FOCUS

Vol. 56, No. 7, September, 2011

DELAWARE ASTRONOMICAL SOCIETY

Next Meeting – October 18th, 2011 at 8:00 PM

~ *Lasers in Astronomy* ~

Speaker: Mike Cimorosi

plus Brief Updates on Plans for the Fall Messier Half-Marathon by Gus Swartout and the Unihedron Sky Quality Meter by Fred DeLucia

at the Mt. Cuba Astronomical Observatory

FROM THE PRESIDENT ■ *Bill Hanagan*

Our October 18 main meeting will feature a presentation by DAS Member Mike Cimorosi on *Lasers in Astronomy.* Mike's talk will include the topics of interplanetary laser communications and adaptive optics. In addition, Gus Swartout will give us a brief run-down on plans for the *Fall Messier Half-Marathon* and Fred DeLucia will describe the *Agena Unihedron* sky quality meter.

I'd like to remind all of you to keep thinking about how YOU can contribute to the DAS and how you can make the DAS a better astronomy club. While we've had some volunteers step forward, and we've received a variety of donations, more volunteers and donations are needed.

A club works best when essentially all of its able-bodied members pitch in and help out in whatever way they can. If you haven't found a way to contribute to the DAS, call me at 302-239-0949. I'm sure we can come up with something that you can do to help the DAS that also suits your particular interests.

DAS Main Meeting Topics and Speakers for the Balance of 2011

October 18: *Lasers in Astronomy*, which will include the topics of interplanetary laser communications and adaptive optics by Mike Cimorosi. Also, the *Fall Messier ½ Marathon*, a brief update on plans for the event by Gus Swartout.
November 15: *Backyard Astronomy with your Observatory*, a review and analysis of the various types of amateur observatories by Ron Worden.
December 20: One mini-talk: *Title to be Determined* by Sheila Vincent, plus the DAS Christmas Party

Important Notice To The Membership

In June of 2011, the DAS board voted to increase member dues from $20 to $30 per year in order to counter the effects of inflation and improve the club's equipment.

More recently, the board also approved moving all members to a November 1 annual renewal date in order to allow the Treasurer's job to be simplified. As things are now, the treasurer must send out renewal notices and process bank deposits continuously throughout the year.

To allow us to make the transition to a common November 1 renewal date, you will soon be asked to pay additional dues for whatever number of months are needed to pay your membership up to date through 11/1/2012. Since other club members don't currently have the same renewal date as you do, they may be asked to pay either more, or less, than you. Please note the calculation is based on your renewal date of record and not the date payment is made.

This may seem a little complicated, but you won't need to do any calculations. You will receive a notice by email detailing your current renewal date, membership status and the amount of dues required to pay your membership through 11/1/2012.

Each issue of FOCUS is full of useful hyperlinks. Just click on any graphic or telltale blue web address and your browser should take you to additional linked web resources.

The Flame Nebula -
Photo by DAS Member Rick Davis.
Designated as NGC 2024 and Sh2-277,
is an emission Nebula in the constellation Orion.

Observing with the Delaware Astronomical Society...

DAS Member Star Parties (MSP's)

■ *Bill Hanagan*

NEW The predominantly wet and cloudy weather pattern that has so far dominated 2011 continued through late September and early October, clouding out or raining out all of the potential MSP dates that bracketed the new moon of September 27. Luckily, as I write this a very strong high pressure cell has developed over the eastern U.S. giving us several days of clear blue skies and amazing 5 out of 5 seeing!

We're planning to hold the *Fall Messier Half-Marathon* MSP on October 21, 22, 28, or 29. If these dates are all clouded over or rained out, November 18 and 19 are also available as backup dates. As in years past, we are planning to hold this event at the Elk River site south of Elkton, MD. Gus Swartout will be the MSP supervisor for this event. November 18 and 19 are potential MSP dates as well and these are backup dates for the *Fall Messier Half-Marathon*. If the weather allows, we may also hold an additional MSP during this period to make up for the rain.

The remaining MSP dates for 2011 are listed in the "Notes on the Member Star Parties (MSPs)" which appear on page 5 of this issue of the *FOCUS*.

NEW Bi-Annual Announcement: DAS Awards

The DAS is proud to offer two recognitions of distinction for those of service to the DAS, astronomy and/or astronomy education. DAS members are encouraged to bring to the attention of the DAS Awards Chairperson, or any member of the Board of Directors, individuals appropriate to these awards.

When awarded these are presented at the DAS Annual Dinner Meeting in May.

Amateur Astronomer of the Year Award

The Amateur Astronomer of the Year Award shall honor an individual who has rendered significant service to the organization and/or to the larger community in nurturing interest, and the advancement of education and scientific knowledge, in the subject of Astronomy.

Luther J. Porter Award

The Delaware Astronomical Society created the Luther J. Porter Award in 1999 to be presented to an individual who has been a strenuous advocate of and active participant in astronomy education and/or related subjects to the larger community over a significant period of time.

The Luther Porter Award is given to an individual for making a sustained, exceptional, and selfless effort to promote amateur astronomy among the public within the Mid-Atlantic region of the United States.

"PUBLIC NIGHTS" at the Mt. CUBA OBSERVATORY...

MCAO PUBLIC NIGHTS ■ *Greg Weaver*

The Mt. Cuba Observatory Public Nights continue year round! In addition to learning about many aspects of the heavens, you'll have a chance to visit and view our all-digital full-dome planetarium. You can pick up a schedule when you next come to a meeting or get the latest updated version off the website at: ***http://MountCuba.org***. Programs are presented on Monday nights at 8pm. Please check the website for programs planned, full details and updates.

The remaining Public Nights schedule for 2011 follows:

Date	***Speaker***	***Topic***
Oct. 24	*S. Vincent*	*Tales of the Night Sky*
Nov. 7	*B. Hanagan*	*How to choose your first Telescope.*
Nov. 21	*L. King*	*How Uranus and Neptune were discovered.*
Dec. 12	*D. Wilson*	*Wonders of the Universe*

DAS Special Interest Groups for Photography and Telescope Construction...

DAS ASTROPHOTOGRAPHY SPECIAL INTEREST GROUP ■ *Bill Hanagan*

The DAS astrophotography special interest group (DAS AP SIG) meets on Friday nights at 7:30pm every other month at Mt. Cuba regardless of weather. The SIG also meets for photo shoots scheduled on 1-2 day notice to synchronize with the weather.

The monthly meetings are informal and typically include the presentation of astrophotos taken by the members along with an extended question and answer period. Objects commonly photographed include constellations, auroras, lunar eclipses, and planetary photos, as well as a wide variety of deep-sky objects such as nebulae, galaxies, star clusters, etc. The topics discussed cover the entire gamut of astrophotography, from how to get started with a minimum of equipment, to polar aligning your telescope, all of the way to the fine points of using auto-guiders and post-processing digital images.

You can get started in astrophotography with just your current camera mounted on a tripod or a motorized telescope by taking wide field photographs of meteor showers, conjunctions, constellations, and star trails. As you move to progressively fainter and smaller subjects, you'll need better equipment. Joining the AP SIG is a great way to learn what equipment you'll need and what works well before you spend your money. If you are interested in joining the AP SIG, just email your name, address, and phone number to me at hanaganw@verizon.net.

NEW The next AP SIG meeting will be the third in our series of "On-Site" meetings to be conducted this year. It will be held at Ron Worden's home and is tentatively scheduled for either October 14 or 15. The exact date will be determined by the weather. Ron will act as host and will review his astro-imaging rig and give us an update on his recent imaging efforts.

Even if you aren't an AP-SIG member, you're welcome to attend to learn more. Be sure to sign up for the DAS Yahoo Group in order to receive the email announcements that provide directions and the date of the meeting.

As always, please consider submitting one or more of your favorite astrophotos for publication in the *FOCUS*. A recent photo is not required. You can email your photo(s) as .jpg files to our *FOCUS* editor, Joe Neuberger at his address at jrneuberger@gmail.com. Please include a text file briefly describing how you made each photo (in Microsoft Word format) along with any by-lines or captions you would like Joe to use. If you would like, you can write a more in-depth discussion to go with your photos. Joe can make a masterful layout, but if you would like to suggest a layout of your own you can insert copies of your photos into the Word document to give him an idea what you would like to see. Either way, don't forget to attach a high resolution .jpg file to your email for each photo. Joe has done a great job improving the look of the *FOCUS* and adding relevant links to take advantage of the fact that the *FOCUS* is now on-line, but like all newsletter editors, he needs as much material as he can get from club members.

DAS AMATEUR TELESCOPE MAKING SPECIAL INTEREST GROUP ■ *Bill Hanagan*

The DAS Amateur Telescope Making (ATM) Special Interest Group (SIG) meets on evenings and weekends according to the availability of the members and the particular projects that are underway. Currently the ATM SIG has a medium Dob building program under way. The general range of activities of the ATM SIG includes all manner of telescope making, mirror making, and the making of accessories for telescopes and observing.

Anyone interested in joining the ATM SIG should email their name, address, and phone number to me at hanaganw@verizon.net.

Meeting dates are announced primarily by email, so if you are interested in telescope making, be sure to let me know!

The refiguring of the club's 17.5" f/4.5 mirror is proceeding. If you would like to participate in this effort, please let me know.

LOANER TELESCOPES and SAWIN OBSERVATORY REMINDER ■ *Tom Sidowski*

One of the best advantages of being a member of the Delaware Astronomical Society is that all members have the privilege of being trained to use and then borrow equipment owned by the club for personal use. Currently, we have two scopes available for loan: a Celestron 8" Schmidt-Cassegrain, and a 6" Orion Sky-Quest XT6 Dobsonian reflector. The loan is for at least a month. If you're interested in checking out either of these scopes, contact Tom Sidowski at 302-239-1844.

The DAS also maintains a club observatory on the grounds of the Mt. Cuba Astronomical Observatory. The Sawin Observatory houses the club's permanently mounted 12.5" reflecting telescope and a 17.5" Coulter Odyssey 2 Dobsonian telescope. They are for the use of club members once they are trained and checked-out in a simple operating procedure. Members who are interested in becoming key holders of the Sawin Observatory should contact me at 302-239-1844 to arrange for training in the use of the facility.

NEW The PRESIDENT'S DAS BOARD MEETING AGENDA for OCTOBER

7:00 p.m., Tuesday, October 18, 2011
In the Library at the Mt. Cuba Observatory

1) Progress on the experimental installation of digital setting circles on the 12.5" telescope in the Sawin Observatory;
2) Purchase of a Barlowed Laser Collimator for loan to the members.
3) Plans for the DAS Christmas Party.

As always, DAS board meetings are open to all DAS members.

On-Site AP SIG Meetings Continue

2nd in this Series of Meetings Hosted by DAS Member Rick Davis at his Home Observatory ■ *Bill Hanagan*

On October 7, members of the AP-SIG, including Rick Davis, Bill Hanagan, and Ron Worden, met at Rick Davis' home for the second in this year's series of "On-Site" AP-SIG meetings. The "On-Site" series of meetings is held at the actua imaging locations of the AP-SIG members to allow everyone, from rank beginner to veteran imagers, to see a variety of astro-imaging gear and techniques in action.

Rick begins the alignment routine on his Gemini G-11 Mount.

Rick acted as host and demonstrated the operation of his Gemini G-11 Mount, 4" Takahashi refractor, and SBIG ST-7 CCD camera. The ST-7, like many SBIG CCD cameras, incorporates a second CCD detector for "auto-guiding".

After doing a polar alignment using the G-11's polar alignment telescope, Rick first sighted a known star, in this case Enif, to begin the alignment routine, as seen in the monochrome (red-light) photo above. A significant amount of ambient light for this photo was provided by the moon.

A short image was then obtained through the ST-7 and an astrometric "plate solve" was conducted to determine exactly where the telescope was pointing at the time. The telescope was then moved under computer control to several other regions of the sky and a "plate solve" was conducted at each location for use in refining the mount's pointing model. With multiple plate solves obtained from different regions of the sky, the software is able to not only calibrate the mount for future GOTO operations, but also to model several different errors that can affect pointing accuracy. These errors include imperfect polar alignment; imperfect orthogonality between the RA, DEC, and optical axes; backlash; and flexure of the telescope OTA, among others. If all major sources of error are adequately modeled, the mount can GOTO specific objects with a high degree of accuracy. This is important when imaging faint objects since some objects can't be detected except in long exposure images.

The photo at the top of the next column is a second long-exposure red-light image which I left in red and the editor manipulated in Photoshop to bring out more of its detail. Rick was moving through the area quickly while using his own red flashlight, but moved too quickly to be caught in the picture.

With the mount aligned and the GOTO system ready to go to work, the group was ready to head inside to control the operation of the telescope from the comfort of Rick's family room. Before we went, we posed for one quick group photo, which appears below. Flash was used in this case because everyone's dark adaptation was about to be spoiled anyway. *(Continued on next page)*

Rick Davis, Bill Hanagan and Ron Worden pose in front of Rick's Gemini G-11 Mount & 4" Takahaski refractor telescope.

On-Site AP SIG Meetings *(Continued from preceeding page)*

Once inside, we spent most of the remainder of the evening controlling the telescope remotely while following the activity on Rick's 50" Plasma screen, which is seen in the picture to the right with Ron Worden.

The next AP SIG meeting will be the third in our series of "On-Site" meetings to be conducted this year. It will be held at Ron Worden's home and is tentatively scheduled for either October 14 or 15. The exact date will be determined by the weather. Ron will act as host and will review his astro-imaging rig and give us an update on his recent imaging efforts.

Even if you aren't an AP-SIG member, you're welcome to attend to learn more. Be sure to sign up for the DAS Yahoo Group in order to receive the email announcements that provide directions and the date of the meeting.

Notes on the Member Star Parties (MSPs) ■ *Bill Hanagan*

For each MSP cycle there are usually four potential dates designated in advance, but which of these is used for the event is "flex-scheduled" according to the weather using the DAS Yahoo Group email system.

Please be sure to mark your calendars with the potential MSP dates that appear in the table! Obviously, you need to keep as many of these dates open as possible so when a GO announcement is made you're in a position to attend the DAS Member Star Party regardless of which date the weather favors!

The DAS has a core group of visual observers and astro-imagers who travel to Tuckahoe, Cherry Springs, West Virginia, and other dark sky sites as opportunities and the weather allow. If you're interested in going along or meeting up on any of the road trips mentioned in the MSP schedule, let me know and I'll fill you in on the details and keep you apprised as plans develop.

Several potential road trips are listed on the schedule. Road trips require that several DAS members commit to going in advance should the weather prove favorable for both nights. When the weather forecast only looks good for one night, the MSP will often be redirected to a closer site such as the Elk River site or the Sawin observatory.

While DAS members who go on road trips are often involved in both observing and imaging, these road trips are particularly valuable for visual observers because they offer the best opportunity to see deep sky objects through large aperture telescopes under dark skies.

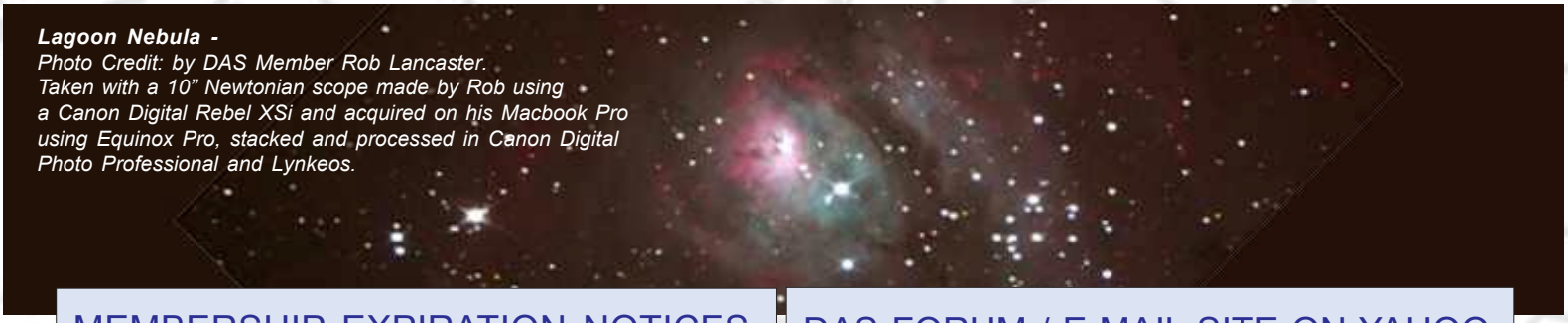
Long-time members of the DAS may remember the disappointing views they had looking through Mount Cuba's 24" Tinsley Cassegrain telescope. Don't let the bad views produced by that telescope affect your thinking about what can be seen through a large aperture telescope. Most of today's big Dobs produce dramatically superior visual images thanks in part to better optics, the use of a "thin" primary mirror, and fans for controlling thermal problems.

If you are truly interested in visual observing, you owe it to yourself to see first-hand what dark skies and a large aperture will allow you to see.

Finally, I'd like to remind you that you need to be signed up for the DAS Yahoo Group to receive the scheduling announcements for the MSPs. A full description of the MSP program appears on the DAS website at http://delastro.org/ and in the December 2009 issue of the *FOCUS*.

2011 DAS Member Star Party (MSP) Potential Dates, Events, and Locations

Potential MSP Dates	Events, Planets, and a List of Deep Sky Objects Near the Meridian ~1 Hour After Twilight (or 9 P.M., whichever is later)	Potential MSP Locations
Oct. 21, 22, 28, 29	Messier Half-Marathon, Part B—Why stay up all night? Do the spring and fall Messier Half-Marathons instead! Jupiter rises >30°AH by ~9:20 P.M. At opposition on Oct. 26, Jupiter is >61°AH. M objects: 31, 32,103, 110. Bright NGCs: 253.	Gus Swartout's Elk River site south of Elkton (mud/snow backup site: DAS Sawin Observatory)
Nov. 18, 19	These are backup dates for the Messier Half-Marathon Part B. Jupiter rises >30°AH by ~7:20 P.M. M objects: 33, 74, 76. Bright NGCs: 457 (Owl cluster). Nov. 25 and 26 are reserved for Thanksgiving weekend.	Gus Swartout's Elk River site south of Elkton (mud/snow backup site: DAS Sawin Observatory)
Dec. 16, 17	M objects: 34, and 77. Bright NGCs: 884 and 869 (the double cluster in Perseus). Jupiter >30°AH on Dec. 17 until after 12 A.M. December 24 and 25 are reserved for . . . a flying sled pulled by nine tiny reindeer?	DAS Sawin Observatory



Lagoon Nebula -
Photo Credit: by DAS Member Rob Lancaster. Taken with a 10" Newtonian scope made by Rob using a Canon Digital Rebel XSi and acquired on his Macbook Pro using Equinox Pro, stacked and processed in Canon Digital Photo Professional and Lynkeos.

MEMBERSHIP EXPIRATION NOTICES

■ *Bill McKibben*

If you receive the *FOCUS* by email, you will be notified of your membership renewal by email. If you receive the *FOCUS* in the mail and the mailing label on the envelope containing your *FOCUS* is marked with red marker, your membership is expiring or has expired. Please see the renewal form at the end of the *FOCUS* for additional renewal information. Also see the "Magazine Subscriptions" section in the *FOCUS* for information about subscription renewal.

LIBRARY NEWS ■ *Glenn Bentley*

NEW It's observing season again, and there is a comet and a near earth asteroid in easy reach and not to forget a *Messier Half-Marathon* coming up. The library has a variety of observing guides and the big red Messier Marathon book that Gus endorses for marathoners that don't have Go-To scopes. I invite the membership to drop by the library after the October meeting to check out our collection of observing guides.

ASTRONOMICAL LEAGUE MEMBERSHIP

DAS members have the opportunity to become members in the Astronomical League at the discounted rate of $7.50 per year. Benefits include the *Reflector* (a quarterly newsletter), observing programs, awards, discounts on books and educational materials. For questions on joining the Astronomical League, contact Lynn King at meetings, call 302-764-8816 or email KLynnKing@verizon.net.

MT. CUBA LENDING LIBRARY ■ *Paul Stratton*

May I first extend a hardy thanks to all of those using the Lending Library. Your interest has made this a rewarding effort.

BOOK OF THE MONTH--***PLANETS FOR MEN*** by Stephen H. Dole and Isaac Asimov

The Kepler Telescope has now found many hundred planets in the Milk Way system. The data being collected is indicating that some of these may very well be inhabitable by humans.

May I quote. " In the course of millions of years the human species has adapted itself to the narrow ranges of temperature and air pressure, the availability of food and water, the chemical and physical components of our earthly environment.. Now that means are at hand to transcend this enviroment, the question arises: Where else in the universe can such physical conditions be found?"

Read ***PLANETS FOR MEN*** and let the thoughts begin.

DAS FORUM / E-MAIL SITE ON YAHOO

■ *Don Shedrick*

This is a restricted e-mail service for use by DAS members for DAS purposes. To use this site, go to http://groups.yahoo.com; search for Delaware Astronomical Society; and click on the link that comes up. To join, you must have a Yahoo ID and password; if you don't, you can register at this time by following Yahoo's instructions. You will then be allowed to "Join the group" upon clicking in that box. You must then register for the DAS group and add your profile by clicking on "add new profile" and completing the form.

When adding or editing your profile, you will need to enter your actual name in the "Real Name" box so you can be identified as a DAS member so Don Shedrick can approve your application to join the DAS group, and everyone will know to whom they are communicating.

Finally, specify your desired email address for delivery of messages. Note: you may choose to not have your name and email address displayed to anyone other than DAS members who are members of the Yahoo DAS email group.

For more detailed instructions, go to the DAS website under *DAS Resource Links*.

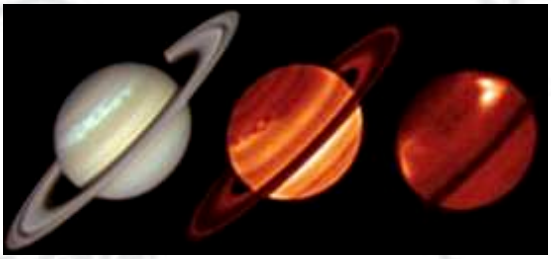
MAGAZINE SUBSCRIPTIONS ■ *Bill McKibbon*

SKY & TELESCOPE will be processed by the club for the first subscription year only. The publisher should then send renewal notices directly to the subscriber at the club rate of $32.95. The subscriber can then pay the publisher directly.

NOTE: If you receive a renewal notice for an amount other than $32.95, check to see if there are any special offers included in the rate. Also check the renewal date printed on the magazine address label. These 'special offers' are likely to occur several months prior to the renewal date. However, if you are approaching your renewal date and have not received the correct renewal notice, contact me and I will process the renewal through the club.

ASTRONOMY will continue to be processed by the club for all subscription years.

Please see the renewal form at the end of the *FOCUS* for additional renewal information.

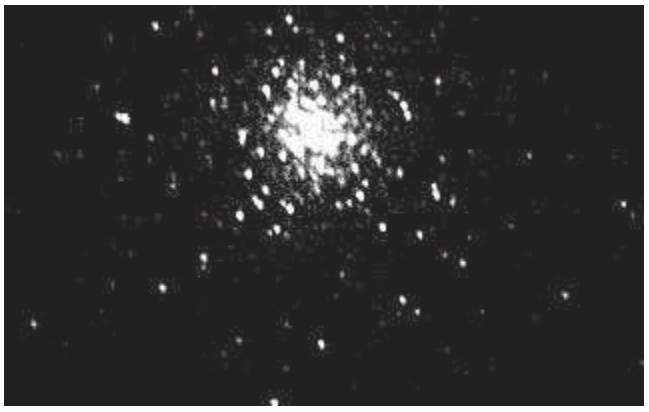


ASTRO-PHOTO of the MONTH

Messier 3 (NGC 5272)

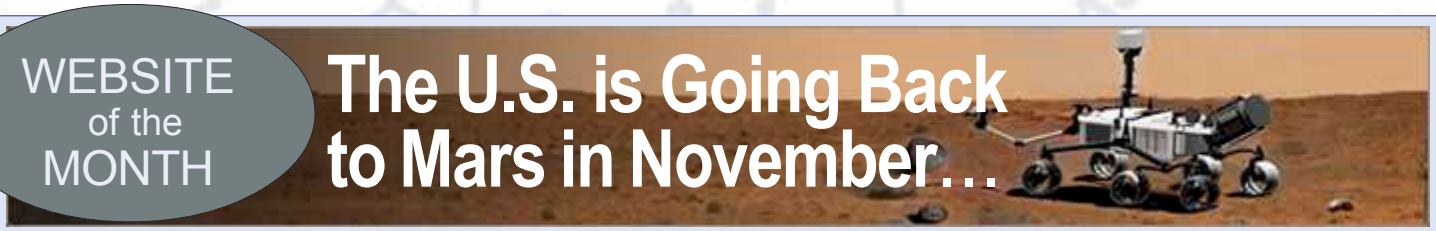
Photo Credit: DAS Member Ron Worden

Photo taken in June 2011 utilizing an SBIG STV CCD camera and a 10" Meade LX200 at a focal length of 1600mm.



Messier 3 (also known as M3 or NGC 5272) is a globular cluster in the constellation Canes Venatici. It was discovered by Charles Messier in 1764, and resolved into stars by William Herschel around 1784. This cluster is one of the largest and brightest, and is made up of around 500,000 stars. It is located at a distance of about 33,900 light-years away from Earth. M3 has an apparent magnitude of 6.2, making it a difficult naked eye target even with dark conditions. With a moderate-sized telescope, the cluster is fully defined. It is estimated to be 8 billion years old. It is pretty difficult to spot this object in an amateur telescope without GoTo as it has no nearby pointer stars; though it is almost exactly halfway between and on a line connecting Cor Caroli with Arcturus.

WEBSITE of the MONTH



The U.S. is Going Back to Mars in November…

http://www.nasa.gov/msl/

Check out this NASA website for full information concerning this landmark launch and science investigation, the most complete attempted yet on a foreign body. Pages 8 & 9 contain a feature on the site chosen for the landing of the auto-sized "Curiosity" rover, but the website completes the story with a vast number of videos concerning the site's selection and the manufacture and instrumentation on this exceptional rover machine and its unique landing apparatus.

The Mars Science Laboratory spacecraft is being prepared for launch during the period Nov. 25 to Dec. 18, 2011. In a prime mission lasting one Martian year — nearly two Earth years — after landing, researchers will use the rover's tools to study whether the landing region has had environmental conditions favorable for supporting microbial life and for preserving clues about whether life existed.

This drawing of the Mars Science Laboratory mission's rover, Curiosity, indicates the location of science instruments and some other tools on the car-size machine. Visit the site and check it all out before the scheduled November launch!

DAS Messier Half-Marathon

■ Gus Swartout

The Fall portion of the DAS *Messier Half-Marathon* will be held on October 21st or 22nd, with the back-up dates on the 28th or 29th.

The event will take place at our dark-sky site on the banks of the Elk River in St. John's Manor, just south of Elkton. We will have access to the cabin for hot/cold beverages, snacks, and restrooms. All are welcome to this friendly event. Bring your scope or binoculars. If you have neither, join me and we'll work as a team.

Please don't become intimidated if you have trouble finding the objects. Everyone will be eager to lend a helping hand. I highly recommend Harvard Pennington's book, ***The Year Round Messier Marathon***, published by Willmann-Bell. Harvard explains in detail how to use the book's charts along with your telescope's finder or telrad to locate all of the Messier objects. The DAS library has a copy you can sign out, and don't forget, as a member of the DAS you can also use a loaner telescope.

As with all DAS star parties, the GO / NO-GO is based on weather conditions and will be posted on the YAHOO user group. Sign up today! And JOIN US!

Directions to the DAS Dark Sky Site at 321 Casparus Way, St John's Manor, Elkton, MD 21921:

Traveling west on Route 40 toward Elkton, continue past the intersection with Route 213 for ½ mile, turn left onto Landing Lane. Continue ½ mile and turn right onto Old Field Point Road. Follow Old Field Point Road for 5-¾ miles to the entrance to St. John's Manor on the left-hand side of the road. Turn left onto Casparus Way. Follow for ¾ of a mile. 321 will be on your left. Look for the signs.

The Strange Attraction of Gale Crater

An artist's concept of Curiosity in Gale Crater. [Click for video preentation]

Sept. 29, 2011:

Curiosity is about to go to Mars. The car-sized rover, also known as the Mars Science Lab, is scheduled for launch in late November or early December 2011 from the Kennedy Space Center. After an eight-month voyage to Mars, Curiosity will land at the foot of a 3 mile high mountain in a crater named "Gale."

It sounds a little odd—a mountain in the middle of an impact crater. Wouldn't the impact have smashed it flat? Some scientists believe the 96 mile wide crater filled in with sediments over time and relentless Martian winds carved a mountain in the center, where it now stands nearly three times higher than the Grand Canyon is deep.

Because of its history, this strangely sculpted mountain is the ideal place for Curiosity to conduct its mission of exploration into the Red Planet's past. Joy Crisp, MSL Deputy Project Scientist from NASA's Jet Propulsion Laboratory, explains:

"This may be one of the thickest exposed sections of layered sedimentary rocks in the solar system. The rock record preserved in those layers holds stories that are billions of years old — stories about whether, when, and for how long Mars might have been habitable."

Today the Red Planet is a radiation-drenched, bitterly cold, bleak world. Enormous dust storms explode across the barren landscape and darken Martian skies for months at a time. But data from the Mars Reconnaissance Orbiter suggest that Mars once hosted vast lakes and flowing rivers.

"Gale Crater and its mountain will tell this intriguing story," says Matthew Golombek, Mars Exploration Program Landing Site Scientist from JPL. "The layers there chronicle Mars' environmental history." *(Continued on next page)*

Gale crater photographed from above by NASA's Mars Odyssey orbiter. Within Gale, an impressive layered mountain rises about 3 miles above the crater floor. [Click picture for larger image] or [ScienceCast video]

The Strange Attraction of Gale Crater

(Continued from preceeding page)

This artist concept features NASA's Mars Science Laboratory Curiosity rover, a mobile robot for investigating Mars' past or present ability to sustain microbial life. Image credit: NASA/JPL-Caltech [Click Picture forFull image and caption] [Click to See full 11 min. animation]

In the gentle slopes around the mountain, Curiosity will prospect for organic molecules, the chemical building blocks of life. Mars Reconnaissance Orbiter has found an intriguing signature of clay near the bottom of the mountain and sulfate minerals a little higher up. Both minerals are formed in the presence of water, which increases potential for life-friendly environs.

"All the types of aqueous minerals we've detected on Mars to date can be found in this one location," explains Golombek.

Clay settles slowly in water and forms little platelets that conform around things, hardening over time and encasing them in ''casts." Clay could seal organics off from the outside environment much like it preserved dinosaur bones on Earth.

"If organics ever existed on Mars, they could be preserved in the clay.

"Even on planet Earth, teeming with life, finding billion year-old well-preserved organics is difficult. But Curiosity will find them if they're present in the samples it takes. The rover is equipped with the most advanced suite of instruments for scientific studies ever sent to the Martian surface[1]. When these are brought to bear on Gale crater's mysteriously layered mountain, the odds of a discovery will be at an all-time high.

As seasoned travelers know, however, the journey is just as important as the destination. Curiosity can travel up to 150 meters per Mars day, but will stop often to gather and analyze samples.

"It could take several months to a year to reach the foot of the mountain, depending on how often the rover stops along the way," says Golombek. "There will be plenty to examine before getting to the central mound."

A high-resolution camera on the rover's mast will take pictures and movies of the scenery, taking Earthlings on an extraterrestrial sightseeing tour.

"As Curiosity climbs toward higher layers, you'll see spectacular valleys and canyons like those in the U.S. desert southwest. The walls on either side of the rover will rise over 100 feet. The sights alone will be worth the trip."

Stay tuned for updates from the Red Planet.

Author: Dauna Coulter | Editor: Dr. Tony Phillips
Credit: Science@NASA

For More Information:
Mars Science Laboratory — Curiosity's home page

Footnotes:

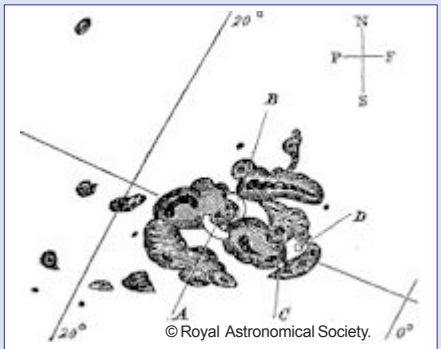
[1]Curiosity will carry the biggest, most advanced suite of instruments for scientific studies ever sent to the Martian surface. For example, the Sample Analysis at Mars or "SAM" instrument inside the rover's body can detect a fainter trace of organics and identify a wider variety of them than any instrument yet sent to Mars. Its vents open to the atmosphere so it can "sniff" the air bird-dog style for evidence of its quarry. It can also "sniff" gases released after baking a sample in its oven. SAM is not restricted to soil samples. It can also analyze samples from inside rocks courtesy of the drill on Curiosity's robotic arm.

"Mounted on the rover's mast is ChemCam—a laser that can aim at a rock and vaporize a small spot on it, producing a plasma cloud we can analyze to learn that rock's chemistry," adds Joy Crisp.

In addition to ChemCam, the mast sports a high-resolution camera called, naturally, Mastcam. It will take pictures and video of geological structures and features, like craters, gullies, and dunes. The rover's robotic arm is equipped with a brush to remove dust from rock surfaces, a drill to collect rock powder, and a scoop to collect soil. "Once a sample or rock powder or soil has been collected, Curiosity shakes it through a sieve and into a portioner and then delivers sample portions to one or both of the two analysis instruments inside the body of the rover," says Crisp. "In other words, the rover does the prep work a human in a lab usually does. We'll send the rover a sequence of commands to enable it to do all this." The rock powder and soil samples will be examined for organic molecules by SAM and for mineralogy by an X-ray diffraction instrument. The arm also wields its own unique instruments. One of them is APXS, the Alpha Particle X-Ray Spectrometer, which will measure the abundance of chemical elements in the dust, soils, rocks, and processed samples. The other arm instrument MAHLI, the Mars Hand Lens Imager, will return color images like those of typical digital cameras and act like a geologist's magnifying lens. Its images can be used to examine the structure and texture of rocks, dust, and frost at the micrometer to centimeter scale. On the back of the rover is an instrument that can measure the hydrogen abundance in the ground under the rover and identify interesting soils and rocks worthy of further investigation. Curiosity will also carry instruments for observing Martian weather and measuring cosmic and solar energetic radiation bombarding the planet's surface.

Learn more about Curiosity's instruments at
http://mars.jpl.nasa.gov/msl/mission/instruments/

The Secret Lives of Solar Flares



Sunspots sketched by R. Carrington on Sept. 1, 1859. Click pic above for more.

Sept. 19, 2011: One hundred and fifty two years ago, a man in England named Richard Carrington discovered solar flares.

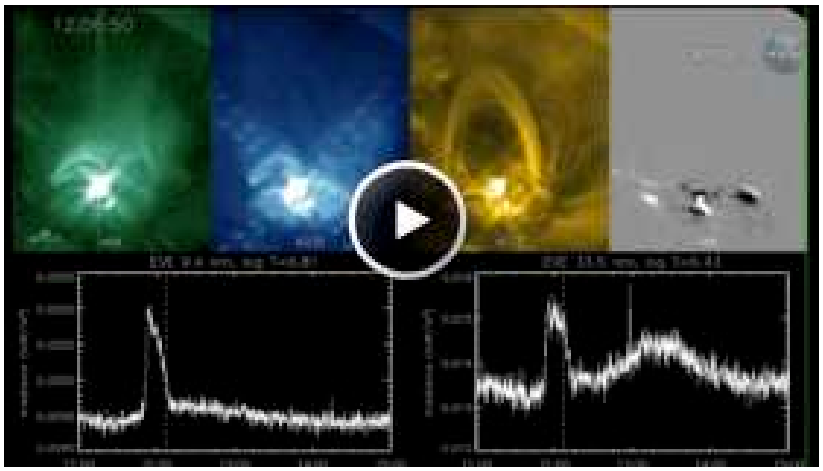
It happened at 11:18 AM on the cloudless morning of Thursday, September 1st, 1859. Just as usual on every sunny day, the 33-year-old solar astronomer was busy in his private observatory, projecting an image of the sun onto a screen and sketching what he saw. On that particular morning, he traced the outlines of an enormous group of sunspots. Suddenly, before his eyes, two brilliant beads of white light appeared over the sunspots; they were so bright he could barely stand to look at the screen.

Carrington cried out, but by the time a witness arrived minutes later, the first solar flare anyone had ever seen was fading away.

It would not be the last. Since then, astronomers have recorded thousands of strong flares using instruments ranging from the simplest telescopes in backyard observatories to the most complex spectrometers on advanced spacecraft. Possibly no other phenomenon in astronomy has been studied as much.

After all that scrutiny, you might suppose that everything about solar flares would be known. Far from it. Researchers recently announced that solar flares have been keeping a secret.

"We've just learned that some flares are many times stronger than previously thought," says University of Colorado physicist Tom Woods who led the research team. "Solar flares were already the biggest explosions in the solar system—and this discovery makes them even bigger."


Click above to view more videos and images in support of this story.

NASA's Solar Dynamics Observatory (SDO), launched in February 2010, made the finding: About 1 in 7 flares experience an "aftershock." About ninety minutes after the flare dies down, it springs to life again, producing an extra surge of extreme ultraviolet radiation.

"We call it the 'late phase flare,'" says Woods. "The energy in the late phase can exceed the energy of the primary flare by as much as a factor of four."

What causes the late phase? Solar flares happen when the magnetic fields of sunspots erupt—a process called "magnetic reconnection." The late phase is thought to result when some of the sunspot's magnetic loops re-form. A diagram prepared by team member Rachel Hock of the University of Colorado shows how it works.

The extra energy from the late phase can have a big effect on Earth. Extreme ultraviolet wavelengths are particularly good at heating and ionizing Earth's upper atmosphere. When our planet's atmosphere is heated by extreme UV radiation, it puffs up, accelerating the decay of low-orbiting satellites. Furthermore, the ionizing action of extreme UV can bend radio signals and disrupt the normal operation of GPS.

SDO was able to make the discovery because of its unique ability to monitor the sun's extreme UV output in high resolution nearly 24 hours a day, 7 days a week. With that kind of scrutiny, it's tough to keep a secret—even one as old as this.

The original research of Woods et al may be found in the Oct. 1, 2011, issue of the *Astrophysical Journal*.

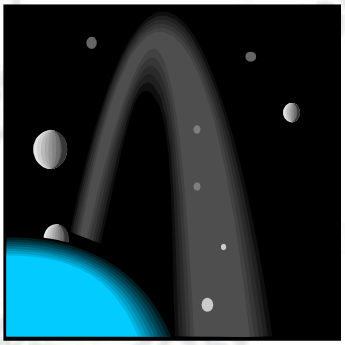
Author: Dr. Tony Phillips | Credit: Science@NASA

For More Information:

Solar Dynamics Observatory — SDO home page

Click for more videos and images in support of this story

SDO's EUV Variability Experiment (EVE) gathered key data that led to the discovery of the late phase



Kepler Discovers a Planet with Two Suns

An artist's concept of Kepler-16b, the first planet known to definitively orbit two stars — what's called a circumbinary planet. The planet, which can be seen in the foreground, was discovered by NASA's Kepler mission.

Sept. 15, 2011: The existence of a world with a double sunset, as portrayed in the film Star Wars more than 30 years ago, is now scientific fact. NASA's Kepler mission has made the first unambiguous detection of a circumbinary planet — a planet orbiting two stars — 200 light-years from Earth.

Unlike Star Wars' Tatooine, the planet is cold, gaseous and not thought to harbor life, but its discovery demonstrates the diversity of planets in our galaxy. Previous research has hinted at the existence of circumbinary planets, but clear confirmation proved elusive. Kepler detected such a planet, known as Kepler-16b, by observing transits, where the brightness of a parent star dims from the planet crossing in front of it.

"This discovery confirms a new class of planetary systems that could harbor life," Kepler principal investigator William Borucki said. "Given that most stars in our galaxy are part of a binary system, this means the opportunities for life are much broader than if planets form only around single stars. This milestone discovery confirms a theory that scientists have had for decades but could not prove until now."

A research team led by Laurance Doyle of the SETI Institute in Mountain View, Calif., used data from the Kepler space telescope, which measures dips in the brightness of more than 150,000 stars, to search for transiting planets. Kepler is the first NASA mission capable of finding Earth-size planets in or near the "habitable zone," the region in a planetary system where liquid water can exist on the surface of the orbiting planet.

Scientists detected the new planet in the Kepler-16 system, a pair of orbiting stars that eclipse each other from our vantage point on Earth. When the smaller star partially blocks the larger star, a primary eclipse occurs, and a secondary eclipse occurs when the smaller star is occulted, or completely blocked, by the larger star.

Astronomers further observed that the brightness of the system dipped even when the stars were not eclipsing one another, hinting at a third body. The additional dimming in brightness events, called the tertiary and quaternary eclipses, reappeared at irregular intervals of time, indicating the stars were in different positions in their orbit each time the third body passed. This showed the third body was circling, not just one, but both stars, in a wide circumbinary orbit.

The gravitational tug on the stars, measured by changes in their eclipse times, was a good indicator of the mass of the third body. Only a very slight gravitational pull was detected, one that only could be caused by a small mass. The findings are described in a new study published Friday, Sept. 16, in the journal *Science*.

"Most of what we know about the sizes of stars comes from such eclipsing binary systems, and most of what we know about the size of planets comes from transits," said Doyle, who also is the lead author and a Kepler participating scientist. "Kepler-16 combines the best of both worlds, with stellar eclipses and planetary transits in one system."

This discovery confirms that Kepler-16b is an inhospitable, cold world about the size of Saturn and thought to be made up of about half rock and half gas. The parent stars are smaller than our sun. One is 69 percent the mass of the sun and the other only 20 percent. Kepler-16b orbits around both stars every 229 days, similar to Venus' 225-day orbit, but lies outside the system's habitable zone, where liquid water could exist on the surface, because the stars are cooler than our sun.

"Working in film, we often are tasked with creating something never before seen," said visual effects supervisor John Knoll of Industrial Light & Magic, a division of Lucasfilm Ltd., in San Francisco. "However, more often than not, scientific discoveries prove to be more spectacular than anything we dare imagine. There is no doubt these discoveries influence and inspire storytellers. Their very existence serves as cause to dream bigger and open our minds to new possibilities beyond what we think we 'know.'"

For more information about the Kepler-16 discovery, visit *http://kepler.nasa.gov/Mission/discoveries/kepler16b/.*

Production Editor: Dr. Tony Phillips | Credit: Science@NASA

EDSCORP 6" f/8 TELESCOPES FOR SALE by the CLUB

Two classic telescopes have been restored by DAS members and the Club is offering them for sale. The scopes will be on display at the October meeting for your inspection. Two clean scopes in the classic style for a beginner or collector. Below appear the individual ads with pictures of these fine instruments being sold by the DAS.

DAS members have restored and refurbished two classic **Edscorp (Edmund Scientific) Telescopes** which the club is offering for sale. Both are **6" f/8 Newtonians** on motorized **German Equatorial mounts**, have **rack & pinion focuser**, and a **6x finder**. One has a mirror which has been refigured by the experts at the Mid-Atlantic Mirror Making workshop and is newly aluminized. The other's mirror was tested by the personnel at MAMM who determined that refiguring was not called for. The coating is original but clean. **Technical specs for both mirrors will be provided to the buyers**. We have even assembled some Edmund materials which show how to use the drive motors, how to collimate, etc. **Contact Tom Sidowski (239-1844 or sidowski@udel.edu) with any questions or to reserve your selection.**

Edscorp Telescope #1

1/6 wave primary mirror (tested at the Mid-Atlantic Mirror Making workshop).
Coating is orginal and clean.
3" setting circles (slightly broken)
One Eyepiece

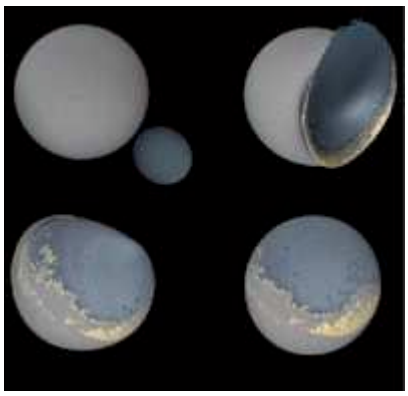
FOR SALE $150.00

Edscorp Telescope #2

1/8 wave primary mirror (refigured at the Mid-Atlantic Mirror Making workshop).
Coating is newly aluminized.
3" setting circles
One Eyepiece

FOR SALE $195.00

GRAIL and the Mystery of the Missing Moon



The "Big Splat." Four snapshots from a computer simulation of a collision between the Moon and a smaller companion show how the splattered companion moon forms a mountainous region on one side of the Moon.

[Click picture above for more info.]

Credit: M. Jutzi and E. Asphaug, *Nature*.

Sept. 7, 2011: On Sept. 10th, NASA's GRAIL mission left Earth to uncover some of the mysteries beneath the surface of the Moon. That cratered gray exterior hides some tantalizing things – even, perhaps, a long-lost companion.

If a paper published recently in the journal *Nature** is right, two moons once graced our night skies. The proposition has not been proven, but has drawn widespread attention.

"It's an intriguing idea," says David Smith, GRAIL's deputy principal investigator at MIT. "And it would be a way to explain one of the great perplexities of the Earth-Moon system – the Moon's strangely asymmetrical nature. Its near and far sides are substantially different."

The Moon's near side, facing us, is dominated by vast smooth 'seas' of ancient hardened lava. In contrast, the far side is marked by mountainous highlands. Researchers have long struggled to account for the differences, and the "two moon" theory introduced by Martin Jutzi and Erik Asphaug of the University of California at Santa Cruz is the latest attempt.

Scientists agree that when a Mars-sized object crashed into our planet about 4 billion years ago, the resulting debris cloud coalesced to form the Moon. Jutzi and Asphaug posit that the debris cloud actually formed two moons. A second, smaller chunk of debris landed in just the right orbit to lead or follow the bigger Moon around Earth.

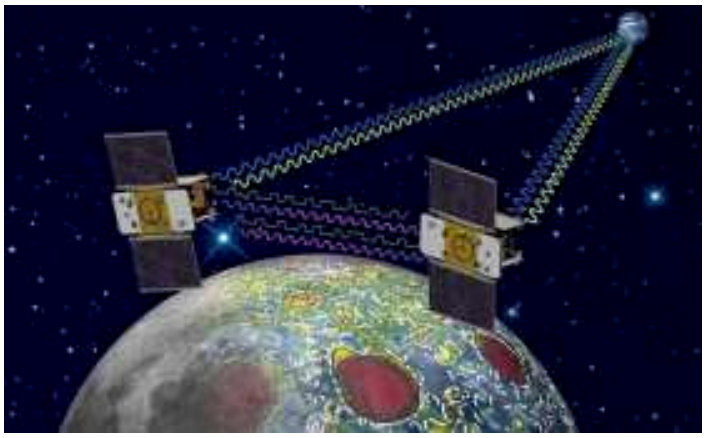
"Normally, such moons accrete into a single body shortly after formation," explains Smith. "But the new theory proposes that the second moon ended up at one of the Lagrange points in the Earth-Moon system."

Lagrange points are a bit like gravitational fly traps. They can hold an object for a long time—but not necessarily forever. The second moon eventually worked its way out and collided with its bigger sister. The collision occurred at such a low velocity that the impact did not form a crater. Instead, the smaller moon 'went splat,' forming the contemporary far side highlands.

In short, the lunar highlands are the lost moon's remains.

"By probing the Moon's gravity field, GRAIL will 'see' inside the Moon, illuminating the differences between the near and far sides."

GRAIL will fly twin spacecraft around the Moon for several months. All the while, a microwave ranging system will precisely measure the distance between the two spacecraft. By watching that distance expand and contract as the pair fly over the lunar surface, researchers can map the Moon's underlying gravity field.**



Flying in formation around the Moon, NASA's twin GRAIL spacecraft will make precise measurements of the lunar gravitational field. [Click for more info.]

"These measurements will tell us a lot about the distribution of material inside the Moon, and give us pretty definitive information about the differences in the two sides of the Moon's crust and mantle. If the density of crustal material on the lunar far side differs from that on the near side in a particular way, the finding will lend support to the 'two moon' theory."

But this information is just one "piece of the jigsaw puzzle." To prove a sister ever existed, other pieces are needed. NASA's Lunar Reconnaissance Orbiter has already provided key information on the Moon's surface topography. Scientists can also refer to lunar surface chemistry data and look at old seismic information from Apollo for clues.

But what's really needed, says Smith, is a sample return mission to the far side to determine the ages of rocks there.

"The smaller moon, if there was one, was about 1/3 the size of our current Moon. So upon collision it would have cooled down faster, and the rocks on the far side, where its remains are thought to have spread, would be older than the ones on the near side."

In any case, we have something new to think about. Shall we try singing "fly me to the moons" or "shine on harvest moons"?

"Don't go changing any song lyrics just yet," says Smith.

Author: Dauna Coulter | Editor: Dr. Tony Phillips
Credit: Science@NASA

For More Information:
Gravity Recovery and Interior Laboratory — GRAIL home page

Footnotes:
* Jutzi, M. & Asphaug, E. *Nature* 476, 69-72 (2011).
** By very precisely measuring the tiny gravitational perturbations of the two satellites at various locations, and then putting all those measurements together for the whole Moon, you get a gravity map. In making all their calculations, the GRAIL team will have to correct for factors such as gravitational pull of the Sun, Earth, and other planets, and general relativity, just to name a few.

Seven Supernovae Found in Single Galaxy—A First

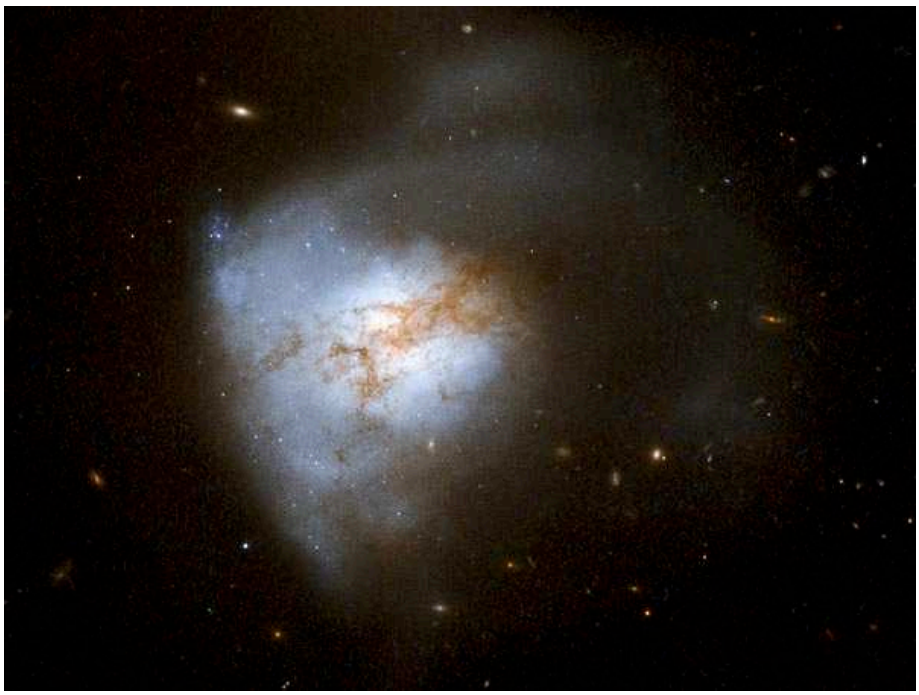
Finding marks Arp 220 as potential lab for studying galaxy evolution.

October 6, 2011:

In a galaxy 250 million light-years from Earth, astronomers have spotted a record-breaking seven super-novae all found at the same time.

"As far as we know, only three supernovae in a single galaxy were found at once so far, which is already an impressive number," said study leader Fabien Batejat, a Ph.D. student at Chalmers University of Technology in Onsala, Sweden.

"But we can confirm seven supernovae [in a single galaxy], thanks to a 17-year monitoring of the radio sources in Arp 220."



The galaxy Arp 220, where the seven supernovae were found.
Image courtesy ESA/NASA and A. Evans, UVA/NRAO/SBU

The unprecedented find may offer a unique cosmic laboratory for studying galaxy evolution.

The prodigious galaxy, known as Arp 220, is thought to have formed from the merger of two smaller galaxies and is well known to host a very intense burst of star formation, easily seen in visible wavelengths.

But the new data confirms that Arp 220 is also a very efficient factory for explosive star deaths, giving scientists a glimpse of how the earliest galaxies in the universe may have behaved.

Telescope Como Revealed Supernovae

Each of the supernovae found in Arp 220 spans less than a light-year, and at such a great distance, each radio signal covers an angle in the sky less than 0.5 milliarcseconds across, Batejat said.

"To give you an idea of how small this is, this size corresponds to what you would see if you would look into a straw of about 1,500 kilometers [932 miles] long," Batejat said.

"In order to see such small objects, we would need a telescope of 10,000 kilometers [6,214 miles] across, which is a bit less than the diameter of the Earth itself. But since we can't build such gigantic telescopes, we use interferometry to simulate them."

In astronomy, interferometry uses the combined power of an array of telescopes—rather than a single, huge telescope—to create high-resolution images that can probe deep into the universe.

Batejat's team used 57 of the largest radio telescopes on Earth, which are spread across two continents and five countries. The project included data from the European VLBI Network, the Very Long Baseline Array, the Green Bank Telescope, and the Arecibo Observatory.

The heart of Arp 220 is highly obscured by dust that can't be penetrated by visible wavelengths. But radio waves can travel through such a dense environment to reach telescopes on Earth.

Supernova Discovery Is "Something Amazing"

Ultimately the data revealed around 40 radio sources near the center of Arp 220. By watching how these sources changed over time in two different radio wavelengths, astronomers could tell that seven of the objects were stars that had exploded around the same time.

Astronomers estimate that our Milky Way galaxy sees only a single supernova every hundred years, on average, Batejat said.

But the highly active Arp 220, with its dynamic cycles of star birth and death, behaves more like how young galaxies probably did more than ten billion years ago.

"We hope this might lead to interesting discoveries on how stars formed [and died] in the early universe," Batejat said.

What's more, such relatively fresh supernovae "are rare, and they have short lives of a few decades maximum" before they settle into supernova remnants, he said. "So discovering seven such supernovae at once is something amazing."

The supernova study appears on the research website arXiv.org and has been accepted for publication in the *Astrophysical Journal*.

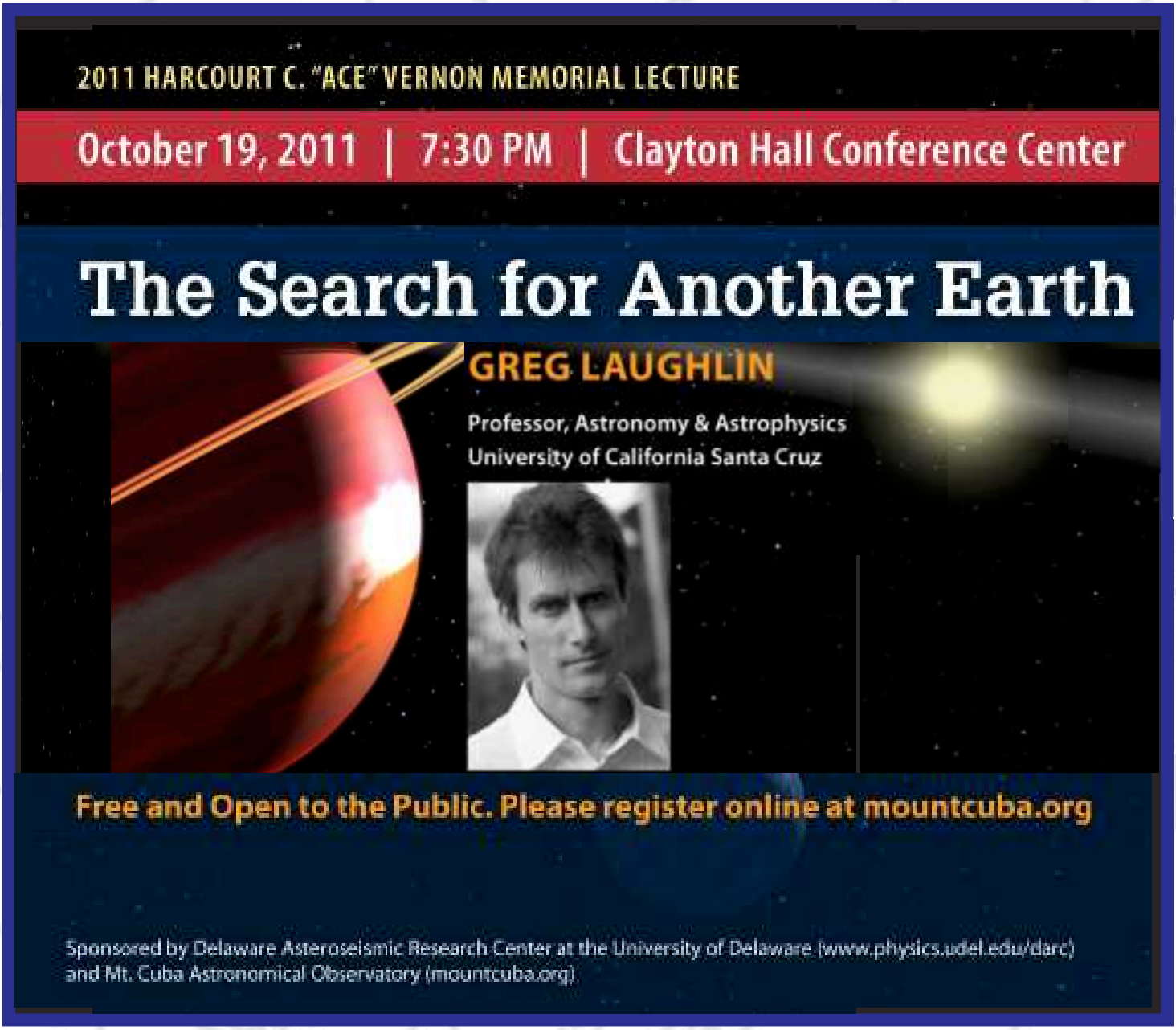
Author: Andrew Fazekas for National Geographic News

FOCUS Editor Seeks to Make the November Issue a Showcase for DAS Astro-Photographers

PLEASE Participate by Submitting Your Photos to the Editor at JRNeuberger@Gmail.com

~ Deadline for Submissions is Sunday, November 5th ~

Share with the DAS Membership What You've Been Up To!



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If you're just joining us for the first time,

THANKS, and welcome to the DAS!

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The Last Word. . .

■ *FOCUS editor Joe Neuberger*

There's Nothing I admire more in this Club of Amateur Astronomers than those who experiment with the evolving technologies related to, and place considerable resources into the exploration that is the Art of Modern Astro-Photography...

And towards that end, the November issue of FOCUS will highlight the work of this group of experimenters in our midst and feature the photos of DAS Members so involved! If this is YOU, please participate in the November issue by submitting your work for inclusion.