

Harford County Astronomical Society

Bel Air, Maryland
www.harfordastro.org



Volume 34 Issue 12

December 2008

Public Star Party (Open House):

January 3, 2008, at dusk

At the Observatory

Telescopes and space probes:

Activity: Understanding what you see. Featured object: Venus

General Meeting:

January 8, 2008, at 7 p.m.

At the observatory classroom.

Please check the website for possible schedule updates and changes:

<http://www.harfordastro.org>

*Happy Holidays to All!
May you have a Happy and Productive New Year!*



<http://www.astronomy2009.org/>



<http://astroleague.org/>



<http://nightsky.jpl.nasa.gov/>

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HCAS Business Meeting

Minutes of November 13, 2008

1. President Tom Rusek called the meeting to order at 7:05 PM. New member John Ditmar from Jarrettsville was in attendance.
2. The minutes of the October 2008 meeting were published in the last newsletter. The group approved the minutes as published.
3. Treasurer: The club's bank balance was \$5345.82. There are currently 41 members on the HCAS rolls. The battery for the open house scrolling sign was purchased. It has since been received and it works fine.
4. Observatory operations:
 - a. Mark Kregel spoke to Sal Rodano and he submitted the cost breakout for the dome upgrade. Sal passed this up to the Math and Science Department head. That person has not passed it forward yet. She needs to discuss it further with Sal Rodano. The cost will come to about \$5200. He also noted that if HCAS member volunteer labor is used on the project, they will need to sign a "hold harmless" release. This is in discussions now.
 - b. Sal Rodano passed along a request for members to NOT turn off the circuit breaker for the overhead projector. If there are any problems with this equipment, we should contact him.
 - c. Joe Manning asked about the plan for execution once the college approves the concept. He wanted to know if there was a project schedule and/or durations for each step in the process. This will let the club know when volunteer labor will be needed. Mark Kregel said that the upgrade will be in three phases. Phase 1 will allow the dome to be rotated and controlled by a computer. Phase 2 will enable the same functionality for the windscreen. Phase 3 will be to control the drop-out window by computer. The desired end state is to enable fully telescope and dome operation remotely by computer.

d. Mark Kregel noted that the observatory will be out of operation during the upgrade. The on-site work will require the removal of the telescope from the mount. They have not yet identified a good location to store the telescope during this period.

5. Outreach:

a. Tom Rusek will give a presentation at the Edgewood Senior Center on the afternoon of November 18th.

6. Observing Reports: Roy Troxel, Phil Schmitz, Jim Hajak and Cathy Tingler observed at Broad Creek on October 31st. They stayed out until about 3:30 AM. It was a productive session.

7. Old business:

a. The CCD camera was ordered (and subsequently received and checked out). It was purchased through Chesapeake Optics in Havre de Grace.

b. Roy Troxel was complimented on the fantastic work he has done on the club newsletter. Everyone agreed that he deserved much credit for his hard work.

c. Dates for the 2009 Open Houses were assigned. Some were moved back a week to avoid nights with the moon a day or two past first quarter. Nights with bright moons hinder observation of many objects of interest to the public.

d. Grace Wyatt passed along a note from Karen Carey. She said that if anyone claims 50 observing hours as part of the Astronomical League program, they need to write a report. She will also have a sign-in sheet at future public events so that members can get Astronomical League credit for their participation. She needs to know who participated in the May 2008 Astronomy Day event so they can receive credit.

8. New business:

a. Phil Schmitz spoke to Doug Wittich, who suggested holding the presentation before the business meeting. Tom Rusek said that we should leave that up to the individual speakers, and that any deviations from the current schedule need to be properly publicized. Doug Wittich also said he was interested in coming to Broad Creek for observing sessions. He has a generator that he brings to the field to power coffee and food heating equipment. Roy Troxel said that he thought food was not allowed at the site. Grace Wyatt replied that this really means that camping and grilling are prohibited, but snacks and coffee should be fine.

b. Grace Wyatt announced the next Night Sky Network teleconference and webcast. This month's topic is the "Itty Bitty Radio Telescope." She will send out the contact information for the teleconference, which takes place on November 18th at 9:00 PM.

c. The Night Sky Network has monthly themed programs available for outreach events for 2009's International Astronomy Year. The club will use these materials at the open houses. Grace Wyatt will send out the list in December.

d. Grace said that she has an old computer printer to donate to the club if we are interested.

e. The group discussed the possibility of having a summer cookout and supplemental star parties on moonless nights. These will be announced 4-6 weeks in advance.

9. The meeting was adjourned at 7:55 PM. Tom Rusek gave a presentation on Geologic Time and plate tectonics after the business meeting adjourned. *- Monroe Harden*

Minutes of HCAS Business Meeting, December 11, 2008

The meeting was called to order at 7:31 pm by President Tom Rusek.

The minutes of the October meeting that were published in the November Newsletter were Motioned for approval by Tim Kamel and Seconded by Gary George, and carried unanimously.

Treasurer's Report: Our checking account carries a balance of \$4047.32, after the purchase of the Starshoot Pro CCD Camera. It was purchased through Chesapeake Optical, which did save the club the taxes that would have been charged. We currently have 41 paid members.

Newsletter: No one reports any issues in receiving the newsletter. October's newsletter was very heavy on Observing Reports, as there were many trips to Astronomy Hill during September and October.

Outreach: Tom Rusek gave a small presentation to approximately 12 people at the Edgewood Elderly Facility. It was about an hour long, which he did on his lunch hour. The audience was interested in Tom's presentation.

December 5, 2008 was an open house at the HCAS Observatory. Because of bad weather, only 6 members and 3 guests attended. Many things were discussed, including the different types of telescopes, sizes & distances in the Universe, and a computer presentation.

Our Havre de Grace Library Display case received positive feedback from the librarians in person and by email.

Grace Wyatt announced that HCAS will do a display case for the Bel Air Library in April.

2009 Open house dates: 1/3, 1/31, 2/28, 3/28, 5/2, 5/30, 6/27, 7/25, 8/22, 9/26, 10/24, 11/21, 12/19.

2009 Meeting dates: 1/8, 2/5, 3/5, 4/2, 5/7, 6/4, 7/2, 7/30, 8/27, 10/1, 10/29. Dates for November and December coincide with holidays. Members will decide at open houses whether it will be necessary to hold a meeting in those months, or discuss business at the open house gatherings.

Tim Kamel states that there is a possible outreach event in February for the Parkville Middle School 7th graders. He says that there is only need for telescopes, not for a presentation. He will work on this and get back with us in January.

Observatory Operations: Mark and Tim have discovered that the dome has become the residence of a bat. It has left a mess that will need to be cleaned up and Tim will contact the College about the cleanup and extermination. The dome upgrades have been submitted to the College, and we are waiting to hear back from them.

Larry Hubble has posted photos taken by the new CCD camera on the HCAS Yahoo site and the Mid Atlantic Astronomers Yahoo group. It is suggested that with proper credit, the photos be submitted to Orion Telescopes and to local newspapers. Larry has purchased a focal reducer which is required to use the camera, and Tim mentioned that perhaps the club reimburse Larry for his purchase so that it will stay with the CCD camera.

Anyone interested in using the CCD camera needs to contact Grace Wyatt to arrange.

Observation Reports: Roy Troxel has stated that no one has gone to Astronomy Hill (Broad Creek) for about 6 weeks due to weather.

Attendees of the meeting discussed their personal stories of the Moon, Venus and Jupiter conjunction on December 1, 2009.

International Year of Astronomy (IYA): Grace told us all that each month's open house in 2009 will have a theme. January's theme is "Ready to Observe: What you will see at the telescope and features Venus which will be at greatest elongation during the month of January. The package includes Lithographs to hand out and there is a booklet available for download, which Grace will provide the link.

Karen Carey states that there is a Podcast for the IYA, which will give a topic every day for the year 2009. It can be subscribed to through iTunes or other podcatching software. More information can be found here: http://www.planetary.org/programs/projects/advocacy_and_education/iya/365days.html. Not only is the IYA looking for subscribers, but also people to make and submit a podcast.

The meeting was adjourned at 8:10pm, with Grace playing a Powerpoint presentation of the Theme song for the IYA "On the Shoulders of Giants". We then moved to the library room where we had a small Winter party with snacks galore.

- Karen Carey

Open House December 6, 2008

On 12/6/2008, we held the open house for the month of December.

Participating for the club were Grace, Roy, Phil, Mark and Gary. The weather was awful and it was completely overcast. Visitors this day were one adult and his two children, part of a Cub Scout group. Grace gave them some astronomy handouts and we discussed our programs. We spent the next 3 hours or so discussing astronomical issues and doing some web surfing of astronomical sites.

We packed it in at about 9:15.

- Tim Kamel

Observation Reports

International Space Station Sightings

The ISS with the space shuttle attached was visible this evening, Nov. 20. I was able to see it after it rose high enough to enter an area without clouds. I would say I saw the ISS about 55 degrees going to the zenith. I then saw it go past Vega, passing the zenith and shortly after disappearing into the clouds again. It was supposed to be a magnitude 3, but did not seem that bright, I guess due to the clouds. Anyway, it was still neat to watch.

You too can do this on a regular basis without investing a lot of time. All you have to do is go to the Satellite Tracker web site. You can reach this site by going to:

[HTTP://spaceweather.com/flybys/](http://spaceweather.com/flybys/)

All you do is type in your zip code. This web site will give you the rise time, direction in which the ISS will rise, elevation and magnitude. The duration of the entire sighting will also be included. I have found the site very accurate. Just go outside a few minutes before the rise time and the ISS will arrive as stated.

Only time invested if not observing at that time is the time it takes to go outside a minute or two before the timed arrival. If you are observing just be on the lookout at the predicted time, otherwise it will sneak up on you and be half way over when you notice it and remember that you had wanted to watch out for it.

- Cathy Tingler

Winter's Planetary Nebulae

When winter arrives, with its bone-chilling frigid temperatures and its never ending winds, we look forward to viewing the Pleiades, the Orion Nebula, the star clusters of Cassiopeia and Auriga, the supernova in Taurus, M1, the Winter Triangle and other interesting objects. But what of the many planetary nebulae that crisscross the winter skies?

I have listed fourteen winter planetary nebulae that should be visible in 8-inch scopes. Photos of all of these objects can be found on the internet, however, I have listed references in *Burnham's Celestial Handbook* or the *Night Sky Observer's Guide* for these planetary nebulae. Most of the photos in *Burnham's* were taken with the world's largest telescopes while the photos in *The Night Sky Volumes* are with amateur telescopes.

We'll start with Gemini's two planetaries. NGC 2392 is known as the Eskimo or the Clown Nebula. This planetary shines at 9.2 and is visible in 4 inch telescopes. This nebula, appears to blink on and off as you use averted vision! The central star is easily visible in small scopes and this nebula is about 3,000 light years away. There are photos of NGC 2392 in *Burnham's Celestial Handbook* on page 941.

My description: Bright, large, greenish, viewed at 95x, 19mm eyepiece, 16 inch telescope.

NGC 2371-2 is a double-lobed planetary resembling M76 in Perseus. It is located near Castor and is listed as faint as 13" magnitude in some catalogs. However, I agree with catalogs that list this nebula around 11.5 magnitude. This nebula is very interesting to view and is easily seen from Broad Creek on a good night. Both lobes are obvious even when the 0-III filter is not used. This nebula is around 4,300 light years away. There is a drawing of NGC 2371-2 in *The Night Sky Observer's Guide Vol. 1* on page 211 (center drawing).

My description: Bright, large, easily visible, viewed at 95x with a 19mm eyepiece, 0-III filter, 16-inch telescope.

Another nice winter planetary is in the constellation of Puppis. Simply locate M46, an open star cluster, and by using an O-III filter, the planetary nebula NGC 2438 will be obvious. This nebula appears as a faint "ring" nebula, using averted vision. It can be seen without the filter, but is much easier with it. The planetary is about 2,900 light years away and is a foreground object and not part of the open cluster. There is a photo of M46 in *Burnham's Celestial Handbook Vol. 3* on page 1511. Can you find the planetary nebula NGC 2438 in the photo? In the *Night Sky Observer's Guide, Vol. 1*, page 349 shows NGC 2438 much clearer.

My description: Faint, oval, colorless, viewed at 95x, 19mm eyepiece, 0-111, 16-inch telescope.

Another planetary in Puppis is NGC 2440. This nebula is magnitude 11.5 and is visible in an 8-inch telescope and is over one light year in diameter. It is some 4,000 light years distant. The 15th magnitude central star of this planetary is 200,000 degrees Kelvin, making it one of the hottest stars known. Check out the Astronomy Picture of the Day for Feb 15, 2007 to see this planetary. There is another photo of it in *The Night Sky Observer's Guide Vol. 1* on page 350.

My description: Bright, central star, diffuse halo, round. Viewed at 155x, with a 12mm eyepiece, 16-inch telescope.

Even Orion has at least two planetary nebulae, but I will only mention the brighter one. NGC 2022 is listed at 12th magnitude, but it appears much brighter to me. This nebula is some 8,100 light years away. It is not too far from Betelgeuse. There is a photo of it in *The Night Sky Observer's Guide Vol. 1* on page 272.

My description: Brighter than listed, small, round, viewed at 95x, 0-III filter, 19mm eyepiece, 16-inch telescope.

NGC7662 in Andromeda is known as the Blue Snowball. This planetary is a rather bright blue or green-colored nebula some 5,600 light years distant. At magnitude 8.3, this nebula is easily seen in almost any telescope. It is estimated to be .8 of a light year in diameter or 50,000 Astronomical Units. In 16-inch scopes or larger the central star may be glimpsed in excellent conditions. This is seen better in Autumn skies but can be seen in Winter. There is a photo of NGC7662 in *Burnham's Celestial Handbook* on page 158 (top photo) as well as a drawing (bottom of the nebula (bottom sketch)).

My description: Bright, small, oval, pale green, viewed at 69x, 26mm eyepiece, 16-inch telescope.

NGC6543 in Draco is known as the Cat's Eye Nebula in the circumpolar constellation of Draco, and is about 3,000 light years away from us. It is the first planetary nebula that was measured with a spectroscope. This nebula could contain a double star, which could explain why there is so much intricate detail throughout the nebula. Although it is better seen in warmer weather, this bright planetary should be visible at some time during the night. At magnitude 8.1 this planetary can be seen in scopes as small as four inches. There is a photo of NGC6543 in *Burnham's Celestial Handbook* on page 871 (top photo).

My description: Very bright, round, greenish, viewed at 95x, 19mm eyepiece, 16-inch telescope.

NGC 1501 is an 11.5 magnitude planetary nebula in Camelopardalis. It can be seen in an 8-inch telescope. It is located a little south of Kemble's Cascade. This nebula is about 4,000 light years away. There is a photo of NGC 1501 in *Burnham's Celestial Handbook Vol. 1* on page 336 (upper photo).

My description: Bright, large, 45"x40", round, O-III filter, viewed at 95x, 19mm eyepiece, 16-inch telescope.

M76 in Perseus is the faintest planetary on Messier's famous list. However, it is rather bright at magnitude 10.1. It was discovered by P. Mechain in September of 1780. M76 is known as the "Little Dumbbell" or simply the "Barbell". It is visible in 4-inch telescopes. There are photos of M76 in *Burnham's Celestial Handbook Vol. 3* on page 1436.

My description: Bright, small, irregular shape, viewed at 69x, 26mm eyepiece, 16-inch telescope.

IC2149 is a bright (10.7 magnitude) but small planetary nebula, located near Beta Aurigae. Because of its small size, this planetary nebula requires about a 12-inch scope to see that it is not just a star. It is 5,200 light years distant. There is a drawing of it in *The Night Sky Observer's Guide Vol. 1* on page 57.

My description: Bright, small, 10"x10", round, viewed at 95x, 0-111 filter, 19mm eyepiece, 16-inch telescope.

NGC40 in Cepheus is a large, faint planetary nebula with an 11th-magnitude central star that is easy to see. At magnitude 12.4, this planetary looks much better in a 12-inch or larger telescope. This planetary is 4,000 light years away and is about .6 of a light year in diameter. There is a photo of NGC 40 in *The Night Observer's Guide Vol. 1* on page 149 (left photo).

My description: Less bright, circular, colorless, viewed at 95x, 19mm eyepiece, 16-inch telescope.

NGC246 in the constellation of Cetus is a bright 10.9 magnitude planetary nebula with a 12th-magnitude central star, which is visible in an 8-inch telescope. Larger instruments will show more detail. This is a very circular planetary with faint stars in front of it. It is at a distance of 1,500 light years and is some 2.5 light years in diameter. There is a photo of NGC 246 in *Burnham's Celestial Handbook Vol. 1* on page 651 (upper photo).

My description: Very faint, large, 100"x100", central star visible, viewed at 153x, 0-111 filter, 12mm eyepiece, 16-inch telescope.

NGC 1535 in Eridanus is rather bright at magnitude 9.6 and is visible in 4-inch scopes. It is relatively small at only 18 arc seconds and is 5,800 light years distant. An O-III filter may be needed to definitely identify this as a planetary nebula. There is a photo of NGC 1535 in *The Night Sky Observer's Guide* on page 187. It is just left of center in the photograph.

My description: Bright, 15"x15", oval, viewed at 95x, O-III filter, 19mm eyepiece, 16-inch telescope.

NGC 1514, a 10.9 magnitude planetary in the constellation of Taurus, has a very visible central star at magnitude 9.4. This nebula is 1,900 light years away. There is a photo in *Burnham's Celestial Handbook Vol. 3* on page 1885 (upper right photo).

My description: Bright, large, oval, meteor through field, viewed at 95x, 19mm eyepiece, O-III filter, 16-inch telescope.

There are many more winter planetaries than listed here. Get out and observe them! Don't forget the hand warmers and hot chocolate!

- Phil Schmitz

Outreach Programs

International Year of Astronomy 2009

The International Astronomical Union (IAU) and the United Nations Education, Scientific and Cultural Organization (UNESCO) have declared 2009 to be The International Year of Astronomy to commemorate the 400th anniversary of the first recorded astronomical observations with a telescope made by Galileo Galilei. The year-long celebration is to introduce people to astronomy and science, with the main theme being "The Universe, Yours to Discover". There will be educational and outreach programs globally to educate the public and even introduce people to the wonders of the Universe.

Educational guides have been provided on a monthly basis to introduce and teach a new concept to visitors at each session. January's theme is "Telescopes and Space Probes: Today's Starry Messengers". The featured activities will educate the public on what they can expect to see through a telescope and how to best use the telescope. The featured object for January is Venus. To gain information that can be shared at the HCAS Open House on January 3 about these activities, please visit the website below and download the January guide. The guide provides information for the night's activities. All the handouts included in the program will be available that night for visitors. Even if you don't plan to attend the open house, the information is interesting to read: <http://www.astrosociety.org:80/iya/guides.html>

The Astrophysics Science Division at NASA Goddard is seeking your feedback about what potential listeners would want to hear on a podcast. These podcasts are intended to highlight NASA science, missions, and people.

Here's the survey: <http://www.knowitbetter.com/limesurvey/index.php?sid=12765>

LCROSS (Lunar CRater Observation and Sensing Satellite) is a NASA mission set to launch in 2009. The mission is to search for water on the moon. NASA is looking for people to assist with the LCROSS Observation Campaign! Observations of the moon by amateur astronomers will help refine new protocols for observing the moon and increase our knowledge of the moon. During the months leading up to the LCROSS launch, amateur astronomers are encouraged to image the north and south poles of the moon.

If you are interested in sharing your observations please visit this website for more information: http://groups.google.com/group/lcross_observation

- Grace Wyatt

HCAS Astrophotography Begins

Astrophotography Session November 23, 2008

Looks like our first attempt to use the new camera was a dud. Larry, Gary and I went to the Observatory this Sunday, 11/23, with the intent of trying out the new Orion Star Shoot and see what it could do.

I had picked up the camera the day before and had spent some time that night installing the software and seeing if I could get the camera to respond. I installed the Astrophotography suite (Maxim DL) and connected the camera. It prompted for the drivers and the installed them from the same disk as the software. I launched the software and it recognized the camera. Without taking the protective red cover off, I pointed the camera at a light and was able to see a dull red glow showing in the picture window on my laptop.

We got the club's C-14 aimed at a faint star (actually Albireo, a nice double), as recommended by the instructions, in preparation for focusing the camera. We then attached Larry's new f/6.3 focal reducer and attached the camera. We then connected the USB cord to the laptop and the camera, and then the power cord to the power tank and the camera and then NOTHING. The cooling fan did not turn on and the camera was not getting power. The power tank worked as the radio, red light and siren worked. We fiddled with the power cord and the power tank and the USB cord and still nothing. Strange, considering that the night before everything worked like a charm.

Larry had one of those multi-voltage plug-in power sources and we tried that. We got the fan to run though it did not run as strongly as I had it going the night before. We then tried getting the laptops to recognize it. Neither Larry's nor my lap top worked. After much trying and reinstalling of software, we packed it in at 9 O'clock or so.

I took the camera home. I plugged the camera into the lighter socket in my car. I still did not get the camera to work. I then found another 12-volt power cord from a Meade scope and plugged that into the car lighter and the other end into the camera. Voila.... instant fan running at high speed. I next connected my laptop to the camera using the USB cord and the laptop recognized the camera and brought up the proper screens.

Looks like somewhere between my using it last night and our plugging it in tonight, the power cord failed. I am guessing this is a one in a million event. Why did it have to happen to us now?!

I called Orion the next day and explained what happened and they said they would mail a replacement one out the same day. It arrived on 12/1. You gotta love this service.

- *Tim Kamel*



M1 "Crab Nebula" in Taurus – First CCD image for HCAS camera!

**Astrophotography Session
November 27, 2008**

Here is my CCD imager progress report for Thanksgiving weekend 2008:

Our first attempt had failed due to a faulty power cord sent from Orion. After taking the imager home, Tim got it to work with a cable of his own. He then turned the camera over to me because I was asked by members to initially test the camera. On Thursday evening, Nov. 27, I attached the camera to my laptop and telescope. I had purchased a 12-volt power converter that converts from 110, for \$30, to power the imager. I used my Celestron Ultima 11 with a Lumicon off-axis guider and focal reducer at about F6. The camera worked perfectly.

The computer recognized the imager immediately, and after locating a star, I began the focusing process. This was time consuming since it was the first time I had used it. After finding my first object, M1, I decided not to use the off-axis guider and just let the telescope track the imager on its own. I determined my telescope on this night could track for about one minute. This is plenty of time for shooting multiple sub-frames. After centering the Crab Nebula in the telescope, I took some short exposures and centered the object on the camera's point of view. Then I took 20 one-minute exposures or sub-frames. By that time, I was so cold, my bones hurt. At one time, I looked up at the thermometer and it was 29 degrees.

But it was good viewing. So I did try an attempt on Orion with not too much luck because the seeing conditions were poor and my whole body ached. It wasn't until this morning that I got a chance to process the images. I used the MaxIm DL software for stacking and miscellaneous processing and then moved to Photoshop, which I am much more familiar with, for the finished product. I am pleased to report that the camera is performing flawlessly and producing outstanding images. In fact, the very first picture taken with our new imager is one of my best deep sky photos ever. Technology has come a long way in this field making it easier and easier for anyone to get involved. I will be holding a presentation on the camera and basic operations at the club's convenience. Then Tim, Gary and I will have a demonstration at the observatory so others can get involved. (I will buy the pizza.)

This is going to be an amazing addition to the club!



M42 and M43 in Orion

Here is my newest update from our new CCD imager, the StarShoot Pro. Due to the weather, the camera has been idle, although I did find time to process the Orion image from the first shoot. This process is taking me a very long time because I am learning as I go along.

Monroe has asked me to submit the processing procedures that I have been using. I basically use MaxIm DL to stack the images and convert the raw images to color. That's where my expertise stops. Then I try different filters in MaxIm DL and other processes by just clicking with the mouse. If I like the results, I save them. Thanks to Jeremy for suggesting the astrophotography action set for Photoshop which I purchased for \$20. They have been a big help in automating some of the processes, making it easier for the novice.

Jeremy may be able to get together with us in December to help with some of this processing. We all could use the help learning the processes. If you want to know about dark room processing, let me know. I have attached the Orion shot after processing and although some of you may say, "Great", it's really not-so-great. The photo is under-exposed and has too few sub-frames to really produce a high quality image. But if our first two shots look this good without flat fields and only one dark frame, and way too few sub-frames, we will soon be producing superior images.

Thanks again for everyone's support,

- *Larry Hubble*

HCAS Astronomy Quiz

A Monthly Feature

by Phil Schmitz

This Month's Question: Which constellation am I?

- I house one of the brightest globular clusters in the northern hemisphere in my boundaries. I am also a mythological figure with great strength.
Centaurus Ophiuchus Sagittarius Hercules
- I cover more square degrees in the sky than any other constellation in the sky and I am as sly as a snake.
Hydra Eridanus Virgo Draco
- I contain one of the summer triangle's stars, I also like to fly.
Delphinus Aquila Lyra Ophiuchus
- I have the only known planetary nebula located within a Messier object and I am commonly seen around the racetrack.
Pisces Perseus Pegasus Pavo
- I contain 5 Messier galaxies and I like to roar about them.
Leo Cygnus Sagittarius Cepheus

Answers to Last Month's Quiz:

- I am standing on the largest known volcano, Olympus Mons.
Earth Venus **Mars** Mercury
If you were standing on the rim of Olympus Mons and looked down, all you would see would be Olympus Mons, it is as big as the state of Arizona!
- I am standing on the rim of crater Birt looking at the straight wall.
Moon Io Titan Triton
The straight wall is on the edge of Mare Nubium on the Moon.
- I am in orbit looking at the Great Dark Spot.
Neptune Jupiter Uranus Saturn
The Great Dark Spot is a feature of Neptune.
- I am on the edge of the Caloris Basin.
Venus Mars Pluto **Mercury**
The Caloris Basin is the largest feature on the planet Mercury.
- I just landed on the feature called the *Saddle*.
Vesta Moon **Eros** Ida
The Saddle is the name given to an area of the asteroid Eros that the Near-Shoemaker craft landed on.

Miscellaneous

365 Days of Astronomy Podcast

The *365 Days of Astronomy Podcast* is a project that will publish one podcast per day on the Web, for all 365 days of 2009. The podcast episodes are written, recorded and produced by people around the world. It is organized by the New Media Working Group of the International Year of Astronomy, and The Planetary Society's Emily Lakdawalla and Mat Kaplan are among the organizers and contributors.

365 Days of Astronomy is looking for individuals, schools, companies and clubs to provide around eight minutes of audio for the daily podcast. You can do as few as one episode or up to 12 episodes (one per month, subject, of course, to the project's editorial discretion). The podcasts can be about virtually any astronomical topic, from simple concepts or how-tos to more in-depth discussions of complex concepts.

If you are interested in subscribing or contributing to the podcasts, go to:

http://www.planetary.org/programs/projects/advocacy_and_education/iya/365days.html

The Milky Way's Satellite Galaxies

There are at least 19 known satellite galaxies associated with the Milky Way. Unfortunately, most of them are too faint to be seen with even large amateur telescopes. The only two bright ones are the Large Magellanic Cloud and the Small Magellanic Cloud, and they are only visible from the Southern Hemisphere.

One of the "easiest" of the satellite galaxies we can see from our locality is probably the Sagittarius Dwarf, some 88,000 light years distant. The globular cluster M54 seems to be a part of the Sagittarius Dwarf. M54 was discovered by Messier in July 1778. M54 is about the same distance as the dwarf galaxy. It is possible that M54 could be the core of the Sagittarius Dwarf or a remnant or just a large globular cluster associated with the Sagittarius Dwarf. There is a photo of M54 in *The Night Sky Observer's Guide Vol. 2* on page 329 (far right photo).

My description: M54 --Bright, small, not resolved, 69x, 26mm eyepiece, 16 inch telescope.

Unless otherwise noted, I have never seen any of the following galaxies:

Both the LMC and the SMC were seen by Portuguese seaman in 1519 and named in honor of Ferdinand Magellan, who was killed on the voyage. The Large Magellanic Cloud, located in the constellation Dorado is some 190,000 light years away. It is classified as an irregular galaxy. It is separated from its smaller neighbor (the SMC) by 80,000 light years. The diameter of the LMC is about 25,000 light years. This galaxy has about 10 percent of the mass of our galaxy or about 25 billion suns. There are at least nine known stars that are 250,000 times brighter than our own Sun. There are at least 700 open clusters, 400 planetaries, 50 diffuse nebulae and 60 globular clusters in the LMC. The Tarantula Nebula, NGC 2070, also known as 30 Doradus, lies within the LMC. If this nebula were at the same distance of the Orion Nebula, around 1500 light years away, it would shine about three times as bright as Venus and would cover some 30 degrees of the sky! The Tarantula Nebula is some 800 light years in diameter and has over 100 supergiant stars in its center. There is a photo of the LMC in *Burnham's Celestial Handbook Vol. 2* on page 840.

The Small Magellanic Cloud, located in the constellation of Tucana, is some 195,000 light years from us, slightly farther than the LMC. It is about 15,000 light years in diameter and is classified

as an irregular galaxy. There is a gaseous envelope surrounding both the LMC and the SMC, showing that they are connected. At least a million stars in the SMC are brighter than Sirius. Our own Sun would shine at 24th magnitude if it were in the SMC and only the largest telescopes could detect it. Although overshadowed by the LMC, the SMC does have some interesting objects. NGC 419 is a globular cluster some 115 light years in diameter. There is a stellar region NGC 456-465 that is some 1100 light years in diameter. There is a photo of the SMC in *Burnham's Celestial Handbook, Vol. 2* on page 1914.

The Sculptor Dwarf galaxy was discovered at Harvard Observatory in 1938. Not to be confused with the Sculptor Galaxy Group that is some eight million light years from us and is considered to be the closest system of galaxies beyond the Local Group. The Sculptor Dwarf galaxy is about 50 times the size of a large globular cluster. The brightest stars are only magnitude 18. This galaxy is around 260,000 light years distant, and about 3,000 light years in diameter.

The Fornax Dwarf galaxy was discovered in 1938 and is about 50 times as massive as the largest known globular cluster in our galaxy. It was discovered in 1938. The brightest stars are only magnitude 19. There are at least five globulars surrounding this system. The brightest, NGC 1049, being around magnitude 12.9 is visible in amateur telescopes in a very dark sky. This galaxy is about 450,000 light years distant and 5,000 light years in diameter. There is a photo of the Fornax Dwarf galaxy in *Burnham's Celestial Handbook Vol. 2* on page 902.

The Canis Major Dwarf is an irregular dwarf galaxy that was discovered in 2003 and is approximately 25,000 light years from us. This may have been a significant galaxy at one time; however, most of its matter is distributed along its orbit due to interaction with the Milky Way. The globulars, M79, NGC 1851, NGC 2298 and NGC 2808 are loosely grouped around this dwarf and may be former members of its galactic halo. If M79 is indeed part of this dwarf, then, like M54 (Sagittarius) and NGC 1049 (Fornax), we can see part of another dwarf. There is a photo of M79 in *Burnham's Celestial Handbook Vol. 2* on page 1098 (Upper photo).

My description: M79 - Bright, small, 3', not resolved, viewed at 95x, 19mm eyepiece, 16 inch telescope.

The Sextans Dwarf was discovered in 1990, making it the 8th dwarf galaxy known (at the time). It is 280,000 light years away and approximately 3,000 light years in diameter.

The Leo I elliptical dwarf galaxy was discovered in 1950 by A. G. Wilson with the Palomar 48-inch Schmidt telescope. This system is about 815,000 light years distant and about 3,000 light years in diameter. It is currently the farthest known dwarf galaxy that is associated with the Milky Way.

The Leo II elliptical galaxy located north of Delta Leonis is smaller and fainter than Leo I and is about 670,000 light years distant. It was discovered in 1950.

Other dwarf galaxies include the Bootes Dwarf, 200,000 light years distant and about 2,000 light years in diameter; Draco Dwarf at 270,000 light years distant and about 2,000 light years in diameter and the Canes Venatici I Dwarf is 720,000 light years distant and is 6,000 light years in diameter.

Below are three other galaxies I will mention that are local group members, but too far away from the Milky Way or M31 to be considered satellites.

M33, also known as the "Pinwheel Galaxy" or NGC 598, is about 2.4 million light years away and about 60,000 light years in diameter. M33 was discovered by Charles Messier in August of 1764. Lord Rosse detected the spiral structure in the 1800's in his 6-foot reflector. M33 is about 570,000 light years from M31. M33 is more or less face on to us and has a low surface brightness. A lot of star formation is taking place in M33. The brightest HII region in M33 is

NGC 604 on the NNE edge. This region is some 1000 light years in diameter and can be seen in moderate sized telescopes on the best of nights. There are other HII regions that can be seen in larger scopes on the perfect night. On exceptional nights, M33 can be seen with the naked eye as a soft glow in the sky. There are photos of M33 in *Burnham's Celestial Handbook Vol. 3* on pages 1898, 1901 and 1903.

My description: Faint, very large, brighter toward middle, viewed at 69x, 26mm eyepiece, 16-inch telescope.

IC 1613 in Cetus can only be spotted in larger amateur scopes. This galaxy is 20.0 by 18 minutes of arc in size, with its overall magnitude at 9.2. This galaxy is 2.8 million light years away and is 16,000 light years in diameter. There is a photo of IC 1613 in *Burnham's Celestial Handbook Vol. 1* on page 648 (Lower photo).

NGC 6822 in Sagittarius is visible in larger amateur telescopes. This galaxy is 19.1 x 14.9 arc minutes in size and is 2.2 million light years from us. The diameter is about 12,000 light years and is also known as Barnard's Galaxy. This galaxy is in a rich star field area of Sagittarius. It has been reportedly seen in 10x50 binoculars under perfectly dark skies, located in the same field as the planetary nebula NGC 6818. This planetary nebula is a foreground object and is not part of the galaxy. However, if you find the planetary, you might be able to glimpse the galaxy since you will definitely be in the right place! There is a photo of NGC 6822 in *Burnham's Celestial Handbook Vol. 3* on page 1617.

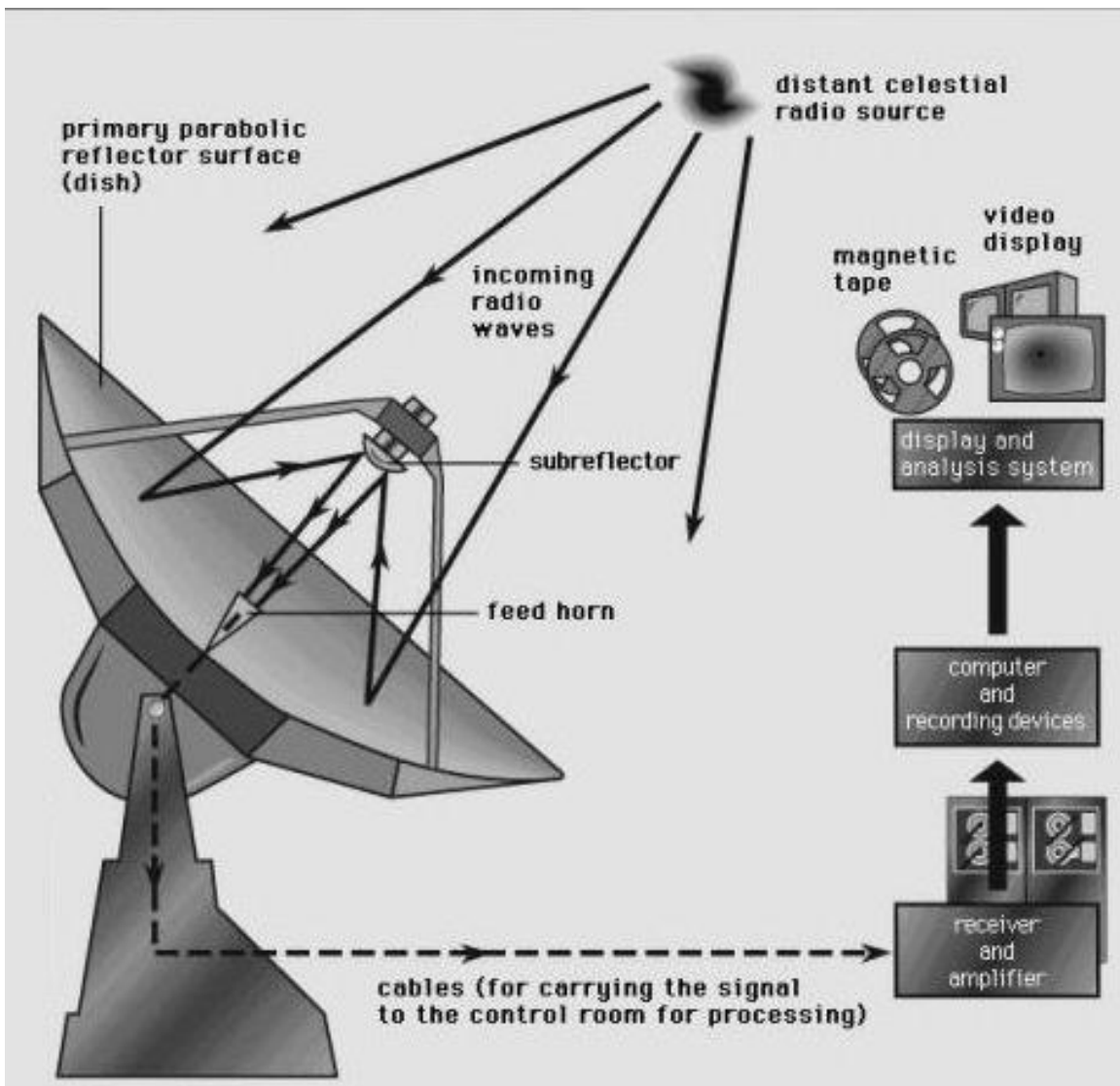
Many more photographs of these galaxies can be found on the Internet. There are many other dwarf galaxies in the local group that are not mentioned here and the future will no doubt add many more.

- Phil Schmitz

Night Sky Network Radio Telescope 101

The Jet Propulsion Lab's Night Sky Network held one of its regular conference calls on November 18. The teleconference was conducted by Sue Ann Heatherly of the National Radio Astronomy Observatory in West Virginia, home of the Green Bank Telescope, the world's largest fully steerable radio telescope.

The GBT achieved "first light" in August 2000. It stands 485 feet tall -- taller than the Statue of Liberty. Its dish measures 100 by 110 meters. It can be pointed with an accuracy of one arc second, or the equivalent to the width of a single human hair seen six feet away. Composed of 2,004 metal panels, the telescope's surface covers almost two acres. It is designed to handle a great range of wavelengths, from 9 feet long down to 1/8 inch.



Contrary to popular belief, radio astronomers do not "listen" to radio waves from space. Instead, they convert radio emissions into images, with devices like those shown in the above diagram.

Radio waves are part of the same magnetic spectrum as visible light waves. Unlike visible light or sound waves, however, humans can't detect radio frequencies without special equipment. Many objects in space including stars, planets, nebulae and galaxies emit not only visible light, but radio waves as well - in varying intensities.

Unlike optical telescopes, radio telescopes have very low resolving power. This is because radio waves are much wider than optical light waves. In fact, they can be as wide as some buildings are tall – over 300 feet. (This is one reason why they're built so large, or set up in arrays.)

You can download a PowerPoint presentation and recording of this transcript from these two sites:

<http://nightsky.jpl.nasa.gov/docs/IBTcom1.ppt>

<http://nightsky.jpl.nasa.gov/docs/IBTtelecon.mp3>

If you save and open these two files on your PC, you can watch the slide show while listening to a recording of the conference call.

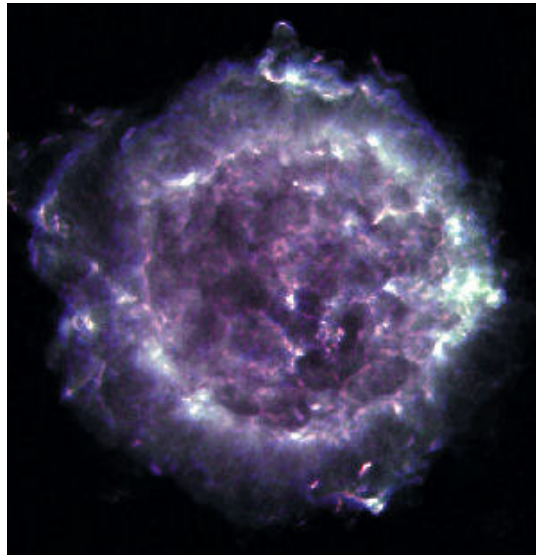
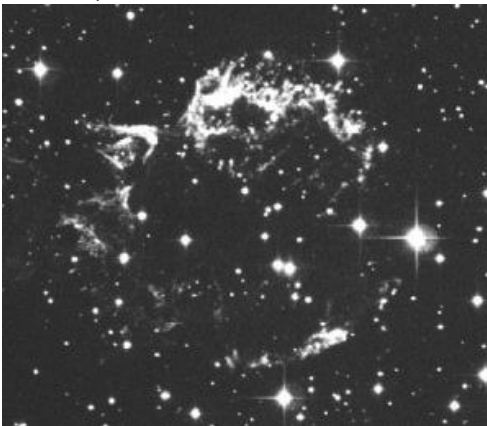
Note: The teleconference audio begins with several minutes of music. You can skip the music by sliding the virtual button forward a few pixels.

The presentation also contains instructions for building your own "Itty Bitty" radio telescope from a kit, for demonstrations or other educational purposes.

There is also a Society of Amateur Radio Astronomers at <http://www.radio-astronomy.org/>

A good example of what radio telescopes can accomplish is this imagery of **Cassiopeia A**, a supernova remnant in the constellation Cassiopeia and the brightest extra-solar radio source in the sky. For more information, see: <http://seds.org/~spider/spider/Vars/casA.html>

Below, left: Optical photo of Cassiopeia A, star remnant. Below, right: Radio telescope photo of Cass A., from Green Bank.



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