



# THE STAR

THE NEWSLETTER OF THE  
MOUNT CUBA ASTRONOMICAL GROUP  
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OUR PROGRAMS ARE HELD THE SECOND TUESDAY OF EACH  
MONTH AT 7:30 P.M. UNLESS INDICATED OTHERWISE  
MOUNT CUBA ASTRONOMICAL OBSERVATORY

1610 HILLSIDE MILL ROAD

GREENVILLE DE.

FOR DIRECTION, PLEASE VISIT

[www.mountcuba.org](http://www.mountcuba.org)

PLEASE SEND ALL PHOTOS AND ARTICLES TO

[pestrattonmcag@gmail.com](mailto:pestrattonmcag@gmail.com)

**MARCH MEETING**  
**TUESDAY THE 11<sup>TH</sup> 7:30 p.m.**

Scott Jackson will give a talk on the Science Olympiad. As most of you know, Scott is the supervisor for the Astronomy phase. Beware for he just might challenge us by giving the MCAG the same test he prepared for the 2013 middle school students.

**OBSERVATIONS FROM THE COMFORTABLE CHAIR**  
**Hank Bouchelle Co-Chair MCAG**

Ancient Greek philosophers posed many possible underlying principles for all that can be seen and heard. Among them was change itself. From time to time, at least, a strong case can be made for this assertion.

Things that do not change are for the most part invisible or unnoticed. We note the way that daylight arrives in the morning. We recognize changes in the Moon, in the weather, and in the coming and going of our friends. Nature is laying in wait to present the character of spring: leaves on the trees, flowers growing in unexpected locations, pleasant temperatures.

The Mount Cuba Astronomy Group is changing, as well. A growing list of members, a growing number of programs and activities.

As I write this, we are expecting snow, and yet another cycle of polar weather visiting every shadow and frozen puddle. Recalling the meaning of change, it will make spring all the more remarkable.

**MCAG PUBLIC OUTREACH:**

**SCHOOLS:**

Other than the Science Olympiad being held on March 1<sup>st</sup>. nothing new for now. I hope to be able to post the winners for each Group in Aprils STAR.

**LIBRARIES:**

By Hank Bouchelle

The February 25 evening program at the Elkton library addressed an audience of approximately 35 people! The central topic was the stars and constellations of winter. However, the evening showed once again that it is difficult, to the point of impossibility,

to talk about a topic in astronomy without talking about something else, as well. The conversations revealed the way that a planisphere can show the parade of constellations that coincidentally shift with the seasons, while others are visible throughout the year. As planets move across the night sky, their apparent paths are along specific and predictable constellations. To find a planet that may be in the night sky, the trick is to note the locations of the Sun during the day.

At the end of the evening, participants adjourned to the outdoors. The evening was chilly but clear. As the February *Sky Calendar* had predicted, Jupiter was nearly straight overhead, and Orion's belt led the way to Canis Major and the brightest of the evening's stars, Sirius. In the other direction, it led to Taurus, and his red 'eye,' Aldebaran.

Future conversations with Ms Suzy Bell, the library's program coordinator, will discuss scheduling a series of programs for adults and children, newbies and old hands, to address audience questions of interest.

### **TELESCOPE WORKSHOP:**

Due to holidays and bad weather, the workshop has not met since October. On the 27<sup>th</sup> of Feb, we once again were able to have a get together and what a success it was.

Below are a few pictures taken that night that gives a good idea of just what we have been doing.



The photo to the left is a few members of the group preparing to begin work on the molding of additional parts for the new sun dial. From left and around the table, Dave Groski, Scott Jackson, Robert Stack, Lynn King (wearing the heavy white coat) and Greg Lee. The photo to the right shows the first step in the process of making a new sun dial, that being the building of a frame that will enclose the part to be cast. I will show the entire process in future editions of the STAR.



As Scott Jackson and Addy Merrall continued to fabricate a new frame for another part to be cast, some members moved to the library and began the process of evaluating a mirror in Robert Starks rebuild of a telescope. More on this procedure in your next STAR. Robert had started with some parts from a Quantum 6, a maksutov telescope built and sold by Optical Techniques Incorporated (OTI). The scope Robert has come up with is a stripped down version without the fancy "control box" that contained flip in, flip out barlow and diagonal combination.

A real Quantum 6 and a short history of OTI can be seen here.

<http://www.company7.com/library/quant6.html> .

The second photo is of Mary Webb and Lynn King assisting by doing some calculations.

### **OTHER MCAG ACTIVITIES:**

Woodside Creamery has contacted the MCAG asking us to bring some telescopes to the creamery again this year so their customers have a chance to view objects in our solar system. We have selected the follows evenings May 3, June 7, July 5, August 2, and Sept 6. All are all Saturdays with the 1<sup>st</sup> Quarter Moon well placed in the sky. We will start around 7:30pm and go until Woodside closes at 9:00pm.

This is a great chance for a family outing. Not only do you have some great ice cream but a chance to see the moon as well as Saturn with its rings and Jupiter and its moons.

### **ASTRONOMICAL TERMS AND NAMES OF THE MONTH:**

The Mission of the Mt. Cuba Astronomy Group is to increase knowledge and expand awareness of the science of astronomy and related technologies. I shall include in each issue of the STAR terms, objects and constellations along with a brief description of each.

### Event Horizon:

In general relativity, an event horizon is a boundary in space-time beyond which events cannot affect an outside observer. In layman's terms, it is defined as "the point of no return", i.e. the point at which the gravitational pull becomes so great as to make escape impossible. The most common case of an event horizon is that surrounding a black hole.

### Globular Cluster:

A globular cluster is a spherical collection of stars that orbits a galactic core as a satellite. Globular clusters are very tightly bound by gravity, which gives them their spherical shapes and relatively high stellar densities toward their centers. The name of this category of star cluster is derived from the Latin globulus—a small sphere. A globular cluster is sometimes known more simply as a globular.

Globular clusters, which are found in the halo of a galaxy, contain considerably more stars and are much older than the less dense galactic, or open clusters, which are found in the disk. Globular clusters are fairly common; there are about 150 to 158 currently known globular clusters in the Milky Way, with perhaps 10 to 20 more still undiscovered. Large galaxies can have more: Andromeda, for instance, may have as many as 500. Some giant elliptical galaxies, particularly those at the centers of galaxy clusters, such as M87, have as many as 13,000 globular clusters. These globular clusters orbit the galaxy out to large radii, 40 kilo parsecs (approximately 131,000 light-years) or more.



M87

## NEWS FROM THE WORLD OF ASTRONOMY:

In the February issue of the STAR, we had an article about Stevens Hawkins new theory on black holes. It goes without saying we have some controversy brewing.

### Stephen Hawking's New Black Hole Theory: Scientists Remain Unconvinced

Famed astrophysicist Stephen Hawking has shaken up the popular science world with his newest study about the basic nature of black holes, but is his idea revolutionary? Some scientists aren't convinced.

Hawking's new black hole study — entitled "Information Preservation and Weather Forecasting for Black Holes" — was published Jan. 22 through the preprint journal arXiv.org and has not yet undergone the peer review vetting process typical for academic papers. It attempts to solve a paradox surrounding the basic building blocks of how the universe works.

"Hawking's paper is short and does not have a lot of detail, so it is not clear what his precise picture is, or what the justification is," Joseph Polchinski of the Kavli Institute wrote in an email to SPACE.com. [The Strangest Black Holes in the Universe]

Black holes are mysterious objects that not even light can escape. But what exactly are they?

Massive gravitational singularities where light cannot escape?

The mouth of a wormhole that leads to another place, or even universe?

A fluke of physics?

An invention by mankind to try and fathom the complex nature of an unknowable universe?

Current theories about black holes hinge upon what's known as the "firewall paradox." This paradox pits Einstein's theory of general relativity against quantum theory in the context of a black hole. The paradox, developed by Polchinski and colleagues about two years ago, is based upon a thought experiment about would happen to a person if he or she fell into a black hole.

If an astronaut fell into a black hole, according to Einstein's theory, he or she would simply float past a point known as the "event horizon" with "no drama." The event horizon refers to the point of no return at which not even light can escape from the black hole. The astronaut wouldn't realize he or she had drifted into the black hole at all. The black hole would then pull the astronaut apart before it crushed the space explorer into its dense core.

On the other side of the paradox lies quantum mechanics, the physics theory that explains the behavior of small particles. In the thought experiment, quantum theory suggests that an astronaut would not find a "no drama" area at the event horizon, but

instead would encounter a "firewall" just inside the black hole that would destroy the unlucky traveler.

In 1974, Stephen Hawking found that matter and energy can escape a black hole through what is now known as Hawking radiation. However, he contended that the radiation would be so scrambled that scientists could never work backwards to understand what fell into the black hole in the first place. This violates a basic piece of quantum theory, the idea that information cannot be destroyed.

In 2004, Hawking had a change of heart and admitted he was wrong about information loss. However, no one is quite sure how information could escape a black hole. Information radiating out of a black hole is not compatible with general relativity, and destroying information isn't possible within the confines of quantum theory. So, who is right?

Hawking's two-page study attempts to resolve the issue by doing away with event horizons and replacing them with the idea of "apparent horizons."

"The absence of event horizons means that there are no black holes — in the sense of regimes from which light can't escape to infinity," Hawking wrote. "There are, however, apparent horizons, which persist for a period of time."

These apparent horizons shift with the behavior of quantum particles within the black hole. This theory suggests, then, that information can radiate from the black hole.

However, this idea doesn't seem to address the firewall paradox at all, said Raphael Bousso, a theoretical physicist at the University of California, Berkeley.

"It's not possible to have both of those things, to have no drama at the apparent horizon and to have the information come out," Bousso told SPACE.com. "Stephen just doesn't discuss this argument, so it's unclear how he means to address it."

Don Page, physicist at the University of Alberta in Canada, agreed. "I do not think that eliminating event horizons by itself solves the firewall problem, which is a subtle problem," he wrote in an email.

And an event horizon-free black hole isn't a new proposal, either, Page said.

"The idea that a black hole does not truly have an event horizon goes back more than a third of a century, and I would not be surprised if someone could trace it back even many years earlier," Page told SPACE.com via email.

by Miriam Kramer, Staff Writer Credit Space.com

## European Extremely Large Telescope “E-ELT”

The Hubble Space Telescope has produced some jaw-dropping images from space, such as the famous “Pillars of Creation” and the Horsehead nebula.

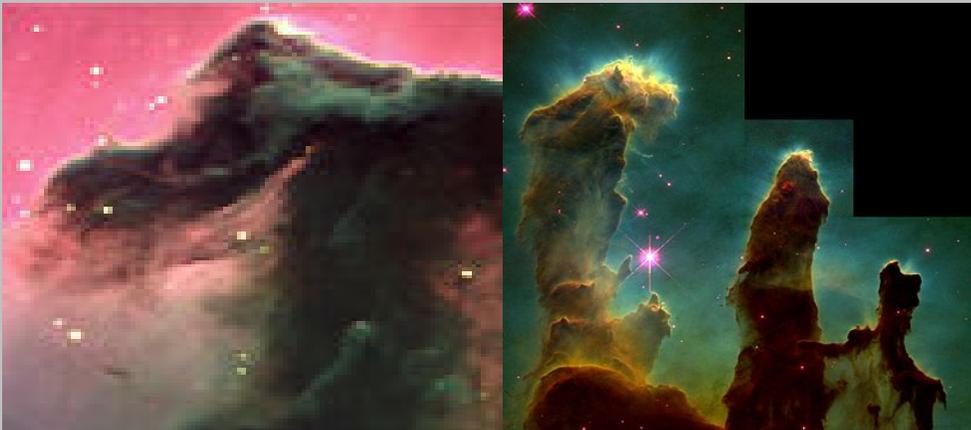
But the Hubble will soon encounter some stiff telescoping competition from a ground-based telescope so large it has been dubbed “E-ELT,” aka the European Extremely Large Telescope.

The telescope is being designed by the European Southern Observatory, which will begin construction on a desert mountain top in Chile as soon as Brazil’s parliament ratifies the OSE’s charter and becomes a member state.

With a reflecting telescope that will measure more than 39 meters (127.95 feet) in diameter, the E-ELT will be the largest telescope ever made.

According to Jochen Liske, an OSE astronomer, the E-ELT will probe for extra-solar planets with Earth-like masses and conduct direct imaging of larger planets. By analyzing light from distant galaxies, the E-ELT will help astronomers understand more about how stars are formed.

Liske also said that the relatively large diameter of the E-ELT’s telescope will allow it to take in more light at higher resolutions than previous ground-based telescopes. OSE plans to finish the telescope by 2024.



**Horsehead Nebula**

**Pillars of Creation**

**By Andrew Lampard Credit Yahoo News**

## Phenomena

Hank Bouchelle

Very generally, there are two sources of meteors. One is the odds and ends of Solar System debris, some of which are the result of collisions among asteroids orbiting

between Mars and Jupiter. Two objects orbiting the Sun at different distances have different velocities. The object closer to the Sun has a greater velocity and can collide with the slower one.

This is true on all scales: Earth's orbital velocity is about 18.5 miles/second, while Mercury's is close to 30 miles/second. The International Space Station is so unprecedentedly large that its various sections tend to orbit at different velocities, so that maintaining a precise posture is unexpectedly difficult.

The other source is debris released by comets. As it nears the Sun, a comet's ices vaporize, and solid particles are freed to continue in their own similar orbits. Indeed, comets typically have two tails. One is composed of gases, which travel directly away from the Sun. Solid particles follow the comet's orbit. When these encounter Earth's enormous velocity, we perceive them as meteor showers, at the rate of perhaps a thousand/hour. ([http://www.huffingtonpost.com/2012/12/31/2013-stargazing-events-comets-eclipses-meteor-showers\\_n\\_2387623.html](http://www.huffingtonpost.com/2012/12/31/2013-stargazing-events-comets-eclipses-meteor-showers_n_2387623.html))

It is astonishing that these small particles can produce sufficient light to be observed from Earth's surface 50 miles below. Traveling through Earth's atmosphere, the skin temperature of the Concord SST in flight was 361 degrees F., sufficient to make the Concord 10 inches longer in flight than sitting on the ground.

Observed from Earth's surface, meteors appear as trails of light. The Moon has no atmosphere. Meteors encountering the Moon give up all of their energy at a single bright point.

On September 11, 2013 a large meteor, about the size of a refrigerator-freezer, encountered the Moon. (<http://www.youtube.com/watch?v=zCFDkj2JtyA>) Generally, observing meteor impacts requires that the Moon be in a crescent phase, to observe the flash on the dark regions of the Moon. Worse, the arrangement of the Sun, Moon, and Earth typically result in showers occurring after midnight.

### **WEB SITES OF INTEREST:**

The American Meteor Society, one among many organizations, keeps track of the dates and likely number of meteors in showers.

<http://www.amsmeteors.org/category/meteor-showers>

## PUBLIC NIGHTS AT MCAO:

10-March 2014      Don Wilson   Exploring the Universe  
24-March 2014      Greg Lee      Viewing upcoming Solar and Lunar eclipses.

The general public is invited to visit the Observatory where programs are presented on Monday evenings at 8:00 pm. These include discussions and illustrated talks on astronomy; planetarium programs; and offer the opportunity to view the planets, moon, and other objects through the telescope, weather permitting. Due to limited parking and seating at the Observatory, admission is by reservation only.

Attendance is limited to adults and students 5th grade and above. Interested individuals or groups can apply by letter or call 654-6407 (preferably between the hours of 9 and 11 am, Monday through Friday) to the Observatory to obtain reservations for these "Public Nights". A map of the Observatory location will be mailed upon request. The evening program will be presented, even if the weather should not permit observation through the telescope. The admission fees are \$2 for adults and \$1 per student. There is no admission fee for MCAO members, but reservations are still required. We also do not host private parties. Please dress appropriately for the weather conditions as observations are outdoors.

## NIGHT SKY FOR MARCH

Planets anyone?

This month brings us the following planets and their locations.



If you know of anyone who is interested in Astronomy or someone who would like to learn more, please do not hesitate to extend and invitation to them to attend our meetings. If they have an interest in joining, our application is below.

## Mt. Cuba Astronomy Group

### *Membership Form*

The Mt. Cuba Astronomy Group is a tax-exempt organization dedicated to astronomy education and public outreach. Benefits of membership include:

- Monthly newsletter that includes details about the Group's activities and much astronomical information
- Monthly programs on subjects and topics of astronomical interest
- Free or discounted subscriptions to astronomy-related publications
- Free registration for MCAG workshops and classes
- Mention Mt. Cuba Astronomy Group and receive a 5% discount at Manor Books in New Castle (<http://www.yelp.com/biz/manor-used-books-New Castle>)



*Mail to:*

Ms. Carolyn Stankiewicz  
1001 Woodstream Dr.  
Wilmington, DE 19810

Name \_\_\_\_\_

Name(s) (children, if any, and age): \_\_\_\_\_

E-mail address: \_\_\_\_\_

Home address: \_\_\_\_\_

Phone (optional): \_\_\_\_\_