

Star Dust

National Capital Astronomers, Inc.

March 2009

Volume 67, Issue 7

<http://capitlastronomers.org>

Next Meeting

When: Sat. Mar. 14, 2009

Time: 7:30 pm

Where: UM Observatory

Speaker: Robert MacDowall,
NASA Goddard

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Directions to Dinner/Meeting

Members and guests are invited to join us for dinner at the Garden Restaurant located in the UMUC Inn & Conference Center, 3501 University Blvd E. The meeting is held at the UM Astronomy Observatory on Metzert Rd about halfway between Adelphi Rd and University Blvd.

Need a Ride?

Please contact Jay Miller, 240-401-8693, if you need a ride from the metro to dinner or to the meeting at the observatory. Please try to let him know in advance by e-mail at rigel1@starpower.net.

Mar. 2009: Dr. Robert MacDowall NASA Goddard Space Flight Center Spacecraft Radio Astronomy of the Solar System: Detecting Sources of Particle Acceleration



Abstract: The solar corona and the interplanetary medium are home to processes such as shock acceleration and reconnection that produce unstable electron distributions. The perturbed electrons may produce radio waves that can be detected remotely. Except for the inner corona, the emission frequencies are sufficiently low that they can not penetrate the terrestrial ionosphere and must be observed from space. A similar situation holds for most planetary radio emissions, as observed by the Voyagers and other spacecraft. In this presentation, the sources of the radio bursts and their

applications will be reviewed. We will also consider briefly other phenomena that are detected with spacecraft electric field (dipole) antennas and will examine future improvements to the observing techniques, such as radio array observatories in space and on the lunar surface.

Biography: Dr. Robert MacDowall is an astrophysicist in the Laboratory for Planetary Magnetospheres at the NASA Goddard Space Flight Center (GSFC) in Greenbelt, Maryland. He obtained his bachelor's degree in physics from Swarthmore College in 1978 and his Ph.D. in Astronomy from the University of Maryland in 1989. His primary research experience is in solar and planetary radio astronomy, solar wind observations, and plasma waves observations and interpretation. He is the Mission Scientist for the Interstellar Boundary Explorer (IBEX) mission, a NASA Small Explorer mission to image energetic neutral atoms from the boundary of the heliosphere, where solar wind meets interstellar medium. He is the Principal Investigator of the Ulysses Unified Radio and Plasma Wave Investigation (URAP) and a Co-Investigator on the Wind/Waves and STEREO/Waves (radio and plasma wave) investigations. Currently, he is working extensively on concepts for radio observatories to be located on the lunar surface for low-frequency radio imaging. Such observatories would permit the imaging of solar and astrophysical sources at frequencies below 10 MHz for the first time.

Observing after the Meeting

Following the meeting, members and guests are welcome to tour through the Observatory. Weather-permitting, several of the telescopes will also be set up for viewing.

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Thank you!

Public Outreach at Space Telescope Science Institute

Michael Chesnes

On Saturday, January 24 NCA members Greg Piepol, Harold Williams, and I traveled to the Space Telescope Science Institute in Baltimore to participate in "StarryTelling at the Institute", part of STScI's Youth for Astronomy and Engineering series of outreach events. This day-long event, which was attended by families from as far away as Pennsylvania, included a variety of activities to engage young people in astronomy. Greg offered views of the Sun through his hydrogen-alpha telescope, which in spite of the lack of activity near solar minimum were pleasing to the eye because they were so sharp. Harold delivered a presentation on the Mayan calendar, and I showed families how to use a Ronchi tester from the NCA telescope making class to locate the errors on a homemade telescope mirror. Al Holm from STScI was a great help to me at the mirror testing station, where I also had books on display and photos from my trips to Stellafane. The event was primarily aimed at 6-12 graders, and some of the other activities available included an inflatable planetarium show, a tour of the Maryland Space Grant Observatory, silk scarf painting, and a presentation by Galileo himself.



Present and Past: The history of solar observation is succinctly represented by Galileo reenactor Mike Francis posing with a hydrogen-alpha telescope.

Photo Courtesy of Greg Piepol

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Please Support the Owens Science Center

Craig Levin

The recent economic situation has forced the state of Maryland to propose cuts to the 2009 budgets of its public schools, which would include the meeting site of the Astronomical Society of Greenbelt, the Owens Science Center (OSC). The OSC is a special facility, funded by the school board of Prince George's County. It is also available to students in private schools and the home-schooled. The OSC also provides use of its unique collections and facilities to scouting groups working on merit badges.

The OSC has a planetarium, the only one in the DC area funded by a school board. The planetarium demonstrates the basic principles of astronomy to student groups, and it also has monthly sky shows that are open to the general public. Also, the OSC has a special computer lab, the Challenger Learning Center, which enables visiting students to experience some of the excitement of running space missions. As such, the OSC is a powerful tool for astronomical outreach and education in our light-polluted area.

The OSC has a nature trail and a collection of both living and preserved plants and animals, concentrating on the flora and fauna of the DC area. It also has a collection of geological specimens. The OSC can both broaden and deepen visiting students' understanding of the "big three" sciences studied in most schools by introducing students to the earth sciences, which depend on chemistry and physics, and to ecology.

The OSC introduces students to the way science is really done, by observing, collecting, and working. As amateur astronomers, we have a natural interest in encouraging young people to be curious about the world in this manner. Unfortunately, because the OSC does not have a PTA, it lacks a natural group of defenders before the school board. I would like to ask you to set some time aside and to write to the school board of Prince George's County to ask them to preserve the OSC.

Mid-Atlantic Occultations and Expeditions

Dr. David Dunham

If one reads the messages on the main occultation observer list servers, especially a new observer, he or she would probably get the impression that relatively expensive and complex equipment is needed to make useful observations, and that events consist mainly of occultations of very faint, difficult to find and observe stars by asteroids, or, for example, the difficult events like the Saturnian satellite mutual events. These are interesting to those of us who have been in the game for a long time, but as you note, intimidating to many. It doesn't have to be that way.

Beginners should start, as I did, and many others who are now observing occultations, by observing some total lunar occultations. These occur quite frequently, visible with common 10cm to 20cm telescopes almost every night that the crescent or not-too-full gibbous Moon is above the horizon, and visible from one's backyard or other convenient observatory or location. Observing these can provide valuable experience for timing other more challenging events, including asteroidal occultations and the spectacular but rarer (usually needing a mobile effort) lunar grazing occultations. Visual timings of total lunar occultations are still useful (although marginally so), and the occasional step events that can be seen can still result in close double star discoveries.

Video recording of lunar occultations is better than visual timing, to eliminate the "personal equation" (reaction time). Their frequent occurrence provide opportunities for practicing and improving one's skills with using video equipment. Video equipment doesn't have to be hugely expensive, as Scotty Degenhardt has shown with his multiple small stations

[for details, see <http://www.asteroidoccultation.com/observations/NA/> in the "Miscellaneous Equipment Files" box in the lower right, and click on the items under "The 'Mighty-Mini' video camera system by Scotty Degenhardt - the most detailed information is the item "The Effects of Optical Miniaturization on Occultations" or, directly, http://thedegshop.com/YA2009/Effects_miniature_optics_occultations.html].

There is some expense, but with care, it can be much less than many telescopes that most observers already have. You do need a sensitive camera, like the PC164C-EX2 from www.supercircuits.com for \$169; fitted with a \$35 adaptor from Adirondack Video, it can fit into any standard 1.25" eyepiece holder and "sees" stars about as faint as you can see with a good eyepiece. The largest expense is usually the recorder, but many already have VCR's, and some have input-capable (that's the key, to be able to record the video from the PC164C-EX2 camera) camcorders that can serve this purpose. If you don't have a video recorder, you might do what Scotty Degenhardt did for his many stations - buy an input-capable camcorder on E-bay. Scotty looked for Canon camcorders, the models ZR10 to ZR300 have the necessary video input capability while most others don't, and by finding ones with burned-out CCD's so they couldn't image directly (which is what most people want with a camcorder), he was able to find many bargains; his average price was only \$36. Unfortunately, the current off-the-shelf digital recorders, such as the MDVR-10 for \$256 from Supercircuits, use compression techniques that lose sensitivity, almost a magnitude for stars, making them less attractive than the old tape machines that record uncompressed, full-resolution NTSC-standard (or PAL-standard and even SECAM-standard in some parts of the world) video.

Note that even if you don't have video, visual observations are still fully acceptable for lunar grazing occultation observations, where the need is only for timings accurate to better than 0.5 second since the accuracy of their results is more dependent on knowledge of the geographical location of the observer. Although almost always requiring a mobile effort, the multiple events seen during these events, sometimes involving very bright stars, make them fascinating to watch and thereby engender enthusiasm.

Finally, we keep stressing that a visual observation of an asteroidal occultation is better than no observation - we are always short of observed chords to define the asteroid's profile. After observing a few of these events, whether an occultation is seen or not ("positive" or "negative" observations, both are important), observers are often motivated to improve their accuracy by "going video". Asteroidal occultations don't require a mobile effort, a few are observable each year, and usually at least one opportunity each month (but then it might be cloudy) from a given location with 20cm telescopes. But if you can go mobile for these events, that increases the number of opportunities.

More information about timing occultations is at <http://iota.jhuapl.edu/timng920.htm> but that was written before Scotty Degenhardt's recent good work with small systems described well in the links given above.

**International Dark Sky
Association Releases Model
Lighting Ordinance (MLO)
for Public Review**
from IDA press release

The IDA/IES Joint Committee proudly announces the release to public review of the Model Lighting Ordinance (MLO). For three years, IDA and the Illuminating Engineering Society (IES) have collaborated on the creation of this breakthrough piece of civil legislation, designed to promote universal implementation of energy efficient, dark sky friendly, community outdoor lighting.

Subsequent versions will incorporate guidelines for street lighting, signage, and sports lighting applications. When finished, the MLO will be an invaluable tool in creating efficient and consistent outdoor lighting plans.

More information is available on IDA's MLO Public Review page

<http://www.darksky.org/mc/page.do?sitePagelId=84399>

Public review closes
Friday, 10 April, 2009.

Astronomy News

Notes on articles in GeminiFocus, December 2008

by Nancy Grace Roman

Star Clusters

Surrounding the nuclear black hole in our galaxy and other galaxies, there are compact star clusters with masses of 100,000 to 10 million suns. Although the total mass of these clusters is proportional to that of their host galaxies, the most massive galaxies appear to lack them. Most clusters contain both young and old stars. The clusters appear to be elongated in the same direction as the galaxy. As for the galaxy, the older stars are more spherically distributed. A study of the galaxy NGC 4244 shows that the disk of the cluster is rotating at 30 km/sec at about 32 light years from the center. Unexpectedly, the spherical distribution of older stars is also rotating.

Quasars and Black Hole Mass

It is well established that for quiescent and Seyfert galaxies the mass of the central black hole is closely correlated with the dispersion in the velocities of the stars in the host galaxy. Because of the brightness of the black holes in quasars, it is unclear whether this relation also holds for quasars.. Observations of four quasars indicate that these objects lie systematically above the line established for smaller central black holes. This may result from systematic effects but may also indicate that the masses of quasars have been overestimated.

Continued on Page 6

ALCON EXPO 2009

Date: Sunday August 2nd through Saturday August 8th, 2009

Place: Hofstra University on Long Island, New York

Sponsored by: Amateur Observers' Society of NY, Inc.

For more details visit: www.alcon2009.org

Turn Lights off for Earth Hour

Saturday, March 28

by Michael Chesnes

One way that NCA members can learn about curbing light pollution is by taking part in Earth Hour, a brief but instructive activity which began 2007 in Sydney, Australia.

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

On 8:30 P.M. local time, people and organizations around the world participating in Earth Hour turn off their lights for one hour. I took part in last year's Earth Hour, and it made me aware of how many lights I have at home, as well as how many I really need to have on at one time. Earth Hour is not an astronomical event per se, but it provides an excellent starting point for understanding how our decisions affect the night sky, and which are the easiest ones to change.

Continued from Page 5

High Speed Binary Pulsar

Most binary pulsars are either millisecond pulsars in circular orbits or longer period pulsars in eccentric orbits. One type of system initially is composed of a high mass star and a solar mass star. When the high mass star evolves into a neutron star, material is pulled from the companion in an accretion stream that increases the spin rate of the neutron star. The second system starts with two high mass stars. When the heavier one explodes, the companion is a red giant. That transfers material to its companion in a stellar wind that does little to increase the rotation speed of the neutron star but leaves the stars in an eccentric orbit. The pulsar, J1903+0327 does not fit either of these pictures. It is a very high speed millisecond pulsar with a solar mass but the orbit is highly eccentric. Such systems are common in globular clusters but there is no globular cluster near J1903+0327. The best explanation is that the explosion drove it from a cluster at a high speed.

Eta Carinae Shock Wave

New data on eta Car reveal faint, very fast moving (up to 36 million miles per hour), material indicative of a powerful shock wave from the explosion of 1843. This indicates that the power source for the great luminous outburst was an explosion. This explosion generated a shock wave similar to but less powerful than those from supernova explosions.

Red Nuggets in Early Universe

A team has discovered "red nuggets" at a redshift $z \sim 1.5$. These are as massive as modern large ellipticals but only one tenth the size. There is nothing comparable in today's universe. More surprising, the size expansion appears to have occurred quickly in the 16 billion years between $1.1 < z < 1.5$.

Datura Asteroids

A new family of asteroids, called the Datura family, has been discovered. These apparently resulted from the breakup of a larger body 400,000 to 500,000 years ago, making them some of the youngest asteroids in the main belt. More exciting, their spectra match those of ordinary chondrites, the most common type of asteroids found on earth for which examples in the main belt had been lacking.

A Standing Invitation to Suggest Speakers and Topics for NCA Meetings

John Hornstein

Is there a local speaker on astronomy whom you would like to hear? Have you come across a news item about a new result that you would like to learn more about? Is there some phenomenon on which you would like an update?

If so, send your suggestion to me, at jshqwave@yahoo.com, and we'll try to implement it at a future NCA meeting.

Calendar of Events

NCA Mirror- and Telescope-making Classes: Fridays, Mar. 6, 13, 20, and 27, 6:30 to 9:30 pm at the Chevy Chase Community Center, at the northeast corner of the intersection of McKinley Street and Connecticut Avenue, N.W. Contact instructor Guy Brandenburg at 202-635-1860 or email him at gfbandenburg@yahoo.com. In case there is snow, call 202-282-2204 to see if the CCCC is open.

Open house talks and observing at the University of Maryland Observatory in College Park on the 5th and 20th of every month at 8:00 pm (Nov-Apr) or 9:00 pm (May-Oct). There is telescope viewing afterward if the sky is clear.

Dinner: Saturday, Mar. 14 at 5:30 pm, preceding the meeting, at the [Garden Restaurant](#) in the University of Maryland University College Inn and Conference Center.

ALCON, the Astronomical League convention, will be at Hofstra University on Long Island this year. The meeting is joint with ALPO and AAVSO and is from 2-8 August. Hofstra is near New York City. Their web site is www.alcon2009.org. There are a number of interesting side tours.

Upcoming NCA Meetings at the University of Maryland Observatory

Mar. 14, 2009
Dr. Robert MacDowall, NASA Goddard Space Flight Center
Spacecraft Radio Astronomy of the Solar System

Apr. 11, 2009
Dr. Rachel Osten, University of Maryland
Stellar Flares

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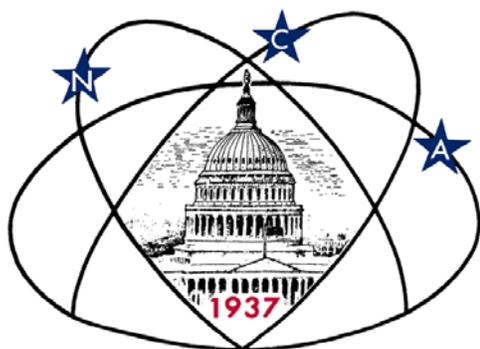
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Next NCA Mtg:

Mar. 14

7:30 pm

@ UM Obs

Dr. Robert

MacDowall

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