

# The Focal Point

The Atlanta Astronomy Club  
Established 1947  
June 2016

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Editor: Tom Faber

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## June AAC General Meeting

Please join us for the next general meeting of the Atlanta Astronomy Club, to be held on Saturday, June 18th at 3PM at the Fernbank Science Center. A short beginner's program will be presented at 2PM. Our featured speaker will be club member Dan Llewellyn.

### The Talk

Come join the Sony revolution! Recent advancements in sensor technology have made their way to consumers and are changing the way astrophotography is done. Three new cameras will be profiled, covering the entire range of Astro Imaging from Planetary, Lunar, Solar, and Deep Sky. These cameras, besides being cutting edge, are also less expensive than traditional Astronomy Cameras and have tremendous benefits.

The Sony A7s, modified and cooled, is the new king of deep sky. Tired of being in the guiding/guide scope/guide camera trap? Or having to purchase an expensive mount to guarantee long exposure guiding? This can be eliminated. Tired of making due with small chip cameras because of the cost? No more, get a modified cooled full frame sensor camera for around \$3,000 and go wide, way wide. Can't put the object on your small chip camera, so you waste a lot of time hunting? Full frame sensors assist tremendously in finding that object and centering it up. Tired of wasting time taking a picture to focus, then download, then make a focuser adjustment, then take a picture, then download...all eliminated with real time focusing. Got an expensive focuser? No need, I have always been able to focus with the live screen due to the sensors' incredible sensitivity. This extends to focusing native at 4 meters on an Edge 14 without a crayford focuser. Rotator not needed, a manual rotation system is included in the kit purchase. The greatest challenge is determining how long you can go before you are sky glow limited. This can be as short as 5 seconds on bright objects, and usually no more than 2 minutes on dimmer ones. With proper polar alignment, most modest mounts can image for a minute or 2 unguided. Periodic error in your mount? Because you are literally taking as many shots as you want in one night, throw the ones out that have a slight bump. Stacking? As we all know, the signal goes up by the square root of



the number of frames stacked. So 16 to 25 generally is the limit due to the square root rule as numerically more really doesn't add a lot percentage wise. Well, make the rule work for you, take 100 or 120 exposures easy.

*Continued on next page*

## Woodruff Boy Scout Summer Camp

The Woodruff Boy Scout Summer Camp starts on June 9th and runs for 8 weeks. We need volunteers to go up to Woodruff (east of Blue Ridge) on Thursday evenings from 9-11 p.m, from June 9 – July 28. This is to let the scouts look through telescopes to earn their Astronomy Merit Badge.

(You can bring your own scope or use a scope in the warm-up shed.)

Please phone or e-mail me (Sharon) or Daniel Herron if you can commit to one or more evenings.

Sharon Carruthers - [Treasurer@AtlantaAstronomy.org](mailto:Treasurer@AtlantaAstronomy.org) 770-941-4640,  
Daniel Herron [danielherron@Observing@AtlantaAstronomy.org](mailto:danielherron@Observing@AtlantaAstronomy.org)

Thursday June 9 – Rick Brown

Thursday June 16 –

Thursday June 23 –

Thursday June 30 –

Thursday July 7 –

Thursday July 14 –

Thursday July 21 –

Thursday July 28 –

Sharon Carruthers, Treasurer, Atlanta Astronomy Club

Light pollution is managed with a CLS CCD light pollution filter, so you can get good results even from the city.

Sony's other cameras, the 42 megapixel A7R2 is exceptional for lunar and solar work. The sensor has an anti-vibration unit on board that moves the sensor to eliminate extended camera shake. It will extend time before field rotation with any fixed lens shot on a regular tripod. Great for planetary, as it records in pixel to pixel 4K content, allowing for a region of interesting planetary capture. Great for ISS transits as well. Sony's 224 chip for planetary imaging is the newest line of Sony chips called EXMORE. This particular chip has approximately 1 electron read noise, perfect for specific planetary imaging.

## Speaker Bio

Dan Llewellyn has been a Planetary and Deep Sky Imager for over 14 years. His images have been featured in *Sky & Telescope*, *Photonic Spectra*, *Atlanta Journal & Constitution*, *Association of Lunar and Planetary Observers (A.L.P.O.)*, *The Astronomical League*, and *Fernbank Science Center*. He has received the highest award from the *Atlanta Astronomy Club*, *The Lenny Abbey Service award* for his contributions in getting people started in planetary and deep sky imaging. Dan has given *Planetary Imaging Lectures* at *Georgia Tech*, *The Peach State Star Gaze*, *Mid South Star Gaze*, *Northeast Astro Imaging Conference NEAIC*, *Chiefland Star Party*, *ALPO* and *ALCON* conferences, *Atlanta Astronomy Club* and at *DragonCon* in the Science trek. Dan currently serves as the *Director of the Planetary Imaging Symposium* at the *Peach State Star Gaze*, which hosted *Damian Peach* as keynote speaker in 2012. Dan images from his house in *Decatur, Georgia*, and his house at the *Deerlick Astronomy Village*. Dan has authored an article in the April 2014 edition of *Sky & Telescope* entitled "Redeeming Color Planetary Cameras".

## May AAC Meeting Report

Photos by Tom Faber.

The May general meeting was held beginning at 3PM on Saturday, May 21st in the *Fernbank Science Center*. Our guest speaker was *Dr. Misty Bentz*, Assistant Professor in the *Department of Physics and Astronomy* at *Georgia State University* (photo top right). *Dr. Bentz* presented a talk about the supermassive black holes that reside at the centers of most galaxies, and the methods used to determine the mass of these black holes. For the Milky Way, advances in infrared astronomy in the last couple of decades have allowed direct observations of stars orbiting the central black hole. A couple of these stars have been observed for more than a complete orbit around the black hole. Knowing the orbital period of these stars and their distance makes it a fairly simple calculation to determine the mass of the black hole they are orbiting. But other galaxies are much too distant to allow these types of observations and much more sophisticated observational and analytical techniques must be used to estimate the central black hole masses.

To read more about *Dr. Bentz's* research check out her web page: <http://www.gsu.edu/2015/11/06/black-holes-could-decide-the-future-of-life-on-earth/>

After her talk *Dr. Bentz* answered a number of questions. After the talk, there were announcements by *Club* officers about upcoming meetings, events, and activities. A number of attendees, including *Dr. Bentz*, went to *Athens Pizza* for dinner and more astronomy discussions.



## The Astronomical League

As a member of the **Atlanta Astronomy Club** you are automatically also a member of the **Astronomical League**, a nation wide affiliation of astronomy clubs. Membership in the AL provides a number of benefits for you. They include:

- \* You will receive *The Reflector*, the AL's quarterly newsletter.
- \* You can use the Book Service, through which you can buy astronomy-related books at a 10% discount.
- \* You can participate in the Astronomical League's Observing Clubs. The Observing Clubs offer encouragement and certificates of accomplishment for demonstrating observing skills with a variety of instruments and objects. These include the *Messier Club*, *Binocular Messier Club*, the *Herschel 400 Club*, the *Deep Sky Binocular Club*, and many others.

To learn more about the Astronomical League and its benefits for you, visit <http://www.astroleague.org>

## The May Charlie Elliott Meeting

By Valorie Whalen, Charlie Elliott Chapter Recording Secretary

The May monthly meeting for the Charlie Elliott Chapter of the Atlanta Astronomy Club was held on 5/7/16 in Building B at the Charlie Elliott Wildlife Management property in Mansfield, Georgia.

Jack Fitzmier, Chapter Director, called the meeting to order at 6:30 p.m. and welcomed everyone. There were twenty-nine (29) members and guests in attendance. Jack presented an Astronomical League award certificate and pin to David Whalen for his completion of the Universe Sampler Program. Also discussed was the upcoming May 9th transit of Mercury across the sun.

The annual elections were held at the May meeting. A slate of officers for the 2016/2017 club year was presented as follows:

Director: Tim Geib

Observing Director: David Whalen

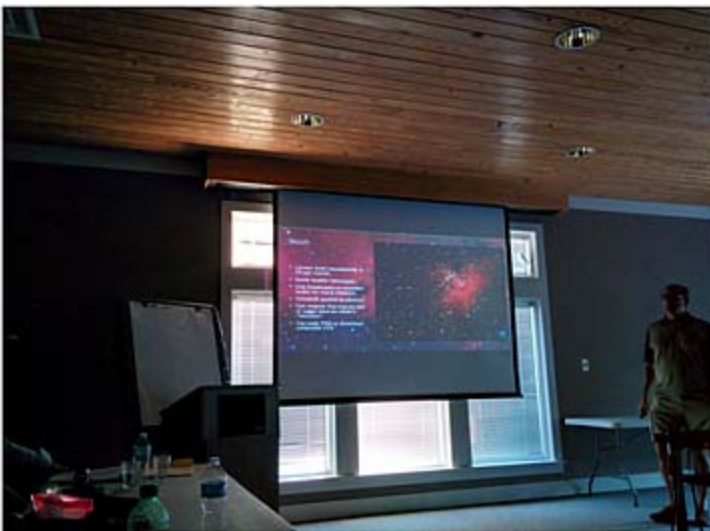
Recording Secretary: Brian Tucker

Jack called for further nominations for the board from the floor. No names were submitted. A vote was called for, and the result was a unanimous election of the presented slate. The new board will take their positions of leadership on June 1, 2016. Congratulations to the new board members.

Marie Lott gave information about the upcoming annual Deerlick Memorial Day picnic. The date is Sunday, May 29, 2016, with a potluck dinner at 5:00 p.m. Camping will be free for that weekend. All information is available on the website [www.deerlickgroup.com](http://www.deerlickgroup.com). There will also be a link to sign up for the potluck dinner.

Our featured speaker this month was Tim Geib. He presented a talk about remote observing from the comforts of home. Both visual observers and astrophotographers can utilize the services. Night Sky Network offers free services that are best for visual observing. Live.Slooh.com offers live events for free, but most of their services involve a fee of \$5.00 per month. With remote operation, astrophotographers can either: (a) remotely control your own gear (offsite), (b) host your own gear, (c) host shared gear, or (d) rent time of other gear either individually or in groups. Deep Sky West offers a range of services for dark sky data capture. Remote hosting of your own gear would run about \$1,000 to \$2,000 a month for a pier and support, so groups are a popular expense alternative.

David Whalen, Observing Director, treated us to another exciting episode of "All of the Above", which gives a run-down of what you can expect to see in the sky in the coming weeks. The theme of this month's presentation was "May is for Mars". Included were current weather conditions for



*Images courtesy of Valorie Whalen*

the Jon Wood Astronomy Field, relative location of each of the planets, along with the sun and moon, and each of their respective rise and set times. He included H-alpha photos of the Sun as of 5/7/2016. Also discussed were several deep-sky targets in the categories of "Relaxing", "Intriguing", "Taxing" and the challenge target for May is NGC 4567 and 4568, also known as "The Siamese Twins". The full list of targets for the month of May is available on the website.

After the meeting, we adjourned to the Jon Wood Field to observe. There were approximately 25 observers taking advantage of the nice viewing conditions.

This month's astrophotography targets are: Beginners - Jupiter; and Advanced - Mars.

## The Next Charlie Elliott Meeting

The next meeting of the Charlie Elliott Chapter will be held on Saturday, July 9th, 2016 at 6:30 pm at the Charlie Elliott Conference Center. Stay tuned for presentation and conference room specifics. (Updates will be posted at: <http://ceastronomy.org/blog/home> ) All are welcome!

At sunset we will head over to Jon Wood Astronomy Field (33.468865, -83.735319) for a night of observing, weather permitting. All are welcome. Bring your scopes, binoculars, or just bring yourself – we enjoy sharing the night sky with our guests! Be sure to arrive before 10 pm, as that is when the security gate on Elliott Trail locks to new entry.

Minutes and Handouts: The minutes, handouts, and presentations from past meetings of Charlie Elliott Astronomy are available for download on our Past Events web page, <http://ceastronomy.org/blog/events>. Monthly sky maps are available from [skymaps.com](http://skymaps.com).

Meeting dates for the remainder of the year are: August 6, September 10 (potluck), October 29, November 19, December 10 (potluck).

## Correction

Last month's "Transit Trivia" article said that the November 1999 Mercury transit wasn't visible from Atlanta. It actually was visible from Atlanta shortly before sunset as pointed out by Alex Langoussis. But during this transit Mercury only skimmed the edge of the sun for about 1 hour, rather than a more central pass that takes 5-6 hours. This transit was partial in Australia, Antarctica and New Zealand's South Island.

## The 2016 Peach State Star Gaze

Mark your calendars for the 2016 Peach State Star Gaze which will be held from Sunday, September 25 to Sunday October 2 at the Deerlick Astronomy Village! Stay tuned to upcoming issues of the *Focal Point* and the AAC web sites for details on the talks, speakers, and other activities that will be held during the Star Gaze. And of course there will be lots of observing under some of the darkest skies in Georgia. The new moon occurs on Friday, September 30. Micki's Kitchen is also scheduled to return with meals, sandwiches, hot coffee and hot chocolate and other drinks, and her famous brownies! See you there!



The AAC field at the DAV during the 2013 PSSG - Photo by Tom Faber.

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## Mercury Transit by Daniel Herron

Here is a composite of 37 shots I took of the Mercury Transit on 5-9-2016. 36 of the shots were used for the different positions of Mercury during the 7.5 hour transit and one additional image used for the background sun with sunspot. 2nd contact (when Mercury just starts entering the edge of the Sun) and 3rd contact (just before it exits) are not included as I was taking higher magnification images during those and did not have images at the right orientation to add.

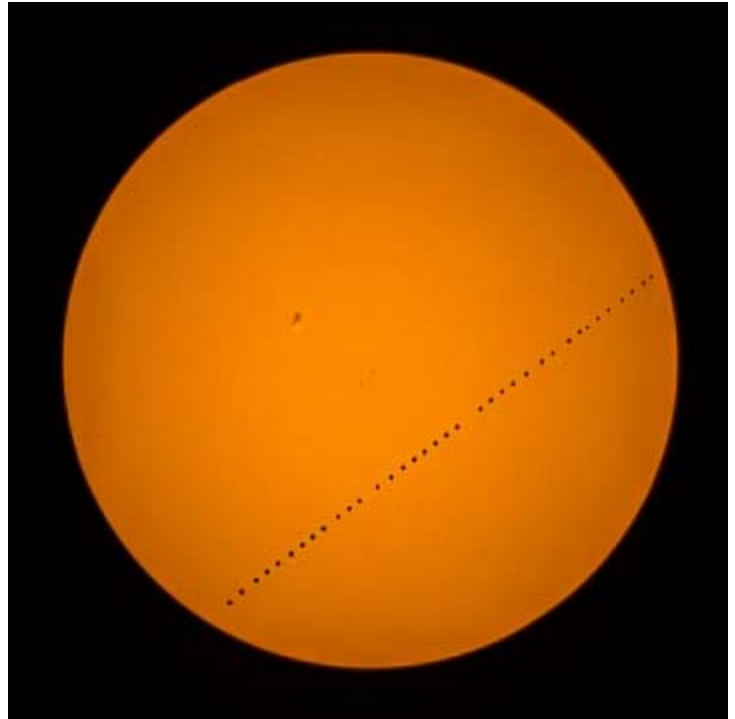
I had to take a little leeway here on the processing to create the composite due to some shots with clouds and at different exposures so you can see that the Mercury looks sharper in some spots than others and the sunspot is not very sharp, but I think it still gives an accurate representation of the path and how Mercury looked against the Sun.

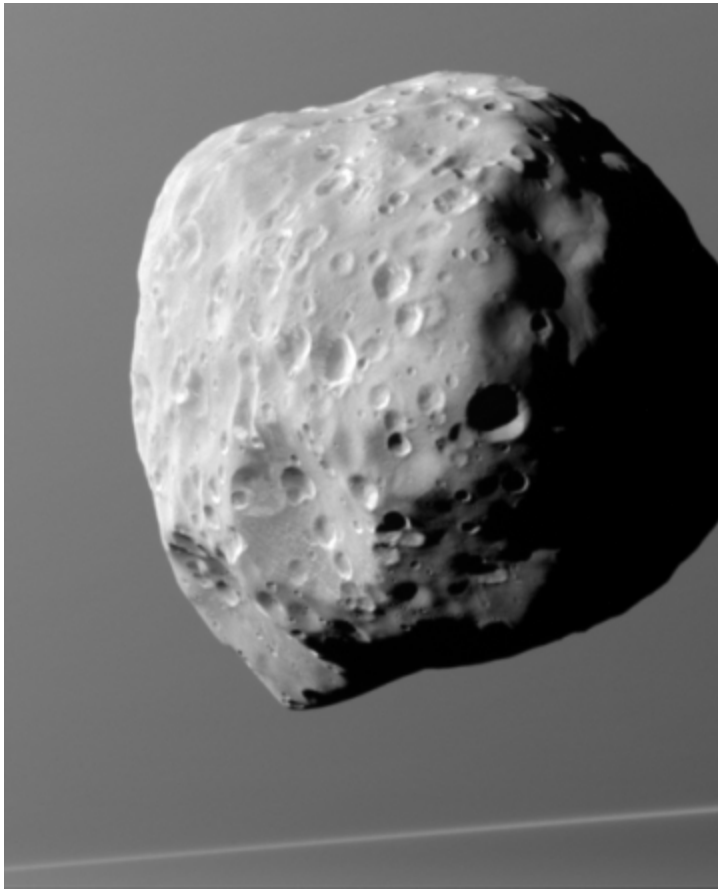
## The Transit of Mercury

Here are some photos of the May 9 Transit of Mercury.



Mercury transiting the sun and sunspots. This image was taken near the end of the transit and was made using an AstroScan telescope and a solar filter made with Baader Solar Safety Film. Photo by Tom Faber.





## NASA Telescopes Find Clues For How Giant Black Holes Formed So Quickly

NASA/Chandra X-ray Observatory News Release - May 24, 2016

Using data from NASA's Great Observatories, astronomers have found the best evidence yet for cosmic seeds in the early universe that should grow into supermassive black holes.

Researchers combined data from NASA's Chandra X-ray Observatory, Hubble Space Telescope, and Spitzer Space Telescope to identify these possible black hole seeds. They discuss their findings in a paper that will appear in an upcoming issue of the Monthly Notices of the Royal Astronomical Society.

"Our discovery, if confirmed, explains how these monster black holes were born," said Fabio Pacucci of Scuola Normale Superiore (SNS) in Pisa, Italy, who led the study. "We found evidence that supermassive black hole seeds can form directly from the collapse of a giant gas cloud, skipping any intermediate steps."

Scientists believe a supermassive black hole lies in the center of nearly all large galaxies, including our own Milky Way. They have found that some of these supermassive black holes, which contain millions or even billions of times the mass of the sun, formed less than a billion years after the start of the universe in the Big Bang.

One theory suggests black hole seeds were built up by pulling in gas from their surroundings and by mergers of smaller black holes, a process that should take much longer than found for these quickly forming black holes.

These new findings suggest instead that some of the first black holes formed directly when a cloud of gas collapsed, bypassing any other intermediate phases, such as the formation and subsequent destruction of a massive star.

"There is a lot of controversy over which path these black holes take," said co-author Andrea Ferrara, also of SNS. "Our work suggests we are narrowing in on an answer, where the black holes start big and grow at the normal rate, rather than starting small and growing at a very fast rate."

The researchers used computer models of black hole seeds combined with a new method to select candidates for these objects from long-exposure images from Chandra, Hubble, and Spitzer.

The team found two strong candidates for black hole seeds. Both of these matched the theoretical profile in the infrared data, including being very red objects, and also emit X-rays detected with Chandra. Estimates of their distance suggest they may have been formed when the universe was less than a billion years old.

"Black hole seeds are extremely hard to find and confirming their detection is very difficult," said Andrea Grazian, a co-author from the National Institute for Astrophysics in Italy. "However, we think our research has uncovered the two best candidates to date."

The team plans to obtain further observations in X-rays and the infrared to check whether these objects have more of the properties expected for black hole seeds. Upcoming observatories, such as NASA's James Webb Space Telescope and the European Extremely Large Telescope will aid in future studies by detecting the light from more distant and smaller black holes. Scientists currently are building the theoretical framework needed to interpret the upcoming data, with the aim of finding the first black holes in the universe.

"As scientists, we cannot say at this point that our model is 'the one'," said Pacucci. "What we really believe is that our model is able to reproduce the observations without requiring unreasonable assumptions."

NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program while the Smithsonian Astrophysical Observatory in

*Continued on next page*

## Hard Knock Life

NASA/JPL Image Release May 9, 2016

Life is hard for a little moon. Epimetheus, seen here with Saturn in the background, is lumpy and misshapen, thanks in part to its size and formation process. Epimetheus did not form with all of those craters in place -- rather, bombardment over the eons has left this tiny moon's surface heavily pitted.

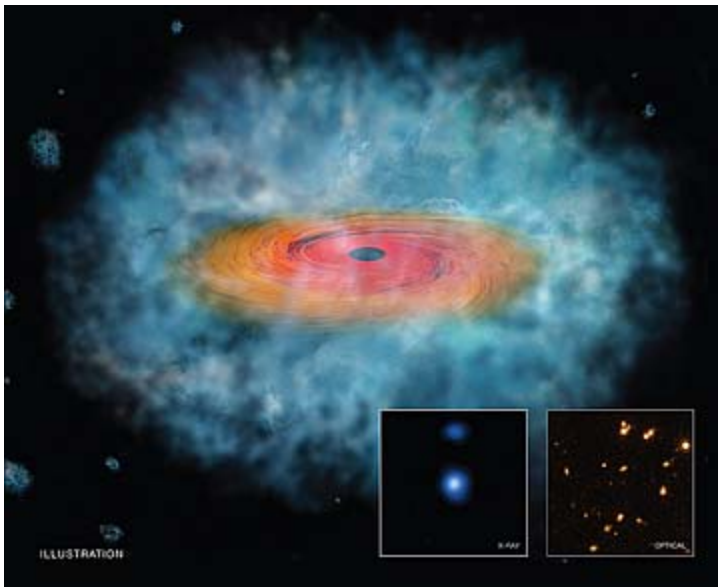
Epimetheus (70 miles or 113 kilometers across) is too small to have sufficient self-gravity to form itself into a round shape, and it has too little internal heat to sustain ongoing geological activity. Thus, its battered shape provides hints about its formation, and the myriad craters across its surface bear testament to the impacts it has suffered over its long history.

North on Epimetheus is up and rotated 5 degrees to the left. The image was taken in visible light with the Cassini spacecraft narrow-angle camera on Dec. 6, 2015.

The view was obtained at a distance of approximately 1,670 miles (2,690 kilometers) from Epimetheus. Image scale on Epimetheus is 520 feet (160 meters) per pixel.

The Cassini mission is a cooperative project of NASA, ESA (the European Space Agency) and the Italian Space Agency. The Jet Propulsion Laboratory, a division of the California Institute of Technology in Pasadena, manages the mission for NASA's Science Mission Directorate, Washington. The Cassini orbiter and its two onboard cameras were designed, developed and assembled at JPL. The imaging operations center is based at the Space Science Institute in Boulder, Colorado.

For more information about the Cassini-Huygens mission visit <http://saturn.jpl.nasa.gov> and <http://www.nasa.gov/cassini>. The Cassini imaging team homepage is at <http://ciclops.org>.



Using data from NASA's three Great Observatories, scientists have found the best evidence to date of a mechanism that produced supermassive black holes in the early Universe. If confirmed, this result, described in our latest press release, could lead to new insight into how black holes were formed and grew billions of years ago.

This artist's illustration depicts a possible "seed" for the formation of a supermassive black hole, that is an object that contains millions or even billions of times the mass of the Sun. In the artist's illustration, the gas cloud is shown as the wispy blue material, while the orange and red disk is showing material being funneled toward the growing black hole through its gravitational pull.

Researchers found evidence that two objects could have formed in this way, by directly collapsing into a black hole from a large cloud of gas. These two candidates for being "direct collapse black holes" are so distant that they may have formed less than one billion years after the Big Bang.

The inset boxes show data from the Hubble Space Telescope (right) and Chandra X-ray Observatory (left) of one of the objects described above. The Hubble image shows the faint, distant galaxy at the center of the image and the Chandra image shows X-ray emission from material falling onto the black hole in the same galaxy.

The researchers used computer models of black hole seeds combined with a new method to select candidates for these objects from long-exposure images from Chandra, Hubble, and Spitzer (not shown in this graphic). By analyzing the combined light from the three telescopes, the team was able to search through thousands of objects to look for any that had properties that matched those predicted by their models.

Two candidates emerged that had the expected red color, seen by Hubble and Spitzer, as well as the X-ray profile predicted from Chandra. These objects were found in the Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey and the Great Observatories Origins Deep Survey-South surveys. The next steps will involve getting more data on these two intriguing objects as well as extending the analysis to other surveys to look for more direct collapse black hole candidates.

These results will appear in the June 21st issue of the *Monthly Notices of the Royal Astronomical Society* and is available online. The authors of the paper are Fabio Pacucci (SNS, Italy), Andrea Ferrara (SNS), Andrea Grazian (INAF), Fabrizio Fiore (INAF), Emanuele Giallongo (INAF), and Simonetta Puccetti (ASI Science Data Center). NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, controls Chandra's science and flight operations.

Credit: X-ray: NASA/CXC/Scuola Normale Superiore/Pacucci, F. et al.  
Optical: NASA/STScI; Illustration: NASA/CXC/M.Weiss

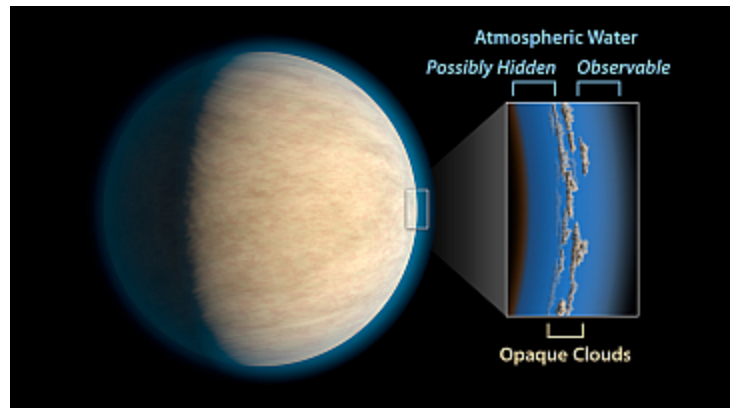
Cambridge, Massachusetts, controls Chandra's science and flight operations.

The Hubble Space Telescope is a project of international cooperation between NASA and the European Space Agency. NASA's Goddard Space Flight Center in Greenbelt, Maryland, manages the telescope. The Space Telescope Science Institute (STScI) in Baltimore conducts Hubble science operations. STScI is operated for NASA by the Association of Universities for Research in Astronomy in Washington.

NASA's Jet Propulsion Laboratory in Pasadena, California, manages the Spitzer Space Telescope mission, whose science operations are conducted at the Spitzer Science Center. Spacecraft operations are based at Lockheed Martin Space Systems Company, Littleton, Colorado.

An interactive image, a podcast, and a video about the findings are available at: <http://chandra.si.edu>

For more Chandra images, multimedia and related materials, visit: <http://www.nasa.gov/chandra>



## Cloudy Days on Exoplanets May Hide Atmospheric Water

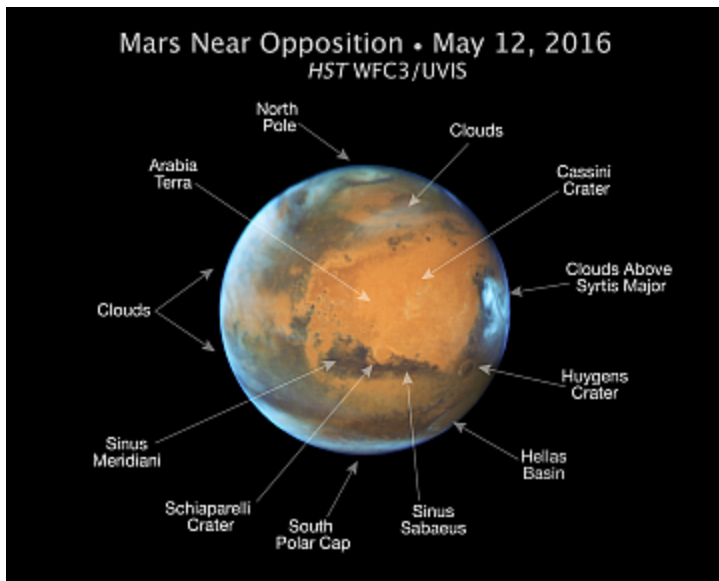
NASA/STScI News Release - June 8, 2016

Water is a hot topic in the study of exoplanets, including "hot Jupiters," whose masses are similar to that of Jupiter, but lie much closer to their parent star than Jupiter is to the sun. They are estimated to be a scorching 2,000 degrees Fahrenheit, meaning any water they host would take the form of water vapor.

Astronomers have found many hot Jupiters with water in their atmospheres, but other hot Jupiters appear to have none. In a new study, scientists used exoplanet data from a single instrument on NASA's Hubble Space Telescope to uniformly characterize a group of 19 hot Jupiters previously studied with Hubble. They found that as much as half of the water in the atmospheres of the exoplanets may be blocked by these clouds or hazes. The new findings suggest that clouds or haze layers could be preventing a substantial amount of atmospheric water from being detected by space telescopes. The study is the first to quantify how much of the atmosphere would be shielded as a result of clouds or haze.

For illustrations and additional information about this study and Hubble, visit <http://www.jpl.nasa.gov/news/news.php?release=2016-144>.





## Hubble Takes Mars Portrait Near Close Approach

NASA/STScI News Release - May 19, 2016

On May 12, 2016, astronomers using NASA's Hubble Space Telescope captured this striking image of Mars, when the planet was 50 million miles from Earth. The photo reveals details as small as 20 miles to 30 miles across. This observation was made just a few days before Mars opposition on May 22, when the sun and Mars will be on exact opposite sides of Earth. Mars also will be 47.4 million miles from Earth. On May 30, Mars will be the closest it has been to Earth in 11 years, at a distance of 46.8 million miles. Mars is especially photogenic during opposition because it can be seen fully illuminated by the sun as viewed from Earth. For more information see: <http://hubblesite.org/newscenter/archive/releases/2016/15/image/a/>

Credit: NASA, ESA, and L. Frattare (STScI)



The **Atlanta Astronomy Club, Inc.**, one of the South's largest and oldest astronomical society, meets at **3:00 P.M.** on the 2nd Saturday of each month at the Fernbank Science Center in Decatur, or occasionally at other locations or times. Membership fees are **\$30** for a family or single person membership. College Students membership fee is **\$15**. These fees are for a one year membership.

Magazine subscriptions to *Sky & Telescope* or *Astronomy* can be purchased through the club for a reduced rate. The fees are **\$33** for Sky & Telescope and **\$34** for Astronomy. Renewal forms will be sent to you by the magazines. Send the renewal form along with your check to the Atlanta Astronomy Club treasurer.

**The Club address:** Atlanta Astronomy Club, Inc., P.O. Box 76155, Atlanta, GA 30358-1155. AAC Web Page: <http://www.AtlantaAstronomy.org>. Send suggestions, comments, or ideas about the website to [webmaster@AtlantaAstronomy.org](mailto:webmaster@AtlantaAstronomy.org). Also send information on upcoming observing events, meetings, and other events to the webmaster.

## Atlanta Astronomy Club Online

While this newsletter is the official information source for the Atlanta Astronomy Club, it is only up to date the day it is posted. So if you want more up to date information, go to our club's website. The website contains pictures, directions, membership applications, events updates and other information. <http://www.atlantaastronomy.org> You can also follow the AAC on Facebook by joining the AAC group, and on Twitter at <http://twitter.com/atlastro>.

### AAC Officers and Contacts

**President:** Mark Banks [President@AtlantaAstronomy.org](mailto:President@AtlantaAstronomy.org)

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**Elliott Chapter ALCor:** Jack Fitzmier

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**PSSG Chairman:** Peter Macumber [pmacumber@nightsky.org](mailto:pmacumber@nightsky.org)

**PSSG Co-Chair:** Open

**Sidewalk Astronomy:** Brad Isley  
[sidewalkastronomy@AtlantaAstronomy.org](mailto:sidewalkastronomy@AtlantaAstronomy.org)

**Light Trespass:** Ken Edwards, Contact info TBA

**Woodruff Observ. Coordinator:** Sharon Carruthers  
[Treasurer@AtlantaAstronomy.org](mailto:Treasurer@AtlantaAstronomy.org)

**AAC Webmaster:** Daniel Herron  
[Observing@AtlantaAstronomy.org](mailto:Observing@AtlantaAstronomy.org)

## Calendar by Tom Faber (Times EDT/EST unless noted)

### AAC Events are listed in BOLD

- June 3rd, Friday: Moon near Mercury. Saturn at Opposition.  
June 4th, Saturday: **CE Chapter Meeting & Potluck.** New Moon.  
June 5th, Sunday: Mercury at Greatest Elongation East.  
June 6th, Monday: Venus at Superior Conjunction.  
June 10th, Friday: Jupiter near Chi Leonis.  
June 12th, Sunday: Moon First Quarter.  
June 14th, Tuesday: Earliest Sunrise (~6:25AM at Atlanta).  
June 18th, Saturday: **AAC Mtg at Fernbank Science Center 3:00PM.** Moon near Saturn.  
June 20th, Monday: Full Moon. Summer Solstice at 6:34PM.  
June 27th, Monday: Moon Last Quarter. Latest Sunset (~8:52PM at Atlanta).  
July 4th, Monday: New Moon. Earth at aphelion. The Juno spacecraft arrives at Jupiter.  
July 6th, Wednesday: Mercury at Superior Conjunction.  
July 7th, Thursday: Pluto at Opposition. Moon near Regulus.  
July 11th, Monday: Moon First Quarter.  
July 15th, Friday: Moon near Saturn and Antares.  
July 16th, Saturday: **AAC Mtg at Fernbank Science Center 3:00PM.**  
July 19th, Tuesday: Full Moon.  
July 26th, Tuesday: Moon Last Quarter.  
July 27th, Wednesday: Alpha Capricornids Meteors.  
July 28th, Thursday: Delta Aquarid Meteors.  
July 29th, Friday: Moon occults Aldebaran. At Atlanta disappears 5:48AM, reappears 6:40AM.  
July 31st, Sunday: Grouping of Mercury, Venus, and Regulus.  
Aug 2nd, Tuesday: New Moon.

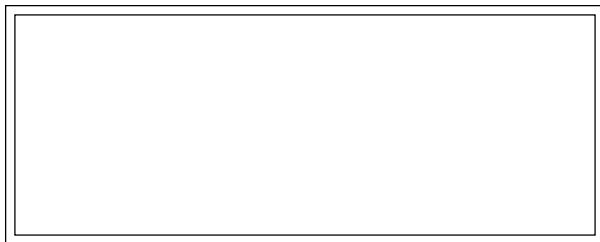
For more event listings see the calendar at [www.atlantaastronomy.org](http://www.atlantaastronomy.org)

### Atlanta Astronomy Club Listserv

Subscribe to the Atlanta Astronomy Club Mailing List: The name of the list is: AstroAtlanta. The address for messages is: [AstroAtlanta@yahoogroups.com](mailto:AstroAtlanta@yahoogroups.com) . To add a subscription, send a message to: [AstroAtlanta-subscribe@yahoogroups.com](mailto:AstroAtlanta-subscribe@yahoogroups.com) .

### Focal Point Deadline and Submission Information

Please send articles, pictures, and drawings in electronic format on anything astronomy, space, or sky related to Tom Faber at [focalpoint@atlantaastronomy.org](mailto:focalpoint@atlantaastronomy.org). Please send images separate from articles, not embedded in them. Articles are preferred as plain text files but Word documents or PDFs are okay. You can submit articles anytime up to the deadline. **The deadline for July is Saturday, June 25. Submissions after the deadline will go in the following issue.**



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We're here to help! Here's how to reach us:

Newsletter of The Atlanta Astronomy Club, Inc.



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