



# Observations

A Monthly Publication Of The  
CHESTER COUNTY ASTRONOMICAL SOCIETY

Vol. 19, No. 12 Two-Time Winner of the Astronomical League's Mabel Sterns Award # 2006 & 2009 December 2011

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## Twinkle, Twinkle, Little Stars!



Image courtesy of Hans-Free-Work

## Membership Renewals Due

12/2011	Bogusch
01/2012	Labroli
02/2012	Kalinowski & Family La Para
03/2012	End LaFrance

## Important December 2011 Dates

- 2nd** • First Quarter Moon, 4:52 a.m.
- 10th** • Full Moon, 9:36 a.m.
- 13-14th** • Geminid Meteor Shower Peaks
- 17th** • Last Quarter Moon, 7:48 p.m.
- 21st** • Winter Solstice, 12:30 a.m.
- 24th** • New Moon, 1:06 p.m.



## CCAS Upcoming Nights Out

CCAS has several "nights out" scheduled over the next few months. Members are encouraged to help out during these events any way they can. See below for more information.

- ✦ **Friday, February 24, 2012** - CCAS Monthly Observing Session, Myrick Conservancy Center, BVA (inclement weather date Saturday, February 25th).
- ✦ **Saturday, March 24, 2011** - Night Out at Hoopes Park, West Chester. The free public event is co-hosted with the West Chester Recreation Department. The observing session starts at sunset.

## Autumn/Winter 2011 Society Events

### December 2011

**7th** • PA Outdoor Lighting Council monthly meeting, Bucktown Branch of National Penn Bank, 1111 Ridge Rd, (Rt. 23 just west of Rt. 100) in South Coventry Township, PA, starting at 7:30 p.m. Meetings are open to the public. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**13th** • CCAS Holiday Party in West Chester, PA. The party is for CCAS members and their families and starts at 6:30 p.m. See page 3 for more information.

**16th** • West Chester University Planetarium Show, "Our Amazing Sun," in the Schmucker Science Building. The show starts at 7 p.m. and runs approximately one hour in length. *Late arrivals will not be permitted to enter.* Reservations are required as the planetarium has limited seating. For more information and reservations, visit the planetarium's [webpage](#).

**20th** • Open call for articles and photographs for the January 2012 edition of Observations.

**26th** • Deadline for newsletter submissions for the January 2012 edition of [Observations](#).

### January 2012

**3rd** • PA Outdoor Lighting Council monthly meeting, Bucktown Branch of National Penn Bank, 1111 Ridge Rd, (Rt. 23 just west of Rt. 100) in South Coventry Township, PA, starting at 7:30 p.m. Meetings are open to the public. For more information and directions, visit the [PA Outdoor Lighting Council](#) website.

**10th** • CCAS Monthly Meeting, Room 113, Merion Science Center (former Boucher Building), West Chester University. Meet & Greet over coffee and refreshments for members and non-members alike from 7:00 p. m. to 7:30 p.m. The meeting starts immediately after at 7:30 p.m. CCAS Member Speaker: Gaston Baudat, "Astrophotography: On-Axis Guiding." (See this month's article by Gaston for a preview of his presentation.)

**20th** • Open call for articles and photographs for the February 2012 edition of Observations.

**26th** • Deadline for newsletter submissions for the February 2012 edition of [Observations](#).

## Minutes from the November 8, 2011 CCAS Monthly Meeting

by Ann Miller, CCAS Secretary

- Submitted by Don Knabb, filling in for Ann Miller.
- Approximately 12 members were in attendance.
- DVD presentation: From the collection *Experiencing Hubble: Understanding the Greatest Images of the Universe*, we viewed *The Sagittarius Star Cloud*.
- Program – Don Knabb presented *Mount Palomar and the 200 Inch Hale Telescope*.
- Roger announced that the holiday party is scheduled for Tuesday December 13<sup>th</sup> at the Four Dogs Tavern at 6:00 p.m. in the upstairs room where the party was held last year. Members will be responsible for their dinner and drinks. The club will provide some appetizers.
- Roger also announced that the executive committee recently agreed that we will not hold BVA observing sessions during December and January due to the cold weather conditions that are normal for that time of year. (Author's note: both Chesmont and DVAA do not hold public star parties during the winter months.)

## Nicholas's Humor Corner

by Nicholas La Para



## Astrophotography: On-Axis Guiding

by Gaston Baudat

### Motivation

Are you amazed by those beautiful deep space images published in the magazines?

If so what does it take to do the same?

This is a question I asked myself many years ago at that time my equipment was just an old C8 "orange tube" from 1984 with its original fork and an equatorial wedge. By the way I still own and enjoy it pretty much!

I started astrophotography long before the digital age using a Canon F1 SLR and a collection of films with various pre-processing to boost their sensitivities. This was the time of single exposures, often more than one hour long. I do remember, and still feel the associated back pain, the tedious task of manually guiding the scope using an illuminated reticle eyepiece and an off-axis guider. From this period I took the image at right of the Halley's comet (scanned from its original print) at Ampfy Madagascar on April 15<sup>th</sup> 1986, a 10 minute exposure.

Of course today almost nobody does it this way anymore, thanks to the digital revolution. Sorting, aligning and stacking many multiple short exposures, or sub-frames, associated with digital image processing have made the task much easier and accessible to many.

Yet astrophotography is very demanding and one of the most challenging fields of photography, but the reward does worth all the effort and investment.

This is especially true for deep space imaging with medium to long focal lengths (2 meters or above). Today's scopes and optical systems are near perfection often limited by the diffraction or more likely by your local seeing. However to get nice tight round stars and resolve more details extreme tracking accuracy is required, chance is you will need some type of active guiding even with a high end mount.



Halley's Comet by Gaston Baudat

### Auto-guiding

Auto-guiding with such long focal, like for Schmidt Cassegrain (SCT) scopes, is a difficult proposition at best. Any deviation in the order of a pixel during even a few minutes exposure

(Continued on page 6)

## Annual CCAS Holiday Party

by Roger Taylor, CCAS President



Ho Ho Ho! Join us on Tuesday, December 13th, 2011, for our annual holiday party. CCAS members and their families will get together to celebrate the holiday season at the Four Dogs Tavern, starting at 6:00 P.M. This is a great opportunity for new members to meet others in the Society!

The tavern is located beside the Marshalton Inn. For the tavern's address & directions, call (610) 692-4367, or visit the official website at

<http://www.marshaltoninn.com/>.

Members are responsible for their dinner and drinks. The club will provide some appetizers.

## Equipment For Sale

by John Kovacs

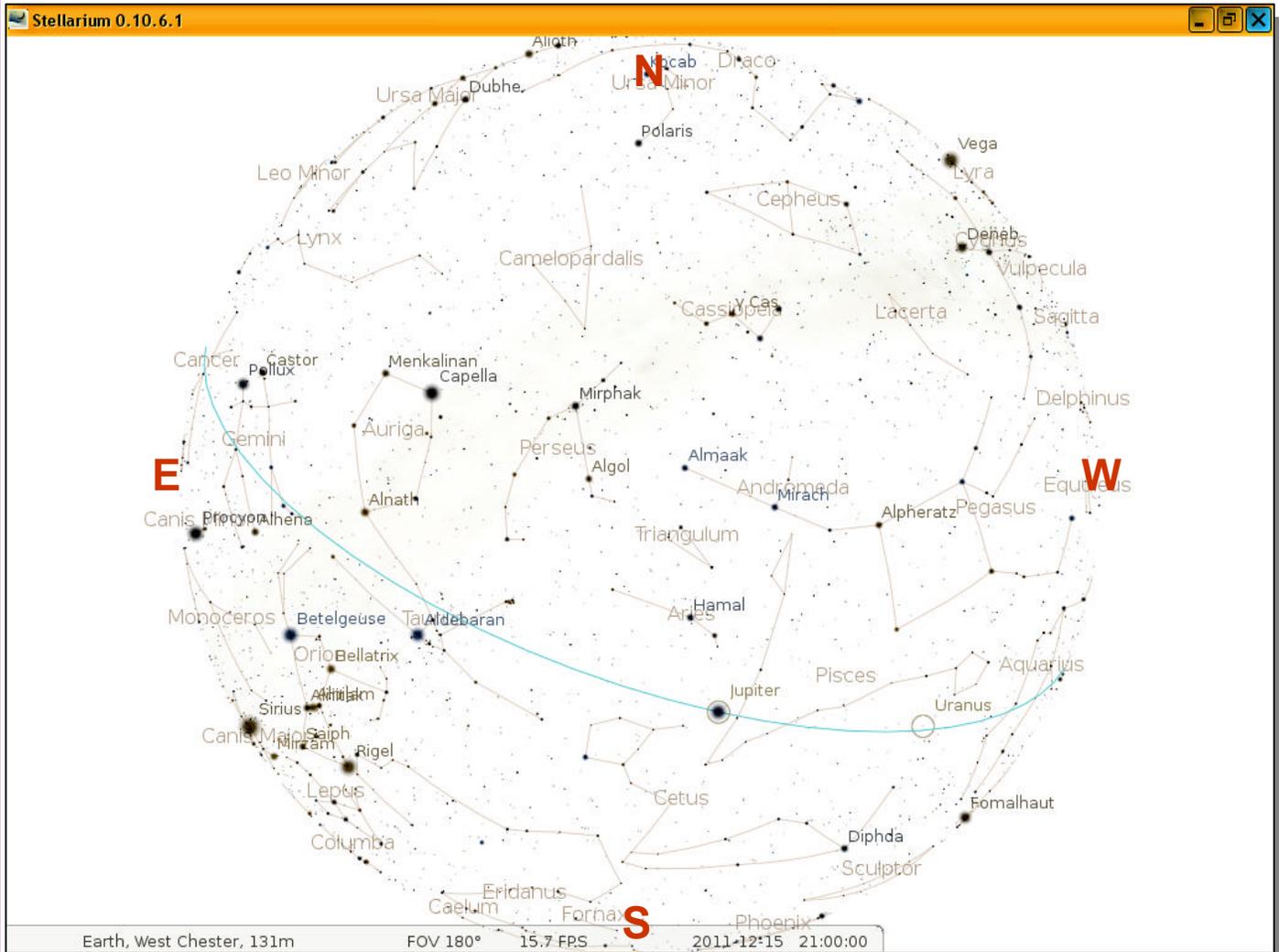
I'm selling a Meade 8" LX90 Schmidt-Cassegrain computerized "Go To" telescope with Ultra High Transmission Coating (UHTC). Also, an 8 piece set of Super Plossi eyepieces from 6.4mm to 40mm with aluminum carrying case.

Contact me at (610) 431-1057 for pricing and more details.

# The Sky Over Chester County

December 15, 2011 at 9:00 p.m. ET

Note: This screen capture is taken from Stellarium, the free planetarium software available for download at [www.stellarium.org](http://www.stellarium.org).



Date	Civil Twilight Begins	Sunrise	Sunset	Civil Twilight Ends	Length of Day
12/01/2011	6:34 a.m. EST	7:04 a.m. EST	4:36 p.m. EST	5:06 p.m. EST	9h 32m 04s
12/15/2011	6:45 a.m. EST	7:16 a.m. EST	4:36 p.m. EST	5:07 p.m. EST	9h 20m 45s
12/31/2011	6:52 a.m. EST	7:22 a.m. EST	4:46 p.m. EST	5:16 p.m. EST	9h 23m 05s

Moon Phases					
First Quarter	12/02/2011	4:52 a.m. EST	Last Quarter	12/17/2011	7:48 p.m. EST
Full Moon	12/10/2011	9:36 a.m. EST	New Moon	12/24/2011	1:06 p.m. EST

## December 2011 Observing Highlights

by Don Knabb, CCAS Treasurer & Observing Chair

December 2	First-quarter Moon, 4:52 a.m.
December 6	Jupiter is near the Moon
December 10	Full Moon, 9:36 a.m.
December 13, 14	The Geminid meteor shower peaks
December 17	Last Quarter Moon, 7:48 p.m.
December 22	Winter begins at 12:30 a.m.
December 24	New Moon, 1:06 p.m.
December 25	Look for a thin crescent Moon low in the west-southwest just after sunset
December 26	Venus shines to the left of the thin crescent Moon
December 27	The shadows of two Moons are visible on Jupiter

**The best sights this month:** Two bright planets, Jupiter in the southeast and Venus in the west, put on quite a show during December. We also have the Geminid meteor shower near mid-month, and late in the month pull out your binoculars or telescope and seek out Comet Garrard in the constellation Hercules just after darkness falls.

**Mercury:** Mercury is only visible during the dawn hours during December.

**Venus:** The “evening star” is rising away from the sunset a little more each day as December progresses. At magnitude -3.9 this planet is impossible to miss as the glow of the sunset fades.

**Mars:** Mars rises around 11 p.m. during December and is bright enough to show its orange-red color to the naked eye. The best observing time is when Mars is near the meridian in the south as dawn approaches. While observing during one November evening I pointed my flashlight toward the “bark” of a fox, and saw its eyes reflect back at me in a bright

orange-red, not unlike the glow of the planet Mars!

**Jupiter:** The king of the planets continues to shine like a beacon in the southern sky during December. Don’t miss enjoying a good long look through the eyepiece of a telescope at this wonder of the night sky. Yes, you might be a little cold, but it is worth enduring the cold for this amazing planet. A special treat is in store on December 27<sup>th</sup> when the shadows of two of Jupiter’s moons can be seen crossing the planet.

**Saturn:** The ringed planet is still an early morning object for a few months, rising several hours after midnight during December.

**Uranus and Neptune:** I enjoyed seeing both gas giants in mid-November, and during December they can still be seen during the first few hours after it becomes dark. You can find sky maps for both planets at <http://skyandtelescope.com>.

**The Moon:** Full moon is on December 10<sup>th</sup>. This is the Full Cold Moon; or the Full Long Night’s Moon. It is also sometimes called the Moon before Yule. The term Long Night’s Moon is appropriate because the midwinter night is indeed long, and because the Moon is above the horizon for a long time. The midwinter full Moon has a high trajectory across the sky because it is opposite a low Sun.

**Constellations:** Oddly enough we can still see the Summer Triangle dipping into the west just after it gets dark. But look to the east and you will see the constellations that make it worth dressing warmly and spending some time outside during the cold December nights. Bright Capella in Auriga is high in the east over the “V” of Taurus the Bull. Just behind Taurus is Orion the Hunter, the most easily recognized constellation of the winter months.

**Messier/deep sky:** With Cassiopeia high in the sky this is a great time of year to see the open cluster NGC 457, also called the Owl Cluster or the ET Cluster. I took a look at this cluster in November

*(Continued on page 15)*

## Astrophotography (Cont'd)

*(Continued from page 3)*

will lead to distorted shape of the bright stars, we are talking about something as little as a half arc-second or so here. Finding a bright enough guide star is also a key choice in the process, and it could become a challenging and time consuming task for some targets, for which there is not so many of those nearby.

Basically there are several traditional options for guiding:

**Guide-scope:** A guide camera is connected to a second scope attached to the principal one. The main advantage here is the access of a wide field of view (fov) since most of the time the guide-scope has a shorter focal length and it can be partially oriented for itself. Therefore you are almost guaranteed to find a suitable guide star.

The fundamental problem however is differential flexure. The mechanical connection between both scopes must be very rigid otherwise you will experience elongated stars, and it does not take much. I have to say that after many years of trail and error I gave up on this one, it just does not work for my set-up, a C11 at f/10, or f/6.3.

I am truly in admiration before the few who were able to make it work. In my experience I could not get consistent results over time and across targets, ever.

Nevertheless I think this remains

a good proposition for shorter focal lengths, wider fov imaging tasks, assuming you can afford the guide scope extra load.

**Off-axis guider (OAG):** Here a pick-off prism is used to access the guide star light. The prism is placed in the vicinity of the imager, yet off-axis such it does not cast any shadow to your image. The result being the guider fov has a donut like shape, which can be quite narrow. This is the old traditional way to guide, as we did before with the film cameras and illuminated eyepieces. Since this uses the same scope and optical train there is no differential flexure so to speak, and motions of the primary SCT mirror can be compensated for.

The main issue with an OAG being the limited fov offered to find a suitable guide star and the high f-number associated with the small prism. This translates in more time to find one, and inevitable compromises.

**Self-guided camera:** Santa Barbara Instrument Group (SBIG) offers self-guided cameras. They have patents on this technology.

SBIG cameras use a second CCD sensor located near the main one, yet on the same focal plane such both sensors, the imager and the guider ones, reach focus in same time. This is pretty much like an OAG, with a better f number in a single body solution. I own a couple of

those, a ST2000XCM, and a ST4000XCM, they are great products. However you still have to deal with an even reduced guider fov while searching for a guide star, always a source of frustration.

**A new approach (ONAG):** Besides having a passion for astronomy I am also an engineer and I have decided years ago to follow and test yet another approach to solve the problem.

The goal was not to compromise with the image quality, yet makes the auto-guiding task and especially the quest of a suitable guide star, much easier and user friendly.

The idea uses the near infra-red (NIR) starlight for guiding. This leads to an on-axis guider (ONAG) concept, I made few, maybe more than few, prototypes before I could settle for the right solution.

Its basic principle is simple: the light from the scope is split in two components by a dichroic beam splitter ("cold" mirror) set at 45 degrees. The visible range from 370nm to 750nm is reflected toward the imager located at 90 degrees from the scope optical axis. The NIR, above 750nm, goes through the guider. This design avoids any optical aberration for the imager since it uses the reflected light, pretty much like with a star diagonal.

*(Continued on page 7)*

## Astrophotography (Cont'd)

(Continued from page 6)

The ONAG has also an integrated X/Y stage associated with a compressing ring focuser at which end the guider is attached. This feature provides an easy and fast way to find a guide star. The accessible guider fov with a 2 meter scope is more than 1.3 arc degree. As a matter of fact the ONAG allows for guiding on and off-axis as well.

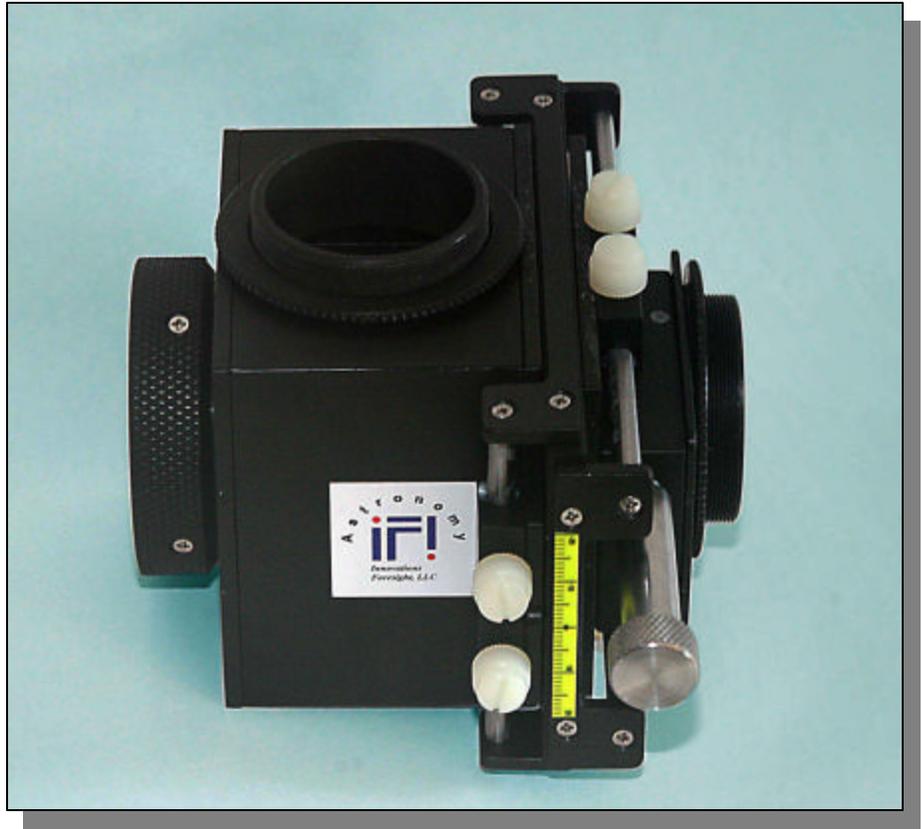
Unfiltered monochrome CCD/CMOS camera are sensible in infra-red, this is why you need a UV-NIR blocking filter when imaging.

Among candidates there is the popular ORION starshoot auto-guider, or the Lodestar from Starlight Express, but also the Meade monochrome DSI, to name few.

More than 76% of the main sequence stars have surface temperatures lower than 3700K (red) radiating large amount of infrared energy. Therefore they are good candidates for NIR guiding. For more details have a look on the right at the ONAG transfer function plotted from 370nm to 1100nm.

I was so please with the convenience and ONAG performance then I eventually decided to make a product available and to sale it to the astrophotography community, why not?

Therefore my friend Tom and I have started a local company

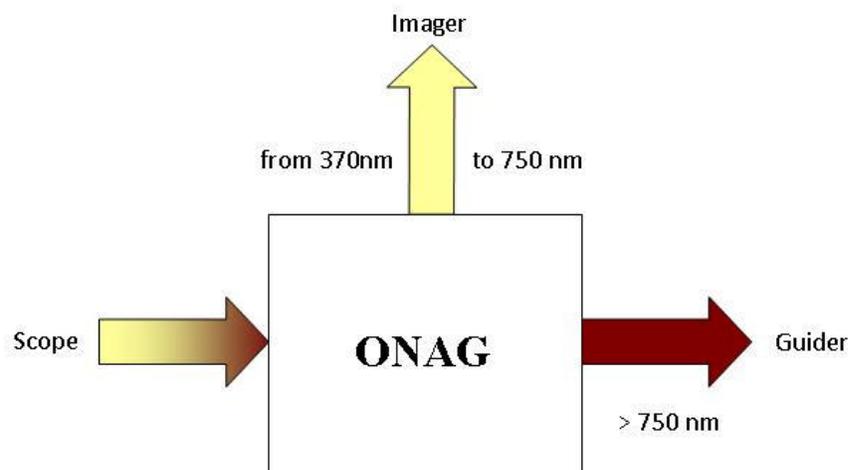


Close-up of the ONAG Unit

near Philadelphia, Innovations Foresight, or IF in short. Tom already owns and runs a well established and successful family company active in the oph-

thalmic and eye care markets. He brings his business experience on the table.

(Continued on page 8)



ONAG Transfer Function Plotted from 370nm to 1100nm

## Astrophotography (Cont'd)

(Continued from page 7)

However for me this is a new uncharted territory and I have to say this is even a much greater adventure and experience than the technical challenges I faced while designing the ONAG.

Our website [www.innovationsforesight.com](http://www.innovationsforesight.com) went live few months ago and we have started to sell our first products. The ONAG has already been chosen by [Sky and Telescope](#) magazine for their hot products of the year 2012, a good beginning I guess.

The ONAG image (See previous page) shows the unit, with on the left the scope port (here with a SCT adapter), on the right the guider port with its X/Y stage and focuser, and on top the imager port using a standard T thread connection.

As I wrote before, I am still using my C8 "orange tube" from 1984, but with 21<sup>st</sup> century gears now. I have attached an ONAG at the C8 visual back associated with a SBIG ST2000XCM imager and ORION Starshoot auto-guider (See image above).

Frank Colosimo has made very nice images using a Hyperion 12" scope and the ONAG. I could not resist sharing with you his whirlpool galaxy (M51) image he took with an Apogee 8300 imager from his observatory at New Ringgold PA (Luminance = 24 x 10 minutes, Red = 10 x 8 minutes, Green = 8



*ONAG attached to C8 w/a SBIG ST2000XCM imager & ORION starshoot auto-guider.*

x 6 minutes, Blue = 11 x 6 minutes).

### **Guiding at prime focus: Some comments**

Although the ONAG solves differential flexure problems while

featuring a wide field of view to locate a suitable guide star, the tracking software is also a key element in the all process of auto-guiding. It is paramount to understand its basic operation and choose the right software settings to achieve good image quality.

Guiding with the ONAG, or an OAG for that matter, means using the same focal length than imaging, and unlike guide scopes, this translates most of the time to a small fov, especially for long focal scopes. Meaning for each guide star frame we may expect having more seeing effect and other short term perturbation contributions. Therefore most of the time it is recommended to bin the guider image by 2x or 3x, which will average nearby pixels,

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*Image credit: M51 by Frank Colosimo.*

## Astrophotography (Cont'd)

(Continued from page 8)

unless the guider pixel size is much greater than the imager one, 4x or above. This can be seen as a low pass filter operation.

Yet the most important single parameter of any tracking software is the aggressiveness, which is the level of correction the algorithm will apply to the mount after each new guide star frame. In control system theory (close loop systems) this is known as the feedback gain  $G_f$ .

If it is too low the correction is not enough to compensate for the mount drift. In the other hand if  $G_f$  is too large the correction will become unstable and erratic. The later is the most problematic and common issue in tracking leading to elongated star in the images even with near perfection optics and no differential flexure.

From the above considerations it is recommend you start with a

low aggressiveness (1/2 or 50%, or less) to begin with, and increase it slowly only if you have to. For instance for Maxim DL this means 5, in PHD guiding this would translate to 50, for both cases it is half way to full scale correction (1, or 100%), or even less.

A common figure of merit for the tracking error quality evaluation is the RMS (root mean square) error value over a time window. However even with a low error value you still may experience elongated stars.

Very often bright stars are much brighter than the target under consideration for your imaging session, such as galaxies, or nebulas.

During several minutes of exposure a short extreme erratic tracking correction during a second or so way above the RMS value will be enough to distort the bright stars. Those outliers

are more likely if  $G_f$  is large. They may also come from some mechanical problems, such as over compensated backlash by the mount software.

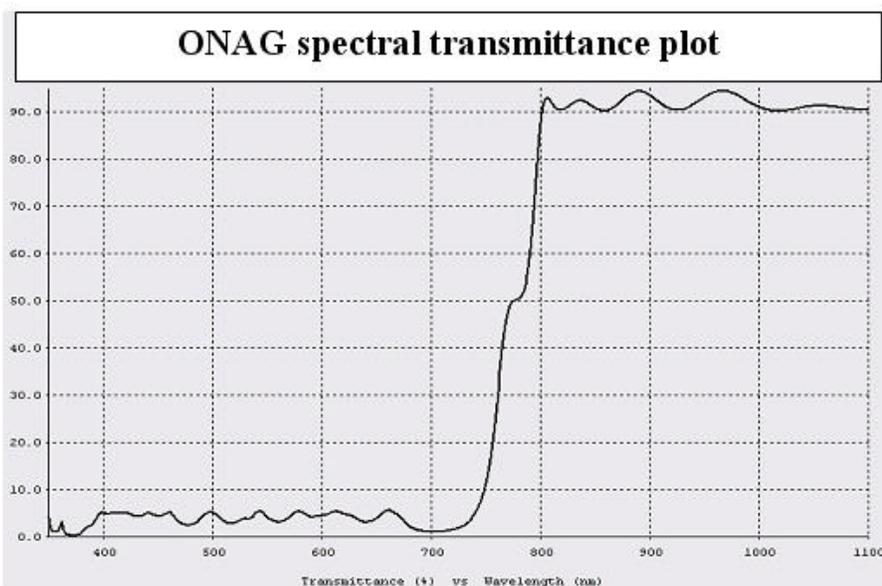
If your mount is equipped with a periodic error correction (PEC) you should use it. It is also recommend to unbalancing just a little your mount in AR, making it "East heavy" to avoid any backlash on the RA axis. Be aware this must be done differently for both meridians on equatorial mounts.

Backlash compensation done by most mount software may result, if too large, in bumping the mount, especially on DEC axis (equatorial mounts) for which the drive motor can reversed it direction. Yet too little backlash compensation leads to lag in the correction and erratic tracking. If you have difficulties to solve this DEC problem you can use a simple technique:

Just disturb a little bit the mount polar alignment, this will result in a single direction DEC drift, the DEC drive motor does not need to reverse anymore avoiding backlash issues.

Most software allows disabling either correction direction in AR and DEC, use this feature when available. You need just a very little polar alignment error to accomplish this trick so no fear of field rotation.

Clear skies!



## A Cosmic SUV Blasts Off for Mars

by Jeffrey Kluger, *Time Magazine*

Nobody is going to call the Mars Curiosity rover "plucky." Back in 1997, *plucky* got used a lot, when NASA's first Mars rover, the microwave-oven-sized Sojourner, landed on the Red Planet and began toddling about. Spirit and Opportunity, a pair of golf-cart-sized Mars cars, followed in 2004 — and *scrappy* was the preferred adjective for them. On Saturday morning, the space agency's third-generation, SUV-sized Curiosity rover blasted off from Cape Canaveral, Fla., commencing a 255-day journey that should have it on the surface of Mars on Aug. 6, 2012. Prepare to hear the word *rugged* a lot.

The Curiosity rover is a bruiser of a vehicle by almost any measure — 9ft. 10 in. (3 m) long, and 7 ft. (2.1 m) tall, with a weight of 1,982 lb (899 kg). It's stuffed with instruments to study the chemistry, geology and possible biology of Mars, and will do that work with the aid of a robotic arm equipped with drills and scoops, and multiple cameras — including one that will operate at human-eye level, giving the images it sends back a familiar frame of reference that will make scales and perspectives easier to understand.

The ship cost a cool \$2.5 billion to design, build and launch, and that price tag is one reason NASA will be especially anxious until it arrives safely next summer. For all the remarkable things Curiosity should do when



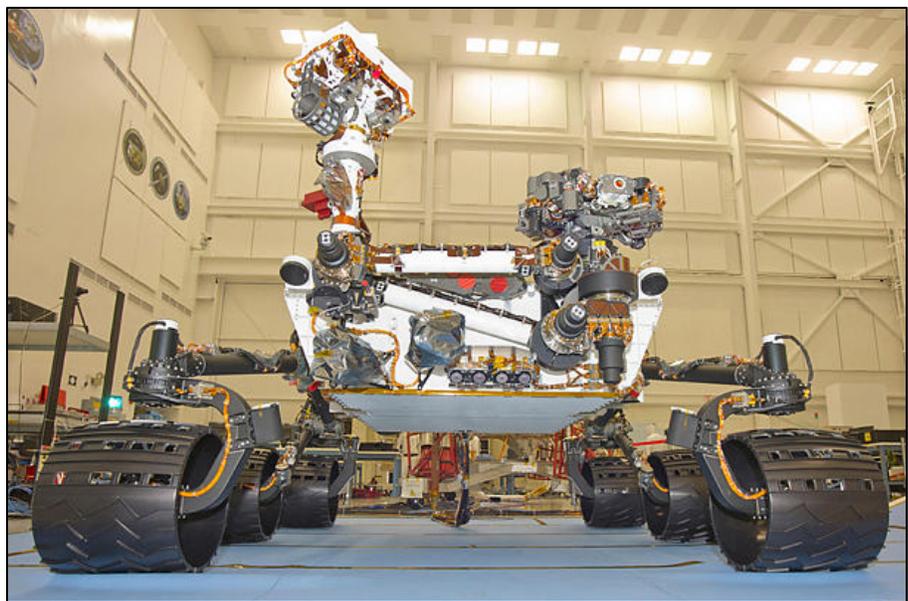
A rocket carrying NASA's Mars-bound Curiosity rover lifts off from Cape Canaveral, Fla., on Nov. 26, 2011. Photo courtesy Terry Renna / AP.

it does touch down, it's the method NASA has developed to get it there that is especially ingenious.

Like all Mars missions, Curiosity blasted off in a precise window in which the ever changing

distance between Mars and Earth affords it the quickest trip possible. At the moment of launch, the blue planet and the red planet were 127 million miles (205 million km) apart, which is less than a third of the

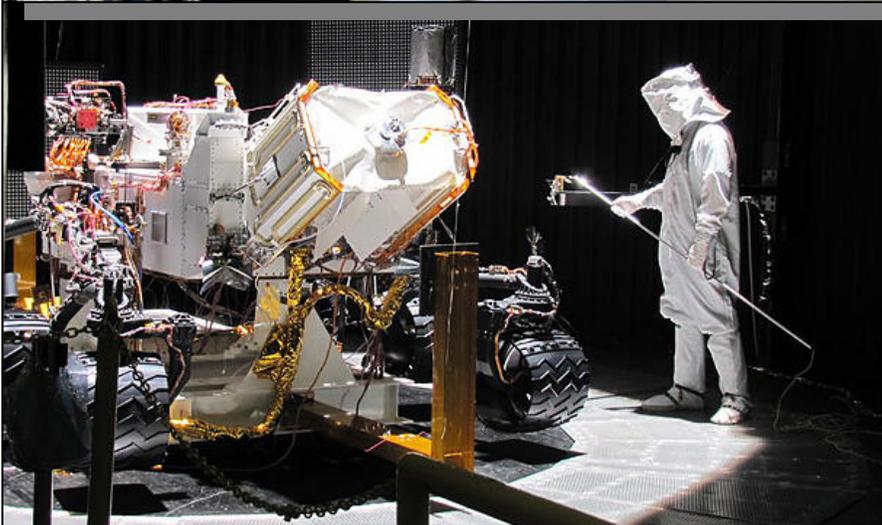
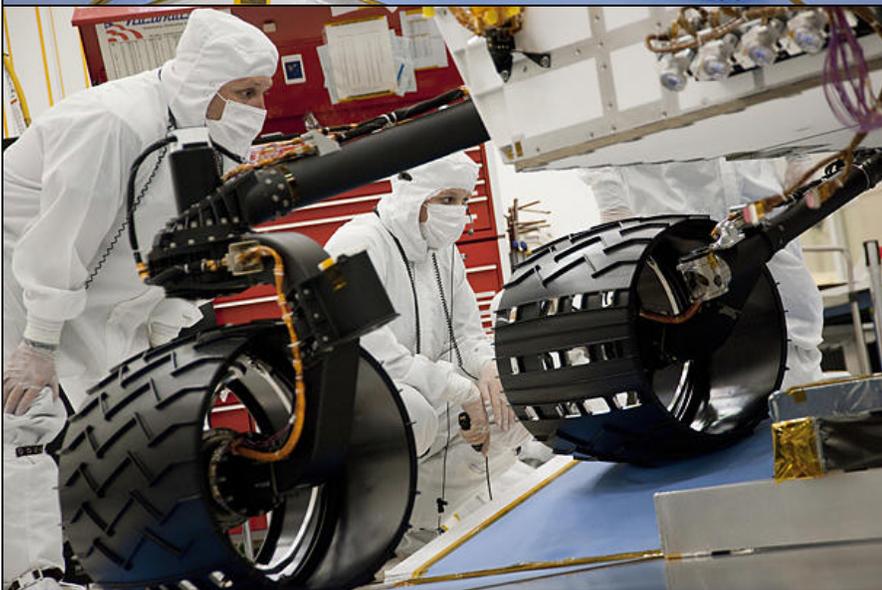
*(Continued on page 11)*



Researchers hope to use the tools on the rover to study whether the landing region has had environmental conditions favorable for supporting microbial life.

Photo courtesy NASA/JPL-CALTECH

## Curiosity (Cont'd)



Photos courtesy of NASA/JPL/CAL-TECH. These photos were taken during the testing phase at the Spacecraft Assembly Facility at NASA's Jet Propulsion Laboratory, in Pasadena, California.

*(Continued from page 10)*

maximum distance they reach during their differing orbits around the sun. That's still a lot of cosmic real estate to cover though, enough that when the rover does land, any signal beamed from Mars to Earth or Earth to Mars — traveling at light speed — will take nearly 14 minutes to arrive.

For the previous three rovers, the business of actually landing on the surface — remarkable as it was — had a certain Ringling Brothers quality to it. Sealed inside a descent shell, the Mars cars would plunge through the atmosphere, aided by braking rockets, parachutes and simple air resistance until their rate of descent had slowed sufficiently, at which point they would simply fall the rest of the way, swaddled in a cocoon of inflatable air bags. The rovers didn't so much touch down as bounce down, bounding and rolling across the surface until they came to a stop and the bags could be shed.

There will be no such ignominious arrival for Curiosity. Entering Mars's tenuous atmosphere about 81 miles (131 km) above the ground, it will free-fall until it's about 7 miles (11 km) up and descending at 900 m.p.h. (1,448 km/h). At that point, parachutes will be deployed, and shortly after that, braking thrusters will fire. Finally, about 66 ft. (20 m) up, long nylon cables will spool out of the hovering descent shell,

*(Continued on page 17)*

## Part of Our Community

by Ken Lehr, West Goshen Township Newsletter Editor

*[This article appeared in the Fall 2011 West Goshen Township Newsletter. It has been reprinted in its entirety.]*

Astronomy is one of the oldest fields of scientific study. Bone carvings dated from 30,000 BC indicate an attempt by early humans to keep track of lunar cycles. Ancient societies in Mesopotamia, Egypt, Mesoamerica, China, and England expended great resources to build large structures dedicated to the science. For much of human history, knowledge of astronomy was crucial for determining time, for navigation, and for religious observances.

Today, people still look to the stars to learn more about the universe and our place in it. Since 1993, the Chester County Astronomical Society has provided county residents with a network to share an enthusiasm for study of the stars and planets, learn more about the latest advances in the ancient science, and to gain hands-on experience with astronomical observation.

Founding member Edwin Lurcott says the Society was started by a half dozen amateur astronomy enthusiasts who wanted to get together to share their avocation. Today, the group claims over sixty members who meet on the second Tuesday of each month at the Merion Science Center at West Chester University, hold monthly observation sessions at the Myrick Conser-

vancy Center of the Brandywine Valley Association, and attend special events such as star parties. Membership meetings usually include a speaker and a video presentation of recent advances in astronomy. Membership meetings and monthly observations are open to the public.

According to Lurcott, the Chester County Astronomical Society offers programs to scout troops, local schools, and other civic groups interested in learning more about astronomy. The Society has partnered with the West Goshen Township Park and Recreation Department to offer Township residents guided viewings of a lunar eclipse and the planets Jupiter and Saturn.

*“Our focus is outreach and education,” says Dave Hockenberry, the Society’s Program Chair. “That’s the hallmark of our club.”*

Since 2010, the Chester County Astronomical Society has partnered with the West Chester University Geology and Astronomy Department to bring Project ASTRO to local schools.

Project ASTRO is a National Program that partners astronomers and teachers to bring hands-on learning about astronomy to the classroom. According to Chester County Astronomical Society Education Chair Kathy Buczynski, volunteer astronomers are trained in activities that meet the Pennsylvania state sci-

ence standards and visit each participating classroom numerous times throughout the school year. In the West Chester Area School District, Pennwood Elementary School currently partners with the Chester County Astronomical Society in Project ASTRO.

“Astronomy clubs like this are extremely important,” says Hockenberry. “Professional astronomers are too weighted down with research for public outreach. There are far more astronomy clubs than professional astronomers.”

Hockenberry emphasizes the significance of the Society’s outreach efforts: “It’s something that’s not only fun, but really important for society.”

The next meeting of the Chester County Astronomical Society will be at 7:30 PM on Tuesday, November 8, 2011 in Room 113 of the Merion Science Center at West Chester University. Observations are scheduled for Friday, November 25th and Friday, December 23rd at the Myrick Conservancy Center of the Brandywine Valley Association.

For more information about the Chester County Astronomical Society, visit [www.ccas.us](http://www.ccas.us).

*“Part of Our Community” highlights local businesses, organizations, and people who make a difference in the community. To submit ideas for future columns, please email Newsletter Editor Ken Lehr at [klehr@westgoshen.org](mailto:klehr@westgoshen.org).*

## January 2012 Speaker & General Business

by Dave Hockenberry, CCAS Program Chair

Our first meeting for the new year is scheduled for January 10, 2012, starting at 7:30 p.m. The meeting will be held in Room 113, Merion Science Center (former Boucher Building), West Chester University. CCAS member Gaston Baudat will present "Astrophotography: On-Axis Guiding System." For a preview of his presentation, check out his article in this month's newsletter on page 3.

We've made several noteworthy changes to our schedule and activities: First, we have tabled the videos presented immediately before the monthly meeting. Instead, we will have a half-hour meet & greet session for new members and the general public to socialize over coffee and other refreshments.

Secondly, because of the adverse weather conditions, we will no longer hold observing sessions in the months of December and January. Too often we end of having to cancel them.

Please note that inclement weather or changes in speakers' schedules may affect the program. In the event there is a change, CCAS members will be notified via e-mail with as much advance notice as possible.

We are looking for presenters for the rest of the 2012 season. If you are interested in presenting, please contact me at [programs@ccas.us](mailto:programs@ccas.us).

## Photos From the Fall "Picnic" at Marshalton Inn

by John Hepler



## Through the Eyepiece: The Blue Snowball Nebula, NGC 7662

by Don Knabb, CCAS Treasurer & Observing Chair

With winter approaching it seems appropriate to write about The Blue Snowball Nebula. Also known as NGC 7662, the Blue Snowball Nebula or Caldwell 22 is a planetary nebula located in the constellation Andromeda.

NGC 7662 is a popular planetary nebula for casual observers. A small telescope will reveal a star-like object with slight nebulosity. A 6" telescope with a magnification around 100x will reveal a slightly bluish disk, while telescopes with a primary mirror at least 16" in diameter may reveal slight color and brightness variations in the interior.

The image below was taken by Josef Pöpsel and Dr. Stefan Binnewies of the Capella Observatory with the telescope "Ganymed". The Capella Observatory is located on Mount Skinakas on the island of Crete. You can view the spectacular photos from the Capella Observatory at <http://www.capella-observatory.com/> The telescope "Ganymed" has guest status at the Skinakas Observatory, which is the observatory of the Astronomical Institute of the University of Crete. "Ganymed" is a 60cm-Hypergraph (24"), a Cassegrain telescope, which has an effective focal length of 4800 mm (f/8).

I recently observed the Blue Snowball Nebula with a 12 inch Dobsonian telescope. This is a small nebula, no more than half the size of the famous Ring Neb-

ula in Lyra. I could barely perceive a hint of blue color in the nebula, and it is a relatively bright object, but I still found it best observed with averted vision. I could clearly see why this nebula was nicknamed a snowball.

A planetary nebula is an emission nebula consisting of an expanding glowing shell of ionized gas ejected by stars late in their life. This name originated with their first discovery in the 18th century because of their similarity in appearance to giant planets when viewed through small optical telescopes, and is otherwise unrelated to the planets of the solar system.

Whereas diffuse nebulae give birth to stars in the gravitational condensation of gas clouds in the interstellar space, planetary nebulae, such as the Blue Snowball Nebula, signal instead the death of stars. Rather than disperse widely across many light-years, the gases of planetary nebula are concentrated around the dying star that throws them off, with a more tightly-packed, ball-like appearance.

NGC 7662 is often referred to as the Blue Snowball Nebula because astronomers are often whimsical, if not lacking in creativity. The Blue Snowball is a very bright (comparatively) magnitude 9 and is well-placed

*(Continued on page 15)*



*Image by Josef Pöpsel and Dr. Stefan Binnewies of the Capella Observatory, taken with the telescope "Ganymed". Used with permission.*

## Through the Eyepiece (cont'd)

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for viewing and imaging in the Northern hemisphere in the fall and winter months. It makes an excellent visual target for small scopes, since this small nebula measures just 32" x 28", so its small size and high actual magnitude couple to create a very high apparent magnitude, which is a very good measure of how bright an object will appear to a visual observer.

One source I found made this comment in regards to visual observation vs. imaging of deep sky objects: "Targets of this size are a mere speck to astrophotographers who sing praise to their tiny apertures with short focal

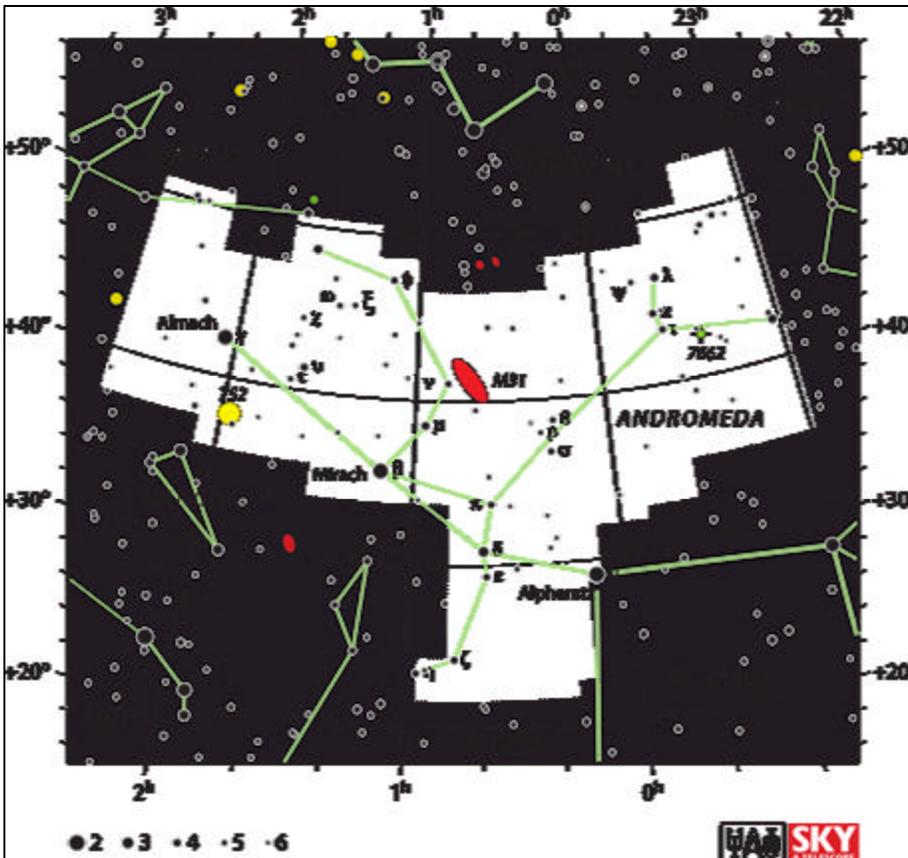
lengths and "starscape" like fields of view. To a large aperture scope, it's a chance for a little redemption."

The Blue Snowball Nebula is not hard to find using the star chart of the constellation Andromeda. It is about half way between the Great Square of Pegasus and Cassiopeia.

So when you are looking through the eyepiece of a telescope, seek out the first snowball of the winter, The Blue Snowball Nebula!

Information sources:

[http://en.wikipedia.org/wiki/NGC\\_7662](http://en.wikipedia.org/wiki/NGC_7662)  
[http://en.wikipedia.org/wiki/Planetary\\_nebulae](http://en.wikipedia.org/wiki/Planetary_nebulae)  
<http://exosky.net/exosky/?p=592>  
<http://www.calvin.edu/academic/phys/observatory/images/Astr111.Fall2009/Morse.html>  
<http://apod.nasa.gov/apod/ap961121.html>  
<http://www.capella-observatory.com/>



Sky map credit: Sky & Telescope

## Observing Highlights (cont'd)

(Continued from page 5)

and it really does look like ET the movie alien with bright eyes and his arms outstretched.

The Andromeda Galaxy is at ideal viewing position early in the evening so aim your binoculars or telescope at our nearest galaxy neighbor. Keep in mind that the fuzzy spot you are seeing is 2.5 million light years away and contains a trillion stars!

**Comets:** Comet Garrard should reach 6<sup>th</sup> or 7<sup>th</sup> magnitude during December, so look to the northwest after mid-month at the constellation Hercules just above the horizon after darkness falls. There is a finder chart at the Sky and Telescope website, <http://skyandtelescope.com>.

**Meteor showers:** The Geminid meteor peaks on the night of December 13/14, but the show will be hampered by a waning gibbous Moon. Still, take a look early and you might catch a few "Earth-grazers".

You can also take a look for a lesser known event, the Ursid meteor shower, on the night of December 22/23. The radiant for this shower is near Ursa Minor, so it never goes below the horizon. This shower normally produces only 10 meteors per hour, but it has spiked to 5 times that rate, so it is certainly worth a look.

## Re-thinking an Alien World: The Strange Case of 55 Cancri e

Forty light years from Earth, a rocky world named “55 Cancri e” circles perilously close to a stellar inferno. Completing one orbit in only 18 hours, the alien planet is 26 times closer to its parent star than Mercury is to the Sun. If Earth were in the same position, the soil beneath our feet would heat up to about 3200 F. Researchers have long thought that 55 Cancri e must be a wasteland of parched rock.

Now they’re thinking again. New observations by NASA’s Spitzer Space Telescope suggest that 55 Cancri e may be wetter and weirder than anyone imagined.

Spitzer recently measured the extraordinarily small amount of light 55 Cancri e blocks when it crosses in front of its star. These transits occur every 18 hours, giving researchers repeated op-



portunities to gather the data they need to estimate the width, volume and density of the planet.

According to the new observations, 55 Cancri e has a mass 7.8 times and a radius just over twice that of Earth. Those properties place 55 Cancri e in the “super-Earth” class of exoplanets, a few dozen of which have been found. Only a handful of known super-Earths, however, cross the face of their stars as viewed from our vantage point in the cosmos, so 55 Cancri e is better understood than most.

When 55 Cancri e was discovered in 2004, initial estimates of its size and mass were consistent with a dense planet of solid rock.

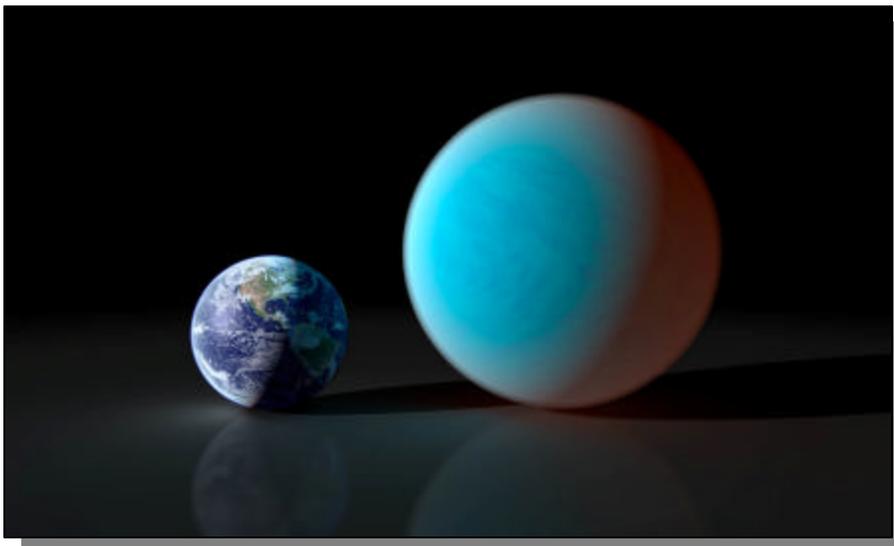
Spitzer data suggest otherwise: About a fifth of the planet’s mass must be made of light elements and compounds—including water. Given the intense heat and high pressure these materials likely experience, researchers think the compounds likely exist in a “supercritical” fluid state.

A supercritical fluid is a high-pressure, high-temperature state of matter best described as a liquid-like gas, and a marvelous solvent. Water becomes supercritical in some steam turbines—and it tends to dissolve the tips of the turbine blades. Supercritical carbon dioxide is used to remove caffeine from coffee beans, and sometimes to dry-clean clothes. Liquid-fueled rocket propellant is also supercritical when it emerges from the tail of a spaceship.

On 55 Cancri e, this stuff may be literally oozing—or is it steaming?—out of the rocks.

With supercritical solvents rising from the planet’s surface, a star of terrifying proportions filling much of the daytime sky, and whole years rushing past in a matter of hours, 55 Cancri e teaches a valuable lesson: Just because a planet is similar in size to Earth does not mean the

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*Artist’s rendering compares the size Earth with the rocky “super-Earth” 55 Cancri e. Its year is only about 18 hours long!*

## Space Place (Cont'd)

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planet is like Earth. It's something to *re*-think about.

Get a kid thinking about extrasolar planets by pointing him or her to "Lucy's Planet Hunt," a story in rhyme about a girl who wanted nothing more than to look for Earth-like planets when she grew up. Go to <http://spaceplace.nasa.gov/story-lucy>.

*The original research reported in this story has been accepted for publication in Astronomy and Astrophysics. The lead author is Brice-Olivier Demory, a post-doctoral associate in Professor Sara Seager's group at MIT.*

## Curiosity (Cont'd)

(Continued from page 11)

lowering the rover gently to the ground. As soon as this so-called sky crane has done its work, the descent shell will kick its engines once more, tossing itself out of the way and crash-landing at a safe distance.

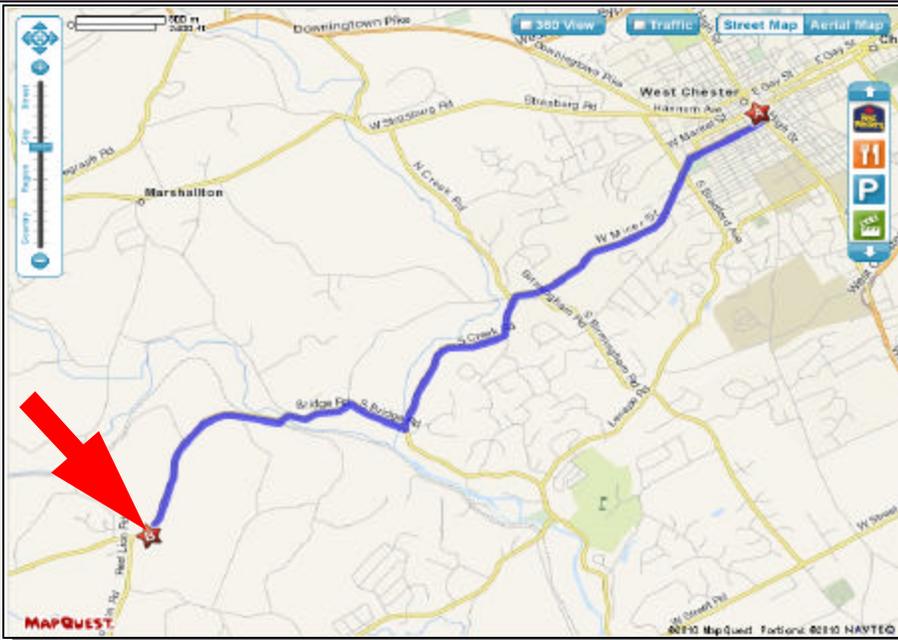
"Basically, this thing is a Transformer," says launch director Omar Baez, a veteran of the previous three rover missions. "It starts as a pancake, it opens up and you've got six wheels, you've got mass, you've got all kinds of protuberances coming out of it, and it's all got to work right the first time."

Assuming it does, Curiosity will get straight to business (the local

Mars time at the moment of arrival, according to the prime mission timeline, will be equivalent of 3 p.m., so there'll be no excuse for not putting in a full day). The rover's landing site is the Gale Crater, along the equator in the eastern Martian hemisphere. The crater is a massive formation — about the size of Rhode Island and Connecticut combined — and assuming Mars was once as wet as scientists are all but certain it was, much of that square mileage would have been underwater, making it a good place to look for the residue of life. Conditions are a little less hospitable to biology now, of course, with the temperature never getting

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## CCAS Directions



### Brandywine Valley Association

1760 Unionville Wawaset Rd  
West Chester, PA 19382  
(610) 793-1090

<http://brandywinewatershed.org/>

BVA was founded in 1945 and is committed to promoting and protecting the natural resources of the Brandywine Valley through educational programs and demonstrations for all ages.

### Brandywine Valley Association

The monthly observing sessions (held year-round) are held at the Myrick Conservation Center of the Brandywine Valley Association.

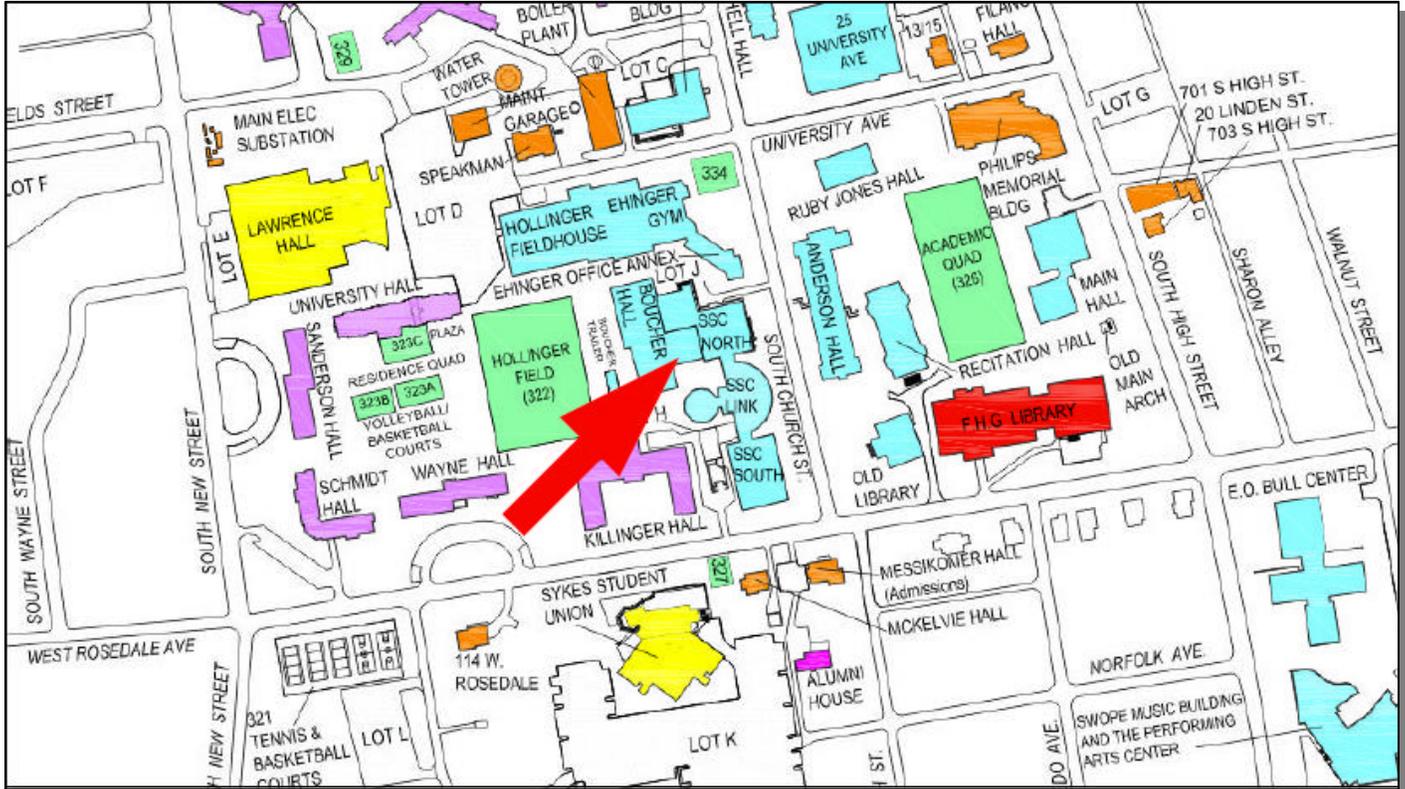
To get to the Myrick Conservation Center from West Chester, go south on High Street in West Chester past the Courthouse. At the next traffic light, turn right on Miner Street, which is also PA Rt. 842. Follow Rt. 842 for about 6 miles. To get to the observing site at the BVA property, turn left off Route 842 into the parking lot by the office: look for the signs to the office along Route 842. From that parking lot, go left through the gate and drive up the farm lane about 800 feet to the top of the hill. The observing area is on the right.

If you arrive after dark, *please turn off your headlights and just use parking lights* as you come up the hill (so you don't ruin other observers' night vision).

## CCAS Directions

### West Chester University Campus

The monthly meetings (September through May) are held in Room 113 in Merion Science Center (formerly the Boucher Building), attached to the Schmucker Science Center. The Schmucker Science Center is located at the corner of S. Church St & W. Rosedale Ave. Parking is generally available across Rosedale in the Sykes Student Union parking lot (Lot K).



### Curiosity (Cont'd)

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above freezing, and often plunging as low as  $-130^{\circ}\text{F}$  ( $-90^{\circ}\text{C}$ ).

If all goes well, Curiosity will survive those punishing conditions for one Martian year (98 weeks), but since previous rovers have dramatically exceeded their minimum life spans, there is reason to believe Curiosity will too. "I bet there's going to be some knockout science and some great pictures and a great experience," says Baez. If the rover's little brothers are any indication, that's a bet worth taking.

### CCAS Membership Information and Society Financials

#### Treasurer's Report

by Don Knabb

#### Nov 2011 Financial Summary

Beginning Balance	\$1,402
Deposits	\$60
Disbursements	\$40
Ending Balance	\$1,422

#### New Member Welcome!

Welcome new CCAS members Michael Gill and Tim Sterrett from West Chester, PA, and Stephen Phipps from Media, PA.

We're glad you decided to join us under the stars! Clear Skies to you!

#### Membership Renewals

You can renew your CCAS membership by writing a check payable to "Chester County Astronomical Society" and sending it to our Treasurer:

**Don Knabb**  
**988 Meadowview Lane**  
**West Chester PA 19382**

The current dues amounts are listed in the *CCAS Information Directory*. Consult the table of contents for the directory's page number in this month's edition of the newsletter.

## Join the Fight for Dark Skies!

You can help fight light pollution, conserve energy, and save the night sky for everyone to use and enjoy. Join the nonprofit International Dark-Sky Association (IDA) today. Individual memberships start at \$30.00 for one year. Send to:

**International Dark-Sky Association**  
3225 North First Avenue  
Tucson, AZ 85719

Phone: 520-293-3198  
Fax: 520-293-3192  
E-mail: [ida@darksky.org](mailto:ida@darksky.org)

For more information, including links to helpful information sheets, visit the IDA web site at:

<http://www.darksky.org>

Note that our CCAS Webmaster John Hepler has a link to the IDA home page set up on our Society's home page at <http://www.ccas.us>.

## Dark-Sky Website for PA

The Pennsylvania Outdoor Lighting Council has lots of good information on safe, efficient outdoor security lights at their web site:

<http://www.POLCouncil.org>

## Find out about Lyme Disease!

Anyone who spends much time outdoors, whether you're stargazing, or gardening, or whatever, needs to know about Lyme Disease and how to prevent it. You can learn about it at:

<http://www.LymePA.org>

Take the time to learn about this health threat and how to protect yourself and your family. It is truly "time well spent"!

## CCAS Event Information

We've set up a special phone number you can dial to find out if our monthly observing session and other scheduled events will be held or postponed. Call **610-436-0829** after 5 PM ET to hear a recording to find out the latest news.

## Good Outdoor Lighting Websites

One of the biggest problems we face in trying to reduce light pollution from poorly designed light fixtures is easy access to good ones. When you convince someone, a neighbor or even yourself, to replace bad fixtures, where do you go for good lighting fixtures? Check out these sites and pass this information on to others. Help reclaim the stars! And save energy at the same time!



Light pollution from poor quality outdoor lighting wastes billions of dollars and vast quantities of valuable natural resources annually. It also robs us of our heritage of star-filled skies. Starry Night Lights is committed to fighting light pollution. The company offers the widest selection of ordinance compliant, night sky friendly and neighbor friendly outdoor lighting for your home or business. Starry Night Lights is located in Park City, Utah.

Phone: 877-604-7377  
Fax: 877-313-2889

<http://www.starrynightlights.com>



Green Earth Lighting is a dedicated lifetime corporate member of the International Dark-Sky Association. GEL's products are designed to reduce or eliminate the negative effects outdoor lighting can have while still providing the light you need at night.

Green Earth Lighting LLC  
620 Onion Creek Ranch Rd  
Driftwood, Texas 78619

Phone: 512-944-7354

<http://www.greeneearthlighting.com>

## Local Astronomy-Related Stores

Listing retail sites in this newsletter does not imply endorsement of any kind by our organization. This information is provided as a service to our members and the public only.



Skies Unlimited is a retailer of telescopes, binoculars, eyepieces and telescope accessories from Meade, Celestron, Televue, Orion, Stellarvue, Takahashi, Vixen, Losmandy and more.

**Skies Unlimited**  
**Suburbia Shopping Center**  
**52 Glocker Way**  
**Pottstown, PA 19465**

Phone: 610-327-3500 or 888-947-2673  
Fax: 610-327-3553

<http://www.skiesunlimited.net>



Located in Manayunk, Spectrum Scientifics educates and entertains customers with an array of telescopes, microscopes, binoculars, science toys, magnets, labware, scales, science instruments, chemistry sets, and much more.

**4403 Main Street**  
**Philadelphia, PA 19127**

Phone: 215-667-8309  
Fax: 215-965-1524

### Hours:

Tuesday thru Saturday: 10AM to 6PM  
Sunday and Monday: 11AM to 5PM

<http://www.spectrum-scientifics.com>

# CCAS Information Directory

## CCAS Lending Telescopes

Contact Don Knabb to make arrangements to borrow one of the Society's lending telescopes. CCAS members can borrow a lending telescope for a month at a time; longer if no one else wants to borrow it after you. Don's phone number is 610-436-5702.

## CCAS Lending Library

Contact our Librarian, Barb Knabb, to make arrangements to borrow one of the books in the CCAS lending library. Copies of the catalog are available at CCAS meetings, and on the CCAS website. Barb's phone number is 610-436-5702.

## Contributing to *Observations*

Contributions of articles relating to astronomy and space exploration are always welcome. If you have a computer, and an Internet connection, you can attach the file to an e-mail message and send it to: [newsletter@ccas.us](mailto:newsletter@ccas.us)

Or mail the contribution, typed or handwritten, to:

**John Hepler**  
2115 Lazor St.  
Apt. 227  
Indiana, PA 15701

## CCAS Newsletters via E-mail

You can receive the monthly newsletter (in full color!) via e-mail. All you need is a PC or Mac with an Internet e-mail connection. To get more information about how this works, send an e-mail request to John Hepler, the newsletter editor, at: [newsletter@ccas.us](mailto:newsletter@ccas.us).

## CCAS Website

John Hepler is the Society's Webmaster. You can check out our Website at: <http://www.ccas.us>

John welcomes any additions to the site by Society members. The contributions can be of any astronomy subject or object, or can be related to space exploration. The only requirement is that it is your own work; no copyrighted material! Give your contributions to John Hepler at (724) 801-8789 or e-mail to [webmaster@ccas.us](mailto:webmaster@ccas.us)

## CCAS Purpose

The Chester County Astronomical Society was formed in September 1993, with the cooperation of West Chester University, as a non-profit organization dedicated to the education and enjoyment of astronomy for the general public. The Society holds meetings (with speakers) and observing sessions once a month. Anyone who is interested in astronomy or would like to learn about astronomy is welcome to attend meetings and become a member of the Society. The Society also provides telescopes and expertise for "nights out" for school, scout, and other civic groups.

## CCAS Executive Committee

For further information on membership or society activities you may call:

<b>President:</b>	Roger Taylor 610-430-7768
<b>Vice President:</b>	Liz Smith 610-842-1719
<b>ALCor, Observing, and Treasurer:</b>	Don Knabb 610-436-5702
<b>Secretary:</b>	Ann Miller 610-558-4248
<b>Librarian:</b>	Barb Knabb 610-436-5702
<b>Program:</b>	Dave Hockenberry 610-558-4248
<b>Education:</b>	Kathy Buczynski 610-436-0821
<b>Webmaster and Newsletter:</b>	John Hepler 724-801-8789
<b>Public Relations:</b>	Deb Goldader 610-304-5303



## CCAS Membership Information

The present membership rates are as follows:

**REGULAR MEMBER**.....\$25/year  
**SENIOR MEMBER**.....\$10/year  
**STUDENT MEMBER**.....\$ 5/year  
**JUNIOR MEMBER**.....\$ 5/year  
**FAMILY MEMBER**.....\$35/year

## Membership Renewals

Check the Membership Renewals on the front of each issue of *Observations* to see if it is time to renew. If you need to renew, you can mail your check, made out to "Chester County Astronomical Society," to:

**Don Knabb**  
988 Meadowview Lane  
West Chester PA 19382-2178

Phone: **610-436-5702**  
e-mail: [treasurer@ccas.us](mailto:treasurer@ccas.us)

## Sky & Telescope Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **\$32.95**, much less than the newsstand price of \$66.00, and also cheaper than individual subscriptions (\$42.95)! Buying a subscription this way also gets you a 10% discount on other Sky Publishing merchandise.

To **start** a **new** subscription, make **sure** you make out the check to the **Chester County Astronomical Society**, note that it's for *Sky & Telescope*, and mail it to Don Knabb.

To **renew** your "club subscription" contact Sky Publishing directly. Their phone number and address are in the magazine and on their renewal reminders. If you have **any** questions call Don first at 610-436-5702.

## Astronomy Magazine Group Rates

Subscriptions to this excellent periodical are available through the CCAS at a reduced price of **\$34.00** which is much less than the individual subscription price of \$42.95 (or \$60.00 for two years). If you want to participate in this special Society discount offer, **contact our Treasurer Don Knabb**.