates place the number closer to 4,000. Johnson Space Center may lose between 400 and 2,200, and Marshall Space Flight Center will likely add jobs, as they are the lead design center for Ares I.

NASA has lost a number of key supporters in Congress this election, some through defeat, and some through retirement. These include representatives from the districts including KSC, JSC, and MSFC. While the new members may be equally supportive of NASA and space flight, they will lack the seniority of their departed colleagues.

A number of names have been making the rounds as potential NASA administrators, to replace Mike Griffin. A number in the industry would like to see Griffin stay on, but he will not if Obama forces major changes in NASA's plans and goals. Others mentioned include the following:

- ◆ Sally Ride, the first female astronaut
- ◆ Steve Squyres, principal investigator on the Mars Exploration Rovers
- ◆ Ed Weiler and Wesley Huntress, former heads of NASA's Science Mission Directorate
- ◆ Charley Bolden, former shuttle commander and retired Marine Corps General
- ◆ Lori Garver, head of Obama's NASA transition team, and a former associate administrator for Policy and Plans

I would like to thank each and every one of you for entrusting the leadership of the Alachua Astronomy Club to me for a fourth year. I consider it a privilege and an honor. I want to strongly encourage each of you to make your own contribution to the life of the AAC, as we celebrate the International Year of Astronomy in 2009.

Bill Helms

Alachua Astronomy Club, President@FloridaStars.org

January Club Meeting

Tuesday, January 13 2009, 7:00 p.m. ET

Speaker: Fred Palgon, Member of the AAC Board

Title: *Rocket Propulsion - History and Development of the World's First Liquid Oxygen and Liquid Hydrogen Engine, the RL 10*

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



Fred Palgon,
AAC Board Member

Preview: Fred will discuss the history and development of the RL 10 rocket engine. The Pratt and Whitney aircraft RL 10, the power plant for NASA/Lockheed Martin's upper stage Centaur space launch vehicle, was the first rocket engine in the world to use high-energy liquid hydrogen as a fuel. It was the technological pathfinder in hydrogen rocketry and led to the development of larger engines that made possible man's greatest engineering achievement, the lunar landing in July 1969. The presentation will include an overview on the design and development of the Alternate Turbopumps for the Space Shuttle Main Engines, why the original turbopumps needed to be re-designed, and a brief explanation of the engine's operation.

About the Speaker: Fred recently retired from Pratt and Whitney Aircraft, where he worked his entire career of 32 years as a Design Project Engineer. During his career, he designed numerous jet engine hardware systems used in military aircraft for the SR-71 Blackbird, F-14 Tomcat, F-15 Eagle, F-16 Falcon, F-22 Raptor and the F-35 Joint Strike Fighter. While working on gas turbine engines, Fred supported the production of Pratt's only liquid hydrogen, liquid oxygen engine, the RL 10 which powers the upper stages of Lockheed Martin's Atlas and Boeing's Delta vehicles. Fred also was directly involved in the Alternate Turbopump Development Program for NASA, which provided replacement designs and production of the High Pressure Liquid Oxygen and Liquid Hydrogen Turbopumps for the Space Shuttle's Main Engines, which are currently flying on the Shuttle today. Fred graduated from the University of Florida with an Aerospace Engineering degree, and currently lives in Gainesville with his wife.



Tom Sarko Receives Astronomical League's "Stellar Outreach Award"

Tom Sarko recently received the Astronomical League Stellar Outreach Award Certificate number 0131-S for his extensive astronomical outreach activities. The Award is given to recipients for offering ongoing encouragement to other astronomers in the field and demonstrating observing skills with a variety of instruments and objects.

Mr. Sarko's activities were certified by Bill Helms, President of the Alachua Astronomy Club. Contact Chuck Broward - our Astronomical League Coordinator for more info on how to start earning your certificate.

Congratulations Tom!

A Year Gone By, a Discussion of Digital Setting Circles....and A PLEA!

November's Tuesday night ATM meeting was a display of happy chaos....

Bob Duvall arrived with his Mac computer stuffed with his lunar observing program that speaks the name of the lunar object you select with the mouse. Bob O'Connell and his wife Jane were instrumental in generating the correctly spoken list of craters, mare, and rilles. The two Bob's, Thomas Olmstead and Don Loftus took over the dining room while exploring Bob's software.

In another part of the house, David Liles, Fred Heinrich, Sandon Flowers and James Quinlan, commented on how to hook digital setting circles up to Pam Mincey's Lightbridge telescope.

And in the kitchen, and later in the GSO (ok, the driveway) Rich Russin and Sandon checked out Rich's new 8 inch Lightbridge. A cute little scope that performs well.

And we cannot forget the plate full of very chocolately turkey cupcakes compliments of Lucille Heinrich. I have never eaten a chocolate iced turkey before.

I apologize if I forgot anyone...it got busy Tuesday night.

The theme of the meeting was to be DSC's, or devices such as the Sky Commander and the Argo-Navis computer pointing devices. Both devices require that you fit your telescope with a pair of digital encoders that cost about \$100 for the pair. These encoders feed rotational information to the little computer devices (DSC) that hopefully will tell you where your scope is pointed, and what it is pointed at!

Another device, which I will check out in 2009 is a less expensive device that sends information to your computer, so that programs such as The Sky, and many others, using a software interface called ASCOM can put a cursor representing where your scope is pointing on the planetarium screen! Pretty nifty.

Both the Argo-Navis and SkyCommander can do this too...

The Argo-Navis is Australian made, and quite sophisticated. It costs about \$600. The Sky Commander is made in Florida, and while not as sophisticated costs about \$400. Each device is about \$100 less without encoders. The computer interface device is a Product of David Ek, and a kit can be purchased for about \$30.

There are other devices out there, but I only have experience with the two I have mentioned. I finally got really interested in using a DSC after my eyesight started falling apart a few years ago, and then, when I moved to Gainesville and severe light pollution, the DSC became a need! Also, the gymnastics required to aim a scope is an issue at my age! Reading setting circles is much easier than twisting behind a Telrad.

Do DSC's work? Well, yes they do with some reservations. All the units require alignment using one or more stars or planets (in the case of the Argo-Navis). This takes about 5 minutes once your system is installed and set up properly. Set-up does take some fiddling. About half the time my SkyCommander is spot-on. I have not used the Argo-Navis enough to comment, but reports say it is good. Both units allow you to re-align on a object, which increases pointing accuracy.

Are DSC's worth it? I spent a marvelous evening last year hopping from object to object with very little fuss and bother. Using the DSC gave me time to savor each object, rather than get more and more frustrated trying to find that faint-fuzzy object in the fuzzy sky. It will give me more observing time at GSO, when I can't even see stars overhead!

Watch out double-stars!

I tested my Argo-Navis on my dob at November's Chiefland Party...the device worked well. Argo-Navis has catalogs and sky tours....and will even try and identify unknown objects....very nice.

(continued on next page)



DSC's can often be found used on Astromart (where I got mine). I will provide more info on DSC's in 2009.

HEY GANG! ATM-OBSERVERS! We need to come up with a list of activities for 2009 meetings. Please get on the list serve and volunteer to do a meeting! I would prefer NOT having to plan each meeting (I will provide munchies and beer and coffee). So step up in 2009 and lets make 2009 another enjoyable year for hands-on astronomy.

Clear Sky
CSB

Chuck Broward is a long time member of AAC, a builder of astro-gadgets and scopes. He also will help you fabricate hardware and parts to customize your 'scope. He likes lunar and planetary observing from the heart of Gainesville, the GSO (Ghastly Skies Observatory).

Photo Right: Assistant Planetarium Director and AAC member Kristin Fiaccato awaits visitors at the Kika Silva Pla 1st Anniversary Celebration on Sept 20. AAC members Bill Helms, Tandy Carter, Tim Malles and Mike Toomey volunteered for the event.
Photo: Tim Malles



Photo Left: Young astronomers and families enjoy making space themed crafts at the Kika Silva Pla Planetarium 1st Anniversary Celebration.
Photo: Mike Toomey.



UF Campus Observatory Closed Till January

December 12th was the last Public Night of the Fall semester! The UF Campus Observatory will reopen on Friday, January 9th.

I would like to thank the members of the Alachua Astronomy Club and the Undergraduate Astrophysics Society and other volunteers that helped during the semester, especially on those nights when we had so many people and students attending the session!.

Happy holidays to everybody and to all the dedicated volunteers!

Francisco Reyes

February Club Meeting

Tuesday, February 10 2009, 7:00 p.m. ET

Speaker: Bill Helms, President, AAC

Title: *How You Can Know Absolutely and Positively For Sure Whether We Landed On The Moon, No Matter What NASA Says*

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



Bill Helms,
President, AAC

Preview: The speaker will present evidence regarding the Apollo missions from sources other than NASA that will allow the audience to come to their own conclusions regarding the truth or falsity of NASA's claim to have landed twelve men on the Moon in 1969–1972. The program will end with a scientific hypothesis which each audience member can test for themselves.

About the Speaker: Bill Helms is the current President of the Alachua Astronomy Club, Inc., and has served the AAC, in outstanding capacity, during his previous three years holding the office.

Bill is also past Programs Coordinator of the AAC. He has a Bachelor's degree in Physics and a Master's degree in Management from Florida State University. Bill retired to the dark skies of North Florida after a 35-year career with NASA at the Kennedy Space Center (KSC), where he was a Firing Room launch console operator for both the Apollo lunar landing missions and the early Space Shuttle missions. While at NASA, Bill designed launch complex instrumentation for the Space Shuttle, and designed the Hazardous Gas Detection System used at the launch complex for over 20 years. The instrumentation he designed was credited with saving three shuttle missions from launch with potentially catastrophic hydrogen leakage. Bill established and managed KSC Instrumentation Development Labs for 20 years. He has been awarded two NASA Exceptional Service Medals.

Bill has been an amateur astronomer for 36 years. In that time, he has earned several Astronomical League Observing

Club Awards: **Messier** - observed the complete Messier Catalog of objects; **Binocular Messier** - observed 50, or more, Messier Catalog objects using binoculars; and the **Lunar** - observed 100 features of the moon by eye, binocular and telescope. Bill, multifaceted and multitalented, is also a percussionist in the Gainesville Community Band.

Right: AAC members sport 3d glasses for Dr. Sarajedini's presentation at the September meeting.
Photo Credit: Tim Malles



Every year usually contains astronomical events that have special importance. The year 2009 is no exception. The author has singled out a half dozen not to be missed. So get out your calendars and mark these event dates

Special astronomical phenomena occur every year. Some events are predictable and some are not, such as the appearance of a bright, new comet or a brilliant fireball. Even lists of predictable events may be incomplete since preferences often vary from individual to individual. However, the year 2009 brings a half dozen astronomical events that I have singled out as either uncommon or special or, at least, not to be missed: two planets that will do without their normal adornments, a Venus spectacular, a very special eclipse, possibly an exceptionally strong meteor shower, and a year than ends with some extra moons.

A Planet Without (Jan. 1) The Earth will pass through the ring-plane of Saturn on *September 4, 2009* leaving the planet apparently without rings for nearly a month (Meeus 2002). This phenomenon occurs twice during each revolution of Saturn around the Sun (29.3 years), or about every 14–15 years. Sometimes the passage of Earth through Saturn's ring-plane even results in three periods of invisibility over about nine months as in 1995–1996.

The previous ring plane crossing occurred February 1996 and the next March 2025. Unfortunately, the 2009 crossing occurs about two weeks before Saturn has a conjunction with the Sun. Then Saturn will be only 11 degrees from the Sun (its *elongation*) making this ring plane crossing difficult to observe. Unfortunately, the 2025 event also occurs when Saturn is near conjunction so 29 years must elapse to observe the "ringed planet" without rings (October 2038).

However, all is not lost.

On January 1, 2009, the ring tilt will be only 0.9 degrees, making this *the best telescope view of the rings at their thinnest for 15 years*. Suggestion: Saturn will rise about 11:00 p.m. on New Year's Eve. Celebrate the New Year then take your telescope outside and show your family, friends and neighbors the "ringed planet" nearly without rings!

And, if either the weather or end of year festivities clouds your vision, do not fret for the ring tilt will still be only 1.3 degrees a month later.

Venus and Moon Spectacular (Feb. 27) Brilliant Venus and a *very thin* waxing crescent Moon will have a close apparition this evening with a separation of only 1.4 degrees (less than three moon diameters). Although the crescent Moon passes Venus about every month on the sky, some close approaches (an *appulse*) are more observable or spectacular than others.

The Moon–Venus appulse on February 27 will be more spectacular and photogenic than most. The Moon will appear as a gorgeous, *extremely thin crescent* only 2.9 day old (9% illuminated) and will be adorned with unusually bright earthshine.

And Venus? Breathtaking since *Venus will have reached greatest brilliancy only eight days* before (February 19). Therefore, Venus will be stunningly bright with an exceptionally bright magnitude that may exceed -4.6 ! *The Observer's Handbook 2009* notes that recent photometry of Venus suggests Venus may reach magnitude -4.8 , about 20 percent brighter than often published.

Sunset in Gainesville is about 6:30 p.m. EST with moonset shortly after 9:00 p.m. Nevertheless, the view will be most special during early evening against the dusk sky. Set up your camera and tripod and shoot some pretty pictures! Then send them to *FirstLight* for publication (firstlight@floridastars.org).

In addition, try a simple experiment during February and March. Observe Venus under moonless skies and try to see your shadow cast by Venus. (Of course, you will need a dark location.) The tremendous brilliancy of our nearest planet makes this sight possible.

Finally, take out your scope and watch the disk of Venus grow from a large crescent (44 arc seconds on February 27) to a supersized, thin crescent nearly an arc minute across at conjunction with the Sun one month later (March 27).

(Continued on next page)

One Heck of a Solar Eclipse (July 22) Six eclipses occur in 2009 including three penumbral and one partial lunar eclipse, one annular solar eclipse and one total solar eclipse. The penumbral lunar eclipses will be either un spectacular or not visible from Florida. The partial lunar eclipse will also not be visible from most of North America. Finally, the annual solar eclipse is not very accessible crossing the South Atlantic south of the African horn before passing through the southern Indian Ocean where the annular eclipse path ends near Borneo. Besides, annular solar eclipses pale in comparison to total eclipses of the Sun.

But, just wait!

The 2009 July total eclipse of the Sun more than makes up for the other five undistinguished eclipses if you are willing to travel. *This will be the longest total solar eclipse of your lifetime* and the longest of the 21st Century. In the South Pacific Ocean the duration of totality reaches 6m39s, not to be exceeded for more than 120 years! Usually, the Moon does not completely hide the Sun during a total eclipse for more than a few minutes.

Don't want to travel? Unfortunately, the next total solar eclipse for the United States is still nearly eight years in the future, 2017 August 21, with a maximum duration of only 2m40s in western Kentucky. Although the eclipse path traverses the USA from Oregon through South Carolina, best weather prospects may be in the Pacific Northwest where totality will last only about two minutes. (The eclipse is partial in Florida.) Thus, residents of Florida may still need to journey several thousand miles to see two minutes of totality since summer rains and clouds may spoil this eclipse over the Southeast.

Meanwhile, the 2009 total eclipse path will cross the exotic country of China exiting the mainland at Shanghai before moving into the Pacific Ocean south of Japan. *Consequently, this extraordinary eclipse provides a marvelous excuse to visit this ancient land of magnificent diversity.* Moreover, maximum total eclipse duration will still reach nearly six minutes in eastern China. What a wonderful way to celebrate the *International Year of Astronomy!*

I will lead a five-star tour to China for this very special eclipse. For more information about both this eclipse and the tour, see www.astroadventures.net/2009/CHINA. Also, see the author's article about this eclipse in the 2008 May/June issue of *FirstLight* available at www.floridastars.org/firstltonline.html.

Another Planet Without (Sept. 3) I mentioned that the giant planet Saturn becomes "ringless" Sept. 4 although the rings will be essentially invisible for nearly a month. (See "A Planet Without" above.) As noted, the small elongation from the Sun at this time makes observing Saturn difficult.

However, shortly after midnight on Sept. 3 (Eastern Time), another giant planet must also do without. *Jupiter will be without its Galilean satellites for nearly two hours*, as seen from Earth, an event that will not occur again until 2019 (Meeus 1997)!

Bright Jupiter will also be about forty-five degrees high over the south horizon in Florida making this gas giant easy to spot and observe throughout this special event.

At approximately 12:44 a.m. EDT, Ganymede will be last to disappear as it begins to move onto the Jovian disk. Europa will already lie on the disk (a *transit*), Io will be behind Jupiter (an *occultation*), while Callisto lies in the shadow of Jupiter (an *eclipse*). If you begin observing earlier, you can actually see Io begin its occultation by Jupiter about 11:43 p.m. EDT. Finally, one hour and 46 minutes later, about 2:30 a.m. EDT, Io will reappear first as it emerges from its eclipse by Jupiter's shadow.

While these events are not especially rare (25 in the 21st Century), the next time Jupiter will be without Galilean satellites is not until November 2019. So don't miss "Jupiter without satellites" or be prepared to wait ten years!

A "Half-Storm" of Meteors (Nov. 17) The November *Leonid Meteor Shower* is most often one of the weakest of the year. However, about every thirty-three years this shower sometimes brings a storm of meteors like no other, often with thousands of meteors for an hour or so. In 1966 observers in the Southwest USA recorded rates of 40–50 per second for about ten minutes. Spectacular shows were last seen in 1998 where some saw rates of 1,000–2,000 per hour. Good shows appeared for a few following years with 1999 and 2002 producing upwards of 3,000 per hour. Nevertheless, the Leonids have now seemed to return to "dormant" hourly levels of 15 or so with the next storm possibly not until 2032.

But wait!

A strong outburst on November 17, 2008 hints that the 2009 Leonids may produce a shower rate of more than 500 per hour. (Cooke 2008)! This suggests the Earth passed through a debris stream of Comet 55P/Temple-Tuttle producing about 100 meteors per hour in Asia and Europe. Since meteor observers consider 1,000 meteors per hour a “storm,” the 2009 Leonids may produce a “half-storm” as noted by Jeremie Vaubaillon of Caltech, who has successfully predicted previous meteor outbursts.

On November 17, 2009, the Earth will again pass through this same comet debris stream, which may produce even higher rates during a few hours with the peak near 4:43 p.m. EST. Although this time again favors Asia and not Florida, *observers here should look for a better than average display during the early evening as the sky darkens.* (Sunset in Gainesville is about 5:30 p.m. EST.) The Moon will cooperate since she will have been in new phase the previous day and will shed no moonlight over the night sky.

The Year Ends Blue (Dec. 31) The year began with exquisite Saturn undressed without her glamorous ring system. *The year ends, however, with an extra full moon.* (Do you know if any months cannot have two full moons?)

The Moon is full December 2 at 2:31 a.m. EST. Colonial Americans sometimes referred to December’s full moon as the “Christmas Moon” or the “Moon Before Yule.” Nonetheless, she will again be full December 31 at 2:14 p.m. EST giving Floridians two full moons in the same calendar month. Some now call this second full moon a “blue moon.” (An older definition is “a blue moon is the third of four full moons in a season” according to Sinnott, et al. 1999.)

While not exactly rare, blue moons average about once every 33 months (last was May 2007, next after 2009 is August 2012). Of course, we hope December’s blue moon does not suggest 2009 will be a “blue” year!

Less important, note that May 2009 has two *first quarter* moons, May 1 and May 30. Can anybody suggest a name for this second first quarter moon in a calendar month?

Meanwhile, prepare for 2010 events. January 2010 opens with the next opposition of Mars on January 29. Unfortunately, this will not be a very favorable opposition of the red planet. The Martian disk will achieve an angular diameter of only 14 arc seconds across, paltry compared with its 25 arc second disk during the very favorable opposition of 2003. (The next best opposition is 2018 when Mars will grow to 24 arc seconds.)

If you know of other “special” astronomical events for 2009, write an article for *FirstLight* and tell our readers. (Send to firstlight@floridastars.org.) ☼

References

- Cooke, Billy 2008, reported in *Return of the Leonids* by Tony Phillips, science.nasa.gov/headlines/y2008/04dec_leonids2009.htm.
- Kelly, Patrick, Ed. 2008, *Observer’s Handbook 2009* (Royal Astronomical Society of Canada, Toronto).
- Mariott, Chris 2005, SkyMap Pro 11(www.skymap.com).
- Meeus, Jean 1997, *Mathematical Morsels*, pp. 281–286 (Willmann-Bell, Inc.: Richmond).
- Meeus, Jean 2002, *More Mathematical Morsels*, pp. 292–298 (Willmann-Bell, Inc.: Richmond).
- Sinnott, R.W., Olson, D.W. and Fienberg, R.T. 1999, *Sky & Telescope*, Vol. 97 (May), pp. 36–38, “What’s a Blue Moon?” (This article is also available on the web at www.skyandtelescope.com/observing/objects/moon/3304131.html.)



Howard L. Cohen is an emeritus professor in the University of Florida’s Department of Astronomy, a founding member of the Alachua Astronomy Club, Inc., and a current member the club’s executive board.

Star Party Report

Gold Head began with an abundance of clouds, drizzle and overall dreariness but as forecast, the clouds parted Saturday afternoon. Between intermittent cloud banks, we still enjoyed the autumn sky, including the wandering star Jupiter. In fact, for about 20 minutes around midnight, the sky was near-perfect, an unexpected occurrence immediately following the passage of a cold front. The new observing location, the Recreation Field, worked splendidly and will be utilized both nights next year. In addition to the star party and picnic, several of us took advantage of the leisurely trails.

It's not too early to reserve your site or cabin at Gold Head for next year, October 17 and 18. My understanding is that this will not conflict with Chiefland's annual star party this time around. Don't wait! In 2008, cabins were booked 4 months in advance. Even the tent sites filled up! All the details of the 2009 edition of the Gold Head Star Party are available on the web site.

Tom Crowley generously hosted the AAC at his property in Chiefland for the November star party. It was cold but the skies were exceptional. It was a good reminder as to what can be seen under very dark skies. This was as bright as I had ever seen the Helix Nebula (a planetary nebula in Aquarius) and the Sculptor Galaxy (NGC 253). Later that night, Tom showed off his recently discovered supernova in the distant galaxy IC 112.

We received an extra treat when Tom Clark invited us over for a peak through his 42-inch reflector. We observed a portion of the Veil Nebula (a supernova remnant), the Crescent Nebula (an emission nebula) and the Dumbbell Nebula (a planetary nebula). Observing from inside a 24 foot dome is a lot warmer than standing outside!

For January, we're trying something new: the Newberry Sports Complex. The Archery Association has invited us to use the site in part because they want to demonstrate all the possible uses of the facility. In fact, if the site is suitable, we may be able to coax the park managers to install some astronomy-ready luxuries, such as power outlets. It could also be an excellent forum for outreach. But that's a discussion for another day. Our first task is to determine the quality of the sky and decide if it is worth pursuing further. Newberry, in an effort to set itself apart from other small cities, may be a community amenable to preserving the night sky.

Gary and Carol Cook will host the AAC for February's star party. Gary is the custodian of the club's Celestron 8-inch Schmidt-Cassegrain telescope – the “classic orange 'scope”. It looks a bit intimidating at first but it really is easy to operate. Anyone thinking of purchasing a telescope for astrophotography should become acquainted with this telescope before investing in their own.

Beginning in January, a new team of Star Party Coordinators will take over. Sandon Flowers will handle the web page and email reminders while Marianne Gamble and Thomas Hettinger serve as star party hosts. May their skies be clear!

Mike Toomey has served the AAC in many capacities since 1998, including President, Secretary, FirstLight editor and Star Party Coordinator. He won the AAC's Service Award in 2000. Mike resides in Gainesville with his wife Heidi.



Photo Above: “Rainmaker”
Mike Toomey Saturday afternoon at the Gold Head Star Party.

STAR PARTY / OBSERVATION SCHEDULE: Upcoming Events - 2009

<u>Star Party Event</u>	<u>Date</u>	<u>Location</u> Check the website for directions and map	<u>Start/End Time</u>
AAC January Lunar Observing Group (LOG)	January 7th, Wednesday	“Kanapaha Observatory” (Cohen Residence)	Set up at 6:00. Event is from 7-10pm EST. Pizza and soft drinks provided. RSVP to Bob O’Connell (352-475-1586).
Stargazing at Hickory Ranch	January 17th, Saturday	Hickory Ranch at Paynes Prairie	AAC members arrive at 5:00pm EST (No entry fee for volunteer AAC members). Event is 6:30 - 9:00 pm. EST
AAC January Star Party	January 24th, Saturday	Newberry Sports Complex	Sunset approx. 5:55 pm. EST
AAC February Star Party	February 21st, Saturday	Gary Cook’s Residence - Little Orange Lake	Sunset approx. 6:20 pm EST.
The Villages Star Party	February 28th, Saturday	The Villages	Public Viewing is 7 - 10pm EST. (Club members arrive early to set up)
Southern Cross Astronomical Society Winter Star Party	Feb. 21 - 28, 2009	Florida Keys	See website for reservations: www.scas.org/wsp.html Prior reservations required
AAC March Star Party	March 21st, Saturday (Rain Date is March 28th)	Loftus Family Farm	Sunset approx. 7:40 pm EST.

Don’t Forget to Renew Your AAC Membership!

Certain Star Parties, AAC Events and access to the FirstLight newsletter online are available to current AAC members only. Be sure to fill out the enclosed form to renew for 2009.

Membership in the AAC entitles you to receive the bimonthly newsletter (*FirstLight*), *The Reflector*, the Astronomical League’s quarterly newsletter, reduced subscriptions to *Sky & Telescope* and *Astronomy* magazines, use of club telescopes, observing sites and library materials and free classifieds in the FirstLight.

An “Asteroid Garden” for the Gainesville Solar Walk?

By Howard L. Cohen

A new feature for the Gainesville Solar Walk is in jeopardy — construction of an asteroid belt or “garden.” A grant proposal to build this component went unfunded. Now we must find a new low-cost design that will still retain both the science and art of this unique Gainesville landmark. Are you up to the task?

Introduction

Most residents of the Gainesville area know that N.W. 8th Avenue between N.W. 34 Street and N.W. 23rd Street houses a unique landmark—a four billion to one scale model of the Solar System (Figure 1). Stretching almost a mile along this popular and heavily-traveled street, people can walk, bike or drive and marvel at the vast distances between ten foot high sculptures representing the Sun and its nine planets. (Yes, Pluto is still number nine!)

While many other scale models exist, the Gainesville Solar Walk has both a scale and linearity that best helps visualize and appreciate the scale of planetary orbits.

Our Solar Walk is also a unique blend of science and art with its ten, imposing sculptures representing the Sun and its horde of planets.

Conceived in 1998 and initially constructed in 2002, this “solar walk” was a joint project of the Alachua Astronomy Club, Inc. (AAC), the Division of Cultural Affairs of the City of Gainesville and Tarpon Springs artist, Elizabeth Indianos. Funds, materials and labor to construct the Gainesville Solar Walk came primarily from donations by members of the AAC, the City of Gainesville, community members, businesses, and the artist.



Fig. 1. The Gainesville Solar Walk. A scale model of the Solar System, scaled four billion to one, stretches nearly one mile along NW 8th Avenue in Gainesville, Florida, from NW 23rd Street to NW 34 Street. Photo by author.

(Lists of major donors can be found on bronze plaques mounted on the back sides of the Sun and Pluto sculptures. Also, see www.floridastars.org/solarwalk/ssdonors.html for a list of donors.)

Later enhancements by the artist include two “star benches” and a pair of two interpretive signs (2006) designed and created by the author, the artist, graphic designer Saydi Kaufman and the Art in Public Places Trust (APPT), which oversees the purchase of public art for the City. Recently (2008) the City added two small sculptures by the artist (Figure 2) representing the near and far points of Comet Halley (*perihelion* and *aphelion* respectively). This feature allows one to “walk” the walk while gaining an appreciation for the enormous range in distance this most famous comet travels toward and away from the Sun.

Additional enhancements have been suggested but not constructed due to lack of funds. For example, a proposed, addition is a garden. This garden is not necessarily filled with plants but with rocks or their representations to illustrate an important feature of our solar system—a vast belt of *asteroids* that populates part of the wide region between the last inner planet Mars and the first outer planet Jupiter.



Fig. 2. Comet Halley Sculptures. Two sculptures represent the aphelion (l.) and perihelion (r.) positions of this famous comet in the Gainesville Solar Walk. The perihelion sculpture sports a tail, common with comets when in the inner solar system. Photo by author.

Last year the AAC submitted a \$25,000 capital grant proposal to the city’s Tourist and Development Center to fund the asteroid belt for the Solar Walk based on a design by Elizabeth Indianos. This feature consisted of a series randomly placed, silicon carbide dust, oblong concrete “asteroids.” Sizes would have ranged from 18 - 38 inches, with the majority being mid-range and smaller. The placement was to begin 65 feet from the Mars sculpture and end 150 foot farther out, illustrating where most asteroids orbit.

Unfortunately, the Tourist and Development Center proposal chose not to fund this project. However, the APPT still wishes to add this meaningful enhancement and is currently seeking alternative ideas for a less expensive design.

New Ideas Are Welcome and Encouraged

Readers are encouraged to forward practical, low-cost ideas and designs for construction of an “asteroid garden.” Plans must be commensurate with the science and art inherent in the Gainesville Solar Walk and fit naturally into the existing project. You can be as detailed as you wish. No budget is yet established but it is likely that the APPT will need a model that they can implement at a total cost of less than \$5,000. Be creative. For example, the “garden” itself need not consist of separate asteroids but could be a stylistic “wall” symbolizing the distribution of asteroids in the main belt.

Therefore, to execute a design for the “garden” that expresses both science and art, one needs basic knowledge of the asteroid belt. Since the asteroid feature should communicate accurate information about the asteroids and the asteroid belt while keeping an artistic flavor, designers should be familiar with basic attributes of asteroids. The remainder of this article is a brief primer about asteroids that may help. This primer is not intended to be a complete discourse on all features of asteroids (e.g., history, nomenclature, origin, evolution, etc.). Instead, the next sections give relevant information important for planning an asteroid feature for the Gainesville Solar Walk.

Send your ideas to the author at 8952 S.W. 92 Lane, Gainesville, FL 32608 or by e-mail (cohen@astro.ufl.edu). Questions? Call (352-495-1811) or use e-mail.

A Brief Asteroid Primer

Asteroid Orbits

Asteroids, sometimes known as *minor planets*, are small chunks of rock and metal orbiting the Sun. The *main asteroid belt* is between Mars and Jupiter where probably 95% of the asteroids roam (Figure 3).

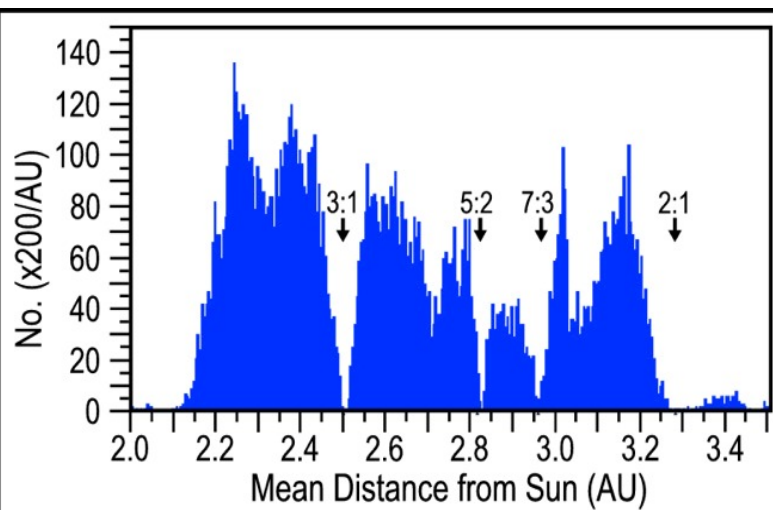


Fig. 4. Main Asteroid Belt Distribution: Kirkwood Gaps. Resonances with Jupiter’s orbit period influences the distribution of asteroid orbits leaving gaps in the belt where fewer asteroids orbit. Several resonances are labeled in the figure. Diagram by author using histogram from Wikipedia (created by NASA).

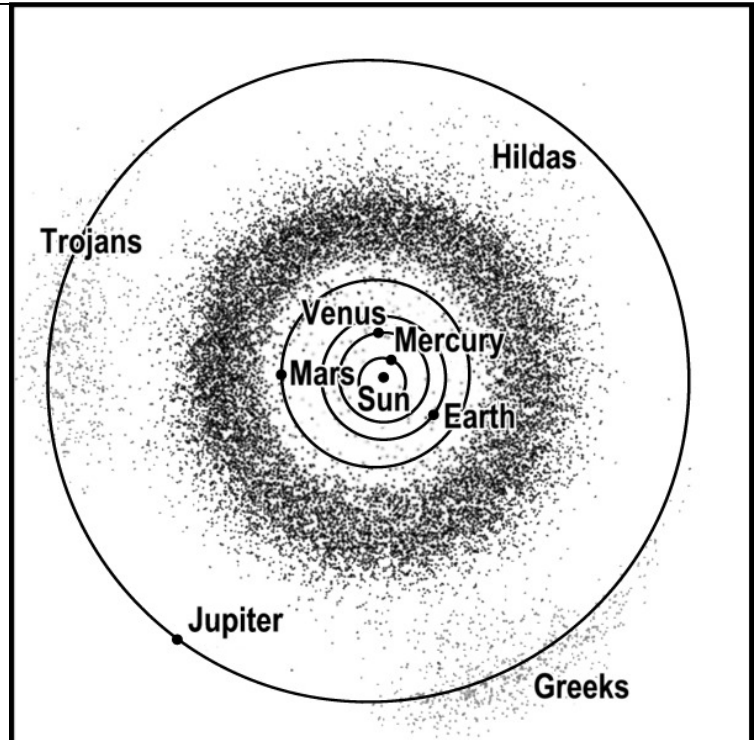


Fig. 3. Main Asteroid Belt and Trojan Asteroids. Diagram looks down on Earth’s orbit 2006 August 14. The Main Belt stretches from about 2.1 to 3.3 AU from the Sun. (An AU or astronomical unit is Earth’s mean distance from Sun.) Two large asteroid families (“Trojans”) also precede and follow Jupiter by 60° where two gravitational stability zones occur (*Lagrangian Points L4 and L5*). Another family (“Hildas”) orbits between 3.5 and 4.2 AU. Diagram based on data in JPL DE-405 ephemeris and Minor Planet Center database of asteroids (2006 July 6) and rendered by custom software written for Wikipedia. Diagram redrawn by author using Wikipedia image.

However, some asteroids wander within the orbit of Earth or even closer to the Sun than the innermost planet Mercury, while others precede and follow Jupiter (labeled “Trojans” or “Greeks” in Figure 3).

In addition, most main belt asteroids orbit at preferred distances from the Sun so that the distribution of asteroid orbits shows gaps or dips where fewer asteroids are found. These locations result from resonances with Jupiter’s orbit period around the Sun. Periodic gravitational interactions between Jupiter and the asteroids result in unstable orbits at distances from the Sun where their orbital periods are related by small integers. See Figure 4.

For example, few asteroids orbit the Sun at a distance of 2.50 astronomical units corresponding to an orbital period of 3.95 years, which is one-third of Jupiter’s 11.86 year orbital period. These “gaps” were first identified by Indiana University astronomer Daniel Kirkwood in 1857 and bear his name.

An “Asteroid Garden” for the Gainesville Solar Walk? - continued

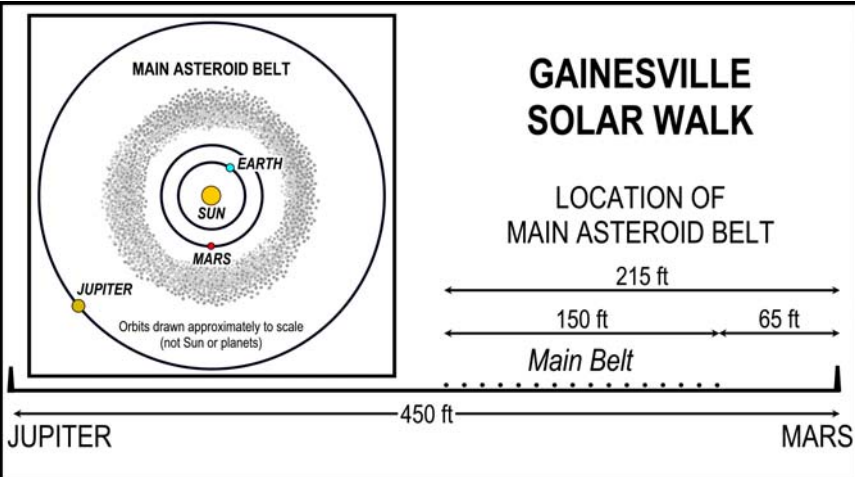


Fig. 5. Location of the Main Belt Asteroids in Gainesville Solar Walk. Inset shows position of main belt in Solar System. The main belt's position scaled to the dimensions of the Solar Walk is shown in the main diagram. The main belt would begin approximately 65 feet beyond Mars and extend 150 feet ending about 215 feet farther out. Diagram by author.

Note: An *astronomical unit* or **AU** is the Earth's mean distance from the Sun, or about 93 million miles, a distance of 123 feet in the Gainesville Solar Walk (scaled four billion to one).

Inspection of Figure 4 shows the vast majority of the asteroids have orbits from about 2.1 to 3.3 AUs from the Sun. This corresponds to a main belt about 150 feet wide in the Gainesville Solar Walk starting about 65 feet beyond Mars and ending about 215 past the red planet (Figure 5).

Many orbit diagrams of the asteroid belt appear to show the asteroid belt very cluttered with asteroids (e.g., see Figure 3). Also many movies (especially science fiction) emphasize this feature by showing space ships trying to avoid imminent collisions with these “space rocks.” This is misleading. The actual space between Mars and Jupiter is about 340 million miles. The corresponding distance between Mars and Jupiter in the Gainesville Solar Walk is about 450 feet. However, the average spacings between asteroids are probably *several million miles* or several feet in the Solar Walk. In addition, most asteroids are very small and would have scaled dimensions much less than 0.01 inches in the Solar Walk. (See next section on asteroid dimensions.) Consequently, illustrating the actual dimensions in the scaled solar system is a challenge!

So, the asteroid belt is quite empty with the distances between asteroids very large. In fact, spacecraft flying through the asteroid belt would probably never encounter or see an asteroid. Indeed, collisions between asteroids are now rare and a spacecraft passing through the asteroid belt has little chance of colliding with one. (Asteroids may have formed from planetary accretion in the early Solar System with subsequent collisional fragmentation of larger objects when the density of objects was very high.)

So, the asteroid belt is quite empty with the distances between asteroids very large. In fact, spacecraft flying through the asteroid belt would probably never encounter or see an asteroid. Indeed, collisions between asteroids are now rare and a spacecraft passing through the asteroid belt has little chance of colliding with one. (Asteroids may have formed from planetary accretion in the early Solar System with subsequent collisional fragmentation of larger objects when the density of objects was very high.)

Asteroid Dimensions

More than 100,000 asteroids have now been observed but they could number in the millions. Estimates of asteroid numbers and dimensions show that all asteroid material would make up an object less than half the diameter of our Moon.

Asteroids range in size from several very large ones as *1 Ceres* (largest with a diameter just less than 600 miles) to many smaller ones less than a mile wide, even down to small stones. (Asteroids are numbered and often named.) For comparison, the Moon and Earth are about 2,160 and 7,920 miles across respectively. *Ceres*, scaled to the dimensions of the Gainesville Solar Walk would be less than 0.01 inches across! (Note: Some astronomers now consider *Ceres* large enough to be called a *dwarf planet*.) Clearly dimensions of asteroids in the Solar Walk cannot be easily represented by their true scaled sizes.

About twenty-six known asteroids are larger than 125 miles across. Many are in the six to 60 mile range. We do not know much about the smaller ones but there may be more than a million one-mile sized asteroids or smaller (tiny as pebbles). See Figure 6.

Only the largest asteroids are likely to be approximately round, most are probably irregular in shape. (Strong gravity is needed to pull objects into a round shape.) Some shapes may have resulted from occasional asteroid collisions, especially in the early solar system. Impact craters are also common on asteroids suggesting violent past encounters with other solar system bodies (Figure 6).

Asteroid Reflectivity and Composition

Most asteroids are quite dark. About 75% probably reflect only about 3% of the light shining on them although some have reflectivities of about 15% to 25% (called the *albedo*).

Asteroid 4 Vesta, second largest asteroid with a diameter of about 320 miles, may be among the lightest, with a reflectivity of perhaps about 40%. *Asteroid 253 Mathilde*, an irregular 40x30 mile asteroid, is more typical and probably reflects only about 3% of the light on the average. An intermediate case is 11x7 mile asteroid *951 Gaspra*, possibly reflecting about 20% of the light shining on it.

Many asteroids are believed to contain iron and nickel but most are probably more “stony.” Three main categories include the following:

C-Type or carbonaceous asteroids are most common (about 75%), especially in the outer part of the asteroid belt. They contain silicates, oxides, sulfides and volatile organic (carbon) compounds plus water-containing minerals. They are very dark (reflectivity about 3–9%). Their composition is probably similar to the original solar nebula out of which the Solar System condensed but have less hydrogen and helium.

S-Type or siliceous or stony asteroids are less common (about 15%) and are found mostly in the inner asteroid belt. These asteroids tend toward grey with intermediate or moderate reflectivity (about 0–22%). They contain mostly siliceous material (metallic iron mixed plus iron-silicates and magnesium-silicates forming silicate minerals as olivine and pyroxene), and are commonly known as “stony asteroids.”

M-Type or metallic asteroids are least common (about 10%) and have moderate reflectivity (about 10–18%) and many are rich in iron and nickel with possibly small amounts of stone.

Other minor groups exist such as composite asteroids, a mix of more than one type and result from coalescence or collision. ☼

References

- Arnett, B . 2008, *Asteroids* from “The Nine Planets” (www.nineplanets.org/asteroids.html).
- Cunningham, C. J. 1988, *Introduction to Asteroids* (Willmann-Bell, Inc., Richmond).
- Gehrels, T., Ed. 1979, *Asteroids* (University of Arizona Press, Tucson).
- National Space Science Data Center 2008, *Asteroids* in “Lunar and Planetary Science,” (nssdc.gsfc.nasa.gov/planetary/planets/asteroidpage.html).
- Wikipedia 2008, *Asteroid* (en.wikipedia.org/wiki/Asteroid).
- Wikipedia 2008, *Kirkwood gap* (en.wikipedia.org/wiki/Kirkwood_gaps).

Howard L. Cohen is an emeritus professor in the University of Florida’s Department of Astronomy, a founding member of the Alachua Astronomy Club, Inc., and a current member the club’s executive board. The AAC has appointed Dr. Cohen to represent the AAC at APPT meetings in matters relating to the Gainesville Solar Walk.

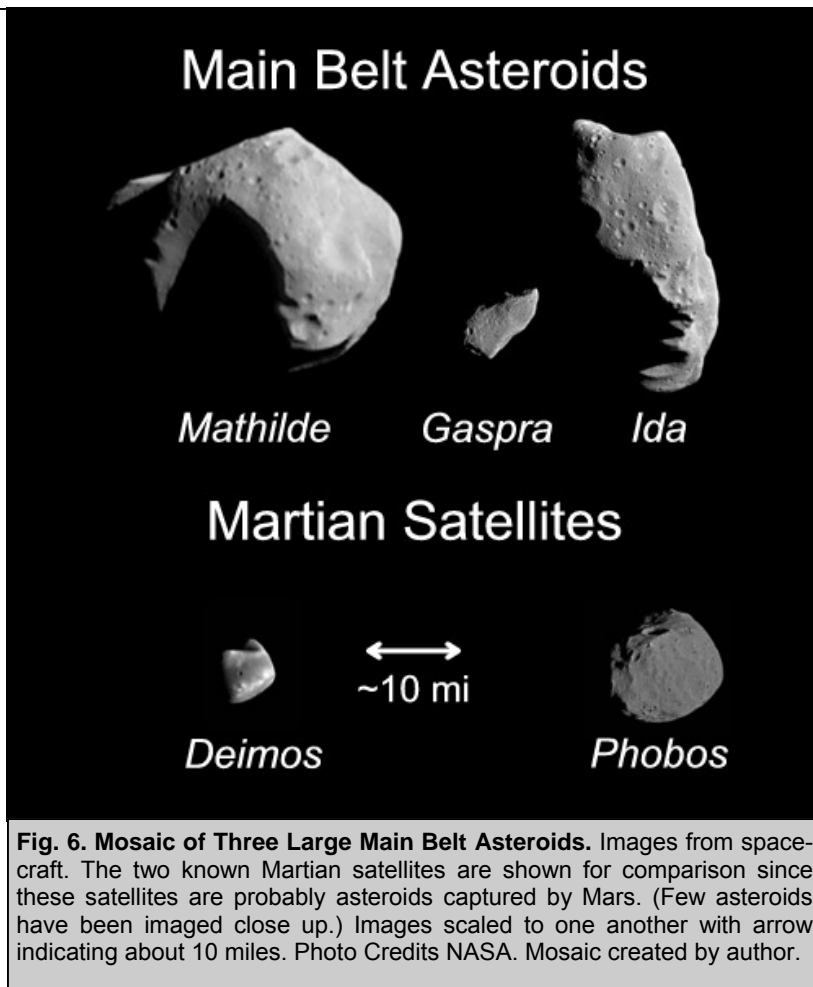
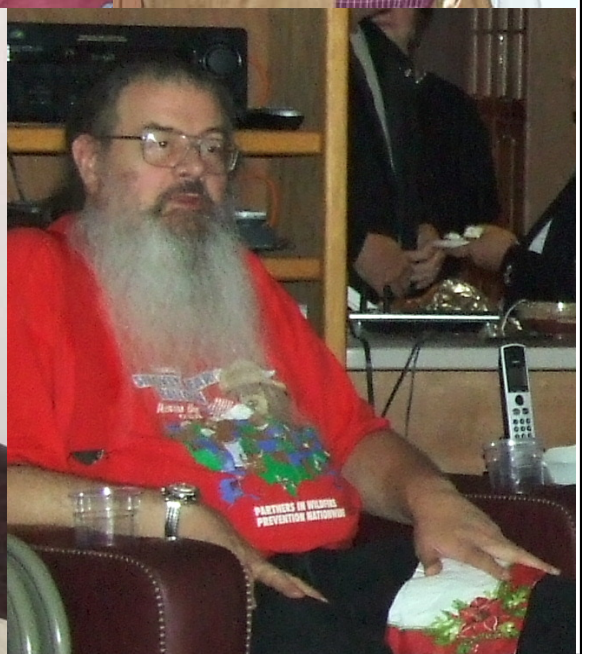


Fig. 6. Mosaic of Three Large Main Belt Asteroids. Images from spacecraft. The two known Martian satellites are shown for comparison since these satellites are probably asteroids captured by Mars. (Few asteroids have been imaged close up.) Images scaled to one another with arrow indicating about 10 miles. Photo Credits NASA. Mosaic created by author.

Holiday Party Pics



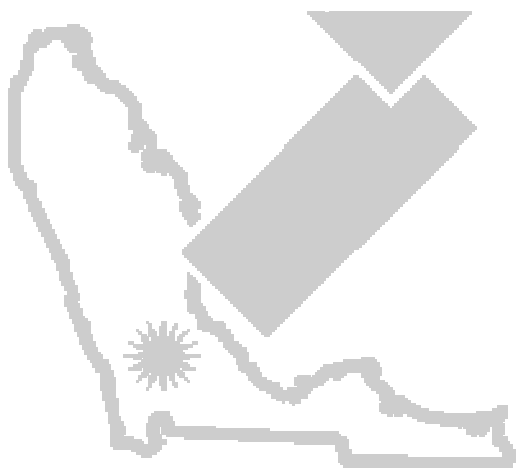


FirstLight
January /
February 2009

Photo Right:
Image of Jeff
Bousquet and a
Prairie horse
with the Moon,
Venus and
Jupiter in the
sky above taken
December 1,
2009 by Chuck
Broward. The
image was taken
with a Nikon
D-80 and a
24-135 mm
Nikkor lens.



Check Page 9 of this issue for Must See Sky Viewing on **January 1st** --
Heavenly Notables During 2009 by Howard Cohen.



FirstLight
Newsletter of the Alachua Astronomy Club, Inc.
P.O. Box 141591
Gainesville, Florida 32614-1591
Web: www.floridastars.org
Email: floridastars@floridastars.org