

# Bays Mountain Astronomy Club

☞ *Next Meeting: Dec. 7* ☞

## REFLECTIONS

2012 comes to an end in a few weeks. A quick review of this year's programs has been quite pleasant in that we covered a wide area of deep sky topics. We have added new sections to the meetings to bring news to the membership, and a feature showcasing one of the constellations that are viewable by members and visitors without the use of advanced equipment. Personally, I think our club is moving in the right direction. The final reflection will be yours.

The November meeting opened with the first of our monthly constellation quest features. "The Big Dipper" was presented by BMAC'er Luke Cameron. He showcased "The Great Bear" as a tool in navigation and its location in the northern sky. Great job Luke and thanks for your contribution to the club. November's keynote speaker was George Privon who updated us on galaxy mergers. George also explained the role amateur astronomers can and do play in today's professional astronomy success with new discoveries and increased understanding. George was engaging with his easy speaking



BY WILLIAM TROXEL

style. Thanks to George for sharing his research and his zest for astronomy. Here are the links to the sites George spoke about; Zooniverse: <http://www.zooniverse.org/>; Cosmoquest: <http://Cosmoquest.org/>;

Asteroid Occultations: <http://www.asteroidoccultation.com/>;

Cataclysmic Variables (Center for Backyard Astrophysics): <http://Castro.org/>.

During the business meeting, we started the conversation about the annual dinner which will be our January 2013 meeting.

That meeting will be held on the Saturday night, January 12, 2013 with the 19th as the snow date.

During the social time of our November meeting, most everyone shared their feelings about where to have the annual dinner. I will be sharing the details of the research and we will need to choose the location during the December meeting, as reservation will be needed.

December's meeting will welcome Dr. Richard Ignace, ETSU Physics Department. His topic will be "Hot Stars." The Constellation Quest will feature "Gemini the Twins" presented by BMAC'er Terry

## Calendar

### Special Events

Jan. 12 Annual dinner. 6 p.m. Place TBD. Dr. Gary Henson from ETSU will speak on "Mars Observations Past & Present." Jan. 19 is the snow date.

### BMAC Meetings

7 p.m., Discovery Theater

Dec. 7 Dr. Richard Ignace from ETSU will speak about "Hot Stars." Const. Quest: Terry Alford - Gemini the Twins.

Feb. 1 Dr. Mark Giroux from ETSU will speak on "Unraveling the Mysteries of the Leo Ring." Const. Quest: Greg Love - Orion the Hunter.

Alford. I hope each of you will be able to come out to hear both of these presentations.

We are very pleased with the website updates and hope that you will continue to find it to be a valuable resource. Invite your friends, neighbors, and co-workers to come discover how exciting the first Friday night of each month is at Bays Mountain Park. I look forward to continue serving you as your Chairman in 2013. Thank you for trusting me with this honor for 2012. Each month I look forward to seeing each of you and meeting new people who allow us to share our passion. Until next time... Clear skies.

## EYE TO THE SKY

BY BOB SMITH

Many nights in December will surely be cloudy since this is the most unsettled time of the year weather-wise. But if the clouds keep away we can also experience some of the most breathtaking clear, dark skies. I'm going to start off this month with the pre-dawn sky so if you're up an hour or so before sunrise at least take a few minutes to look over the sky-scape.

Saturn, Venus and Mercury appear close to each other as the month begins an hour or so before dawn. Mercury will depart the scene after about the 15th. On the 1st, the trio spans a distance of only  $13^\circ$  with Saturn rising almost three hours before the Sun. At magnitude 0.7 it is the faintest of the three, although highest. The "Ringed World" will continually move further west all year until it is in the early evening sky next spring. Through the telescope, the ring system is tilted almost  $20^\circ$  to our line of sight. Be sure to locate bright moon Titan as it circles the Ringed World. Keep in mind that NASA's Cassini spacecraft is still active and snapping pictures of the Saturnian system. You might want to visit the NASA website and look over some of the photos. A thin crescent Moon passes by Saturn the night of December 10th.

The next morning (the 11th) our Moon passes within  $2^\circ$  of Venus, a little further down the ecliptic. At its usual magnitude of -4, our sister planet will immediately draw your attention to the lower eastern sky. There's never a problem finding Venus.

Mercury will reach greatest elongation the morning of December 4th when it rises almost two hours before the Sun. If you have a good

eastern horizon you may be able to spot elusive Mercury from late November 'til about December 12th or 15th. If your telescope is handy, this is the best time to look over the inner-most planet but don't be expecting much--its 7 arcsecond disk is tiny and will be 61% illuminated. On the 9th, Mercury and Venus will appear only about six degrees apart.

The evening sky will be much more interesting to most of us and with good reason. Jupiter is really putting on a show this month. Old Jove reaches opposition on the 2nd and shines at -2.8 magnitude among the stars of the Hyades. By midnight the giant planet is due south and high in the night sky. With a steady atmosphere, this should translate into stunning views of the surface through your highest power eyepiece. Spend a few minutes really studying the cloud tops and turbulent weather systems. Of course, no look would be complete without the Jovian moon system included. Pick out Io, Europa, Ganymede and Callisto in their race around the giant planet. At times the shadow of one of the moons may transit the face of Jupiter. One such transit occurs the night of December 7/8. Look for the tiny black dot of Io's shadow to move across the face of the planet from a few minutes after midnight until a little after 2 a.m. The shadow of Ganymede will traverse the southern portion of Jupiter from 1:30 a.m. until 3:45 a.m. on the morning of December 13th. A transit of Europa's shadow is visible from 1:16 a.m. until 3:40 a.m. the morning of December 28th. The almost Full Moon is less than half a degree from Jupiter on the 25th.

While in the area of the Hyades, be sure to try for two of the largest members of the asteroid belt located only a few degrees from Jupiter. Asteroid 1Ceres is at opposition on December 8th and reaches magnitude 6 just a few degrees southeast of Beta ( $\beta$ ) Tauri. Find a good chart or look up the coordinates and locate the bright space rock over a two or three night period since it moves slowly and will take a few nights to pinpoint. Also at opposition is 4Vesta which is slightly south of Ceres and moving toward Alpha Tauri (Aldebaran). On New Year's Day (night) Ceres is  $2^\circ$  south of Beta Tauri while Vesta is found  $2^\circ$  north of Aldebaran. NASA's DAWN spacecraft has had a successful rendezvous at Vesta and is due to arrive at Ceres in 2015.

Winter solstice occurs this year at 6:12 a.m. on December 21st. Check the location of the Sun at local noon; it is at its lowest of the year on this date.



*StarFest attendee Jim Williams sent in this nice photo of a  
sundog with part of a solar halo showing spectra.  
Taken November 14, 2012.*

## HAPPY BIRTHDAY APOLLO 17

BY ROBIN BYRNE

This month we celebrate the last time man left earth orbit. Although the Apollo missions were originally scheduled up through Apollo 20, by 1972, interest in continuing to go to the moon was waning [Ed.: hah!] and funding was drying up. So, the decision was made to make Apollo 17 the last moon mission.

But before they could go, a landing site needed to be chosen. Because this was our last chance to bring home samples from the moon, it was important to find a site that would be different from all the previous landings. The first goal was to find a site where old highland material was available. Second, they also wanted to find young (less than 3 billion years old) volcanic material. From orbit, they wanted the orbital track to cover new areas that had not yet been studied extensively during previous missions, but still overlap some of the older mission paths to study the same features with new instruments. Ultimately, the decision was made to land in the Taurus-Littrow valley. The south wall of the valley had recently experienced a landslide and would be a good location for finding old highland material, and one of the craters had a dark rim that could indicate new volcanic material (however, the samples brought back found that this was not the case).

Crew rotations were designed so that one mission's backup crew would be the prime crew 3 flights later. Gene Cernan, Ron Evans and Joe Engle had been the backup crew for Apollo 14, so they were slated to be the Apollo 17 crew. Meanwhile,

Harrison Schmitt, the only professional geologist in the astronaut corps, would have flown on Apollo 18. Due to the cancellation of the later missions, the scientific community pressured NASA to fly Schmitt on the last mission. NASA agreed, but then had to decide whether to replace Joe Engle with Schmitt, or to replace the entire crew with the Apollo 18 crew. The



decision was made for Gene Cernan to be the mission Commander, Ron Evans the Command Module Pilot, and Harrison Schmitt the Lunar Module Pilot.

On December 7th, 1972 at 12:33 a.m., Apollo 17 launched from the Kennedy Space Center. This was the only night launch of the Apollo missions, and was visible up to 500 miles away. After reaching earth orbit and confirming that everything was working properly, the third stage of the Saturn V rocket was lit, and the crew left earth orbit on their way

to the moon. Three days later, they reached their destination and entered lunar orbit. Cernan and Schmitt immediately began preparing the Lunar Module and by the next day, they were heading for their landing site. Evans would remain alone in the orbiting Command Module for the next three days.

Apollo missions were designated by letters to indicate what would occur. The first moon landing by Apollo 11 was a G-type mission. H-type missions included precision landings, a two-day stay on the moon, and two Lunar Extravehicular Activities (LEVA's). Apollo 17 was a J-type mission, which meant staying on the moon for three days, three LEVA's, more scientific equipment, and the use of the Lunar Roving Vehicle (LRV). This was the third, and last, J-type mission. The LRV was put to good use throughout the mission. Not only did it carry the astronauts to the various sites they wanted to sample, but also held their tools, communication equipment, scientific instruments, and carried back all of their rocks. During Apollo 17, they traveled over 20 miles in total.

A wide variety of scientific experiments were conducted during the mission. Apollo 17 was the only moon mission to carry the Traverse Gravimeter Experiment (TGE), which measured the local gravitational intensity at various locations around the landing site.

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## NASA SPACE PLACE

## It Takes More Than Warm Porridge to Make a Goldilocks Zone

By Diane K. Fisher

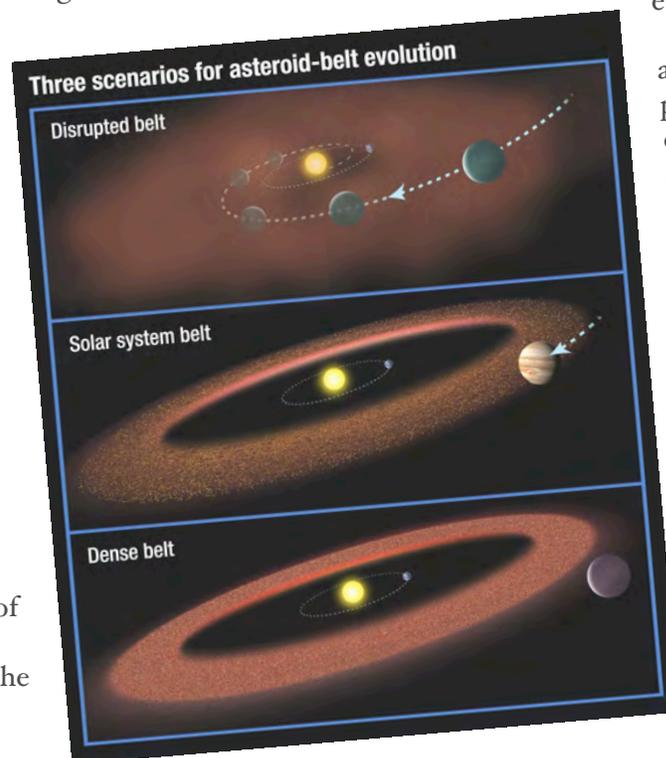
The “Goldilocks Zone” describes the region of a solar system that is just the right distance from the star to make a cozy, comfy home for a life-supporting planet. It is a region that keeps the planet warm enough to have a liquid ocean, but not so warm that the ocean boils off into space. Obviously, earth orbits the sun in our Solar System’s “Goldilocks Zone.”

But there are other conditions besides temperature that make our part of the Solar System comfortable for life. Using infrared data from the Spitzer Space Telescope, along with theoretical models and archival observations, Rebecca Martin, a NASA Sagan Fellow from the University of Colorado in Boulder, and astronomer Mario Livio of the Space Telescope Science Institute in Baltimore, Maryland, have published a new study suggesting that our Solar System and our place in it is special in at least one other way.

This fortunate “just right” condition involves Jupiter and its effect on the asteroid belt.

Many other solar systems discovered in the past decade have giant gas planets in very tight orbits

around their stars. Only 19 out of 520 solar systems studied have Jupiter-like planets in orbits beyond what is known as the “snow line”—the distance from the star at which it is cool enough for water (and ammonia and methane) to condense into ice. Scientists believe our Jupiter formed a bit farther away from the Sun than it is now. Although the giant planet has moved a little closer to the Sun, it is still beyond the snow line.



*Our Solar System is represented by the middle scenario, where the gas giant planet has migrated inward, but still remains beyond the asteroid belt.*

So why do we care where Jupiter hangs out? Well, the gravity of Jupiter, with its mass of 318 Earths, has a profound effect on everything in its region, including the asteroid

belt. The asteroid belt is a region between Mars and Jupiter where millions of mostly rocky objects (some water-bearing) orbit. They range in size from dwarf planet Ceres at more than 600 miles in diameter to grains of dust. In the early Solar System, asteroids (along with comets) could have been partly responsible for delivering water to fill the ocean of a young Earth. They could have also brought organic molecules to Earth, from which life eventually evolved.

Jupiter’s gravity keeps the asteroids pretty much in their place in the asteroid belt, and doesn’t let them accrete to form another planet. If Jupiter had moved inward through the asteroid belt toward the Sun, it would have scattered the asteroids in all directions before Earth had time to form. And no asteroid belt means no impacts on Earth, no water delivery, and maybe no life-starting molecules either. Asteroids may have also delivered such useful metals as gold, platinum, and iron to Earth’s crust. But, if Jupiter had not migrated inward at all since it formed farther away from the Sun, the asteroid belt would

be totally undisturbed and would be a lot more dense with asteroids than it is now. In that case, Earth would have been blasted with a lot more asteroid impacts, and life may have never had a chance to take root.

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## MISCELLANEOUS

**Happy Birthday  
by Robin Byrne***(continued from page 4)*

This would then give clues about what materials would be found below the surface. The landing crew also performed the Surface Electrical Properties experiment. It was comprised of a transmitter near the Lunar Module and a receiver on the LRV. At various stops they would measure the strength of an electrical signal sent from the lander to the rover through the ground. This confirmed the almost entire lack of water in the lunar soil. They also deployed explosives to be set off after they left the moon's surface. Seismographs put in place by this crew and previous Apollo crews across the moon could then measure the seismic waves and create a preliminary model of the moon's structure. And, of course, they gathered a wide variety of lunar samples wherever they went, including the unusual orange sand. Meanwhile, in orbit, Ron Evans was using the Scientific Instrument Module (SIM) to perform three different experiments. The lunar sounder bounced electromagnetic signals off of the moon to determine the structure to a depth of 0.81 miles. The Infrared Scanning Radiometer created a thermal map of the moon's surface. The Far-Ultraviolet Spectrometer made measurements of the composition and density of the moon's tenuous atmosphere. While in transit between the earth and moon, the crew conducted experiments to try to determine the source of light flashes that many of the astronauts

observed through their closed eyelids while trying to sleep. They confirmed what had been expected, that the flashes were due to cosmic rays hitting the retina.

On December 14th, 1972 Cernan and Schmitt left the moon's surface and joined up with Evans in lunar orbit. Once all samples were transferred to the Command Module, the Lunar Module was jettisoned so that it could crash into the moon for another seismic experiment. On December 19th, they safely arrived back home on earth. The Command Module is now on display at the Johnson Space Center in Houston, Texas.

Many records were broken in this mission. The LRV drove farther than on any previous mission, the 75 hours Cernan and Schmitt stayed on the moon was (and still is) a record amount of time on the moon, and they brought back a record-breaking 243 pounds of moon rocks. But beyond the records, this mission stands out as the last time anyone ventured out of earth orbit. NASA is hoping to change that with the Orion and SLS launch vehicles. It has been 40 years since we have been to the moon. It is time for us to boldly go back to the moon and onward to asteroids and Mars. Ten years from now, I don't want to still be saying that Apollo 17 was the last time we left earth orbit.

Ed.: My family, I, and neighbors gathered outside to see the Apollo 17 launch from our front yard in Ft. Lauderdale, FL. Being a night launch and clear skies, we had a good chance of seeing it fly overhead. It's trajectory also brought it down to

**Regular Contributors****WILLIAM TROXEL**

William is the current chair of the club. He serves as activities coordinator for a local retirement living community.

**BOB SMITH**

Bob is a founding member of BMAC, since 1980. He has also served as chair many times over the years. He currently works at Pioneer Industrial Sales.

**TERRY ALFORD**

Terry is also a founding member since 1980 and has been chair many times, as well. He has worked as an astronomy lab instructor at ETSU since 2001.

**ROBIN BYRNE**

Robin has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

**ADAM THANZ**

Adam has been the Editor for almost all of the years since 1992. He is the Planetarium Director at Bays Mountain Park as well as an astronomy adjunct for NSCC.

more southerly latitudes, increasing our chances of seeing it. We set up a small, portable B&W TV on a TV tray out on the lawn and we were sitting in lawn chairs with drinks and snacks. What a great excuse for a lawn party in the middle of the night! Even though it was December, it was South Florida. I looked up the low temperature for that night, a chilly 72°! We probably wore a thin windbreaker.

I do remember the endless delays. It was supposed to launch in the early evening, but did not do so until much later. As I was eight years old, I had stayed up to a late 10 p.m. or so, but went to bed. A little after midnight, my father woke me and got me outside as it looked like it was going to launch. It did, just past 12:30 in the morning. I still remember seeing the flame of the giant Saturn V rocket arch over our northern sky as the craft and crew sailed out over the Atlantic.

#### References:

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#### Apollo\_17

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List of Apollo mission types - Wikipedia

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## NASA Space Place

*(continued from page 5)*

The infrared data from the Spitzer Space Telescope contributes in unexpected ways in revealing and supporting new ideas and theories about our universe. Read more about this study and other Spitzer contributions at [spitzer.caltech.edu](http://spitzer.caltech.edu). Kids can learn about infrared light and enjoy solving Spitzer image puzzles at [spaceplace.nasa.gov/spitzer-slyder](http://spaceplace.nasa.gov/spitzer-slyder).

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

## Club Dues to Change

After more than 20 years, the club dues rates will increase starting Jan. 1, 2013. The new rates will be \$16 for a full member and \$6 for additional family members. If you are a member of the Park Association (an additional fee), then your club dues are reduced 50%.

# The Bays Mountain Astronomy Club



Find out more at our website:

[www.baysmountain.com](http://www.baysmountain.com)

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## Dues:

The Bays Mountain Astronomy Club requires annual dues for membership. It covers 12 months and is renewable at any time.

## Rates:

\$12 /person/year

\$4 /additional family member

If you are a Park Association member, a 50% reduction in fees is applied.

Note: After more than 20 years, these rates will change on Jan 1, 2013. The new rates will be \$16 and \$6.

## Calendar

### Special Events

Jan. 12 Annual dinner. 6 p.m. Place TBD.  
Dr. Gary Henson from ETSU will speak on "Mars Observations Past & Present." Jan. 19 is the snow date.

### BMAC Meetings

7 p.m., Discovery Theater

Dec. 7 Dr. Richard Ignace from ETSU will speak about "Hot Stars." Const. Quest: Terry Alford - Gemini the Twins.

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Apple logo Made on a Mac!

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