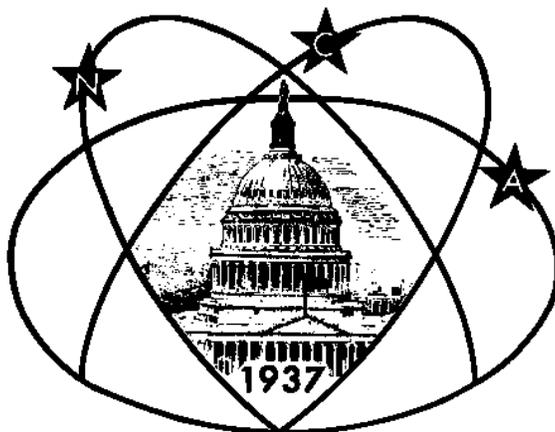


Star



Dust

National Capital Astronomers, Inc.

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Dr. Tom Van Flandern: "Why Do Planets Explode?" *submitted by Gary Joaquin*

Dr. Tom Van Flandern will present the featured talk for the October 6 meeting of National Capital Astronomers, "Why Do Planets Explode?" The meeting will be held in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane, Bethesda, MD at 3:00 P.M. The synopsis and biography that follow were written by the speaker.

Synopsis

Over 100 lines of evidence support the exploded planet hypothesis. Among these are the presence of explosion signatures in asteroid orbits, young exposure ages of meteorites to cosmic rays in space, comet-asteroid similarities, a comet orbit traceback indicating simultaneous origin at a common point, patterns of blackening on planet and moon surfaces, and the abundance of satellites orbiting asteroid and comet nuclei. The most frequently asked question by those encountering this evi-

dence is, "What would make a planet explode?"

Three models of planetary explosions now exist. The first is that planetary cores are either heating up due to gravitational contraction or cooling due to heat radiation. Eventually, the core pressures and temperatures reach a critical point at which some element undergoes a change of state (like water to ice or steam). Changes of state are accompanied by sudden changes of volume.

(continued on Page 2)

The President's Corner

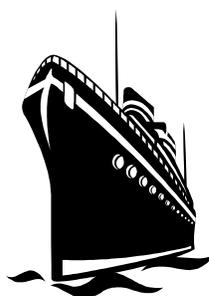
As you can see, we have a very different time and location for the October meeting. The events of September 11 have caused increased security at NIH

and Lipsett

is not available on weekends. I don't know how long this will last. I hope that the Bethesda Service Center site and time are satisfactory. An afternoon meeting might make it more convenient for juniors.

Also note that Bethesda is having their "Taste of Bethesda" celebration from 11-4 in the Woodmont triangle so parking there will be tight. We should be OK, though. The garage at the center is large. It was used in the movie "The Pelican Brief". Come early and try out the food. At the September meeting I said that I wanted to begin having tutorials to give mem-

(Continued on page 2)



We are moving the time and place of our October Meeting.

It will now take place at 3:00 P.M. at the Bethesda-Chevy Chase Regional Services Center of Montgomery County.



NCA

See directions and map on Page 8.

Review of September Lecture by Lou Mayo *By Gary Joaquin*

On Saturday, September 8, Lou Mayo of Goddard Space Flight Center and Raytheon presented a talk entitled "Titan, Our Second Sister Planet". Mr. Mayo suggested that Saturn's satellite, Titan, was more of a sister planet to Earth than the planet Venus. He reviewed what is known historically about Titan and how he has used data collected by Voyager to support his hypothesis.

Venus has always been considered to be a "sister" planet to Earth because of its similar size, but the differences between these planets are extreme. Venus has a surface temperature of 750°K (900°F), clouds composed of sulfuric acid and an atmospheric pressure approximately 90 times greater than Earth's; hardly a prescription for kinship. Lou Mayo suggested that Titan with its largely Nitro-

(Continued on page 3)

NCA Events This Month

The Public is Welcome!

NCA Home Page: <http://capitalastronomers.org>

Wednesdays, October 3, 10, 17, 24, 31, from 7:00 to 10:00 P.M. Mirror-Making classes during October will be on Wednesday evenings from 7:00 p.m. to 10:00 p.m. in Rooms 9, 13, and/or 14 in the basement of McKinley Hall, at American University, near Ward Circle, between Nebraska and Massachusetts Avenues, NW in Washington, DC. Call Guy Brandenburg for details at 202-635-1860 (evenings) or email him at gbranden@earthlink.net. **Note change from Fridays to Wednesdays.** See article on Page 6.

Fridays. Open nights with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia. See below.

Saturday, October 6, 3:00 P.M. - NCA meeting in the Bethesda-Chevy Chase

Regional Services Center of Montgomery County, 4805 Edgemoor Lane, Bethesda, MD. See the map and directions on Page 8.

Dr. Tom Van Flandern will present the featured talk "Why Do Planets Explode?".

Saturday, October 6, following the meeting

Dinner with the speaker and NCA members at the Moongate Restaurant, 4611 Willow Lane (across from the Farm Women's Market). Telephone: 301 657-3740. See the map and directions on Page 8.

Saturday evening, Oct. 20 beginning at 6:00 p.m., Open House at Hopewell Observatory. See directions on Page 6.

Tom Van Flandern

(Continued from page 1)

This can cause a planet to either implode or explode. The second model is based on the recent discovery of natural fission reactors, and the realization that these can be operative in planetary cores. The third is the most complete model, and relies on gravitation being a dynamic rather than a static process, allowing gravitational energy to accumulate within planets until a crisis occurs. Fortunately for us residents of planets, all of these processes operate on time scales of billions of years.

Biography

Tom received his Ph.D. degree in Astronomy, specializing in celestial mechanics, from Yale University in 1969. He spent 20 years at the U.S. Naval Observatory, where he became the Chief of the Celestial Mechanics Branch. In 1991, Tom formed a Washington, DC-based organization, Meta Research (<http://metaresearch.org>), to foster research into ideas not otherwise supported solely because they conflict with mainstream theories in astronomy. Tom is editor of the *Meta Research Bulletin*, which specializes in reporting anomalies and evidence that do not fit with standard theories in the field. During the past few years, he has also been a Research Associate at the University of Maryland Physics Department in College Park, MD, and a consultant to the Army Research Laboratory in Adelphi, MD, working on improving the accuracy of the Global Positioning System (GPS). Tom is also a member of National Capital Astronomers.

North Atlantic Books is the publisher of Tom's book, *Dark Matter, Missing Planets and New Comets*, in 1993 (2nd Ed. 1999). As with his research papers, the book is critical of many standard models in astronomy, such as the Oort Cloud, the Dirty Snowball, and the Big Bang theory. Tom also organizes the Eclipse Edge Expeditions to view solar eclipses and meteor storms. Tom has been honored by a prize from the Gravity Research Foundation, served on the Council of American Astronomical Society's Division on Dynamical Astronomy, taught astronomy at the University of South Florida and to Navy Department employees, been a consultant to NASA's Jet Propulsion Lab, and done several spots for the "Project Universe" series that continues to air occasionally on public TV.

(Continued from page 1)

bers some ideas for using their telescopes (or even buying one). To begin, I will hold one on solar observing, both visual and photographic. While I am by no means an expert, I can help people get started. The date is Saturday, October 13, at Noon with a cloud/rain date of October 27. My house is at 8924 Ridge Place in Bethesda. To get to my house, turn onto Greentree Rd. from Old Georgetown Rd. Ridge Place is about 0.9 mi down Greentree Rd. Then make a right turn onto Ridge Place and my house is the last house on the left. My phone number is 301-530-7942. If you plan on coming, please let me know a day or two before, or at the October 6 meeting. I don't know how long it will last, but I would say one to two hours.

Someone at the September 8 meeting said that they thought the University of Maryland Observatory wanted to relate more to the local amateur community. It turns out that this is true. I spoke to one of the people who operates the observatory and they would like to have some observing technique classes next summer. This is so that more amateurs can assist professionals in data collection and also simply improve and expand their abilities. We heard from Steve Robinson last year about the gamma ray burster project. The observatory has recently refurbished their C-14 and 0.5m f/15 Cassegrain. As soon as I hear more, I will pass it on.

Jay H. Miller

Observing with the NCA C-14

by **Bob Bolster**

Date

Oct. 12 (all 8:30 pm)

Oct. 19

Oct. 26

Prime Object

Uranus and Neptune

CCD Workshop: Learn the basics of CCD imaging techniques for deep-sky objects.

Gibbous Moon, Uranus and Neptune

At Ridgeview Observatory in Bob Bolster's backyard, 6007 Ridge View Drive, Franconia, Virginia (off Franconia Road between Telegraph Road and Rose Hill Drive). Call Bob at 703-960-9126 before 6:00 p.m., to let him know you are coming.

Review of September Lecture by Lou Mayo

(Continued from page 1)

gen atmosphere containing prebiotic hydrocarbons is a much more appealing relative.

Titan Facts

Titan was discovered by the Dutch astronomer Christian Huygens in 1655. Having a diameter of 5150 km (3200 miles), Titan is larger than the planets Pluto and Mercury and is the second largest satellite in the Solar System just after Jupiter's satellite, Ganymede. Revolving about Saturn at a distance of about 1,200,000 km (750,000 miles or about 20 times the radius of Saturn) Titan's rotational period is synchronized with its orbit which means that, like Earth's Moon, Titan always shows the same face to Saturn.

In 1944 the Dutch astronomer Gerald P. Kuiper confirmed that Titan possessed an atmosphere when his spectrographic observations detected the gas methane (CH₄), a major component of natural gas on Earth that is used for fuel. In 1970, Lewis, et al. detected Nitrogen in its atmosphere.

Not a whole lot was known in great detail about Titan until the Voyager space probes' encounters in 1980 and 1981. Lou Mayo is primarily interested in the data collected by Voyager 1's Infrared Spectrometer and Radiometer (IRIS) instruments.

Titan's Atmosphere

Titan's thick atmosphere distinguishes it from all the other satellites in the solar system. The atmospheric pressure at Titan's surface is 1.6 bars or about 60% greater than the atmospheric pressure at sea level on Earth. With a much weaker surface gravity than Earth's, Titan must have a lot more gas in its atmosphere to sustain this pressure, about 10 times more.

Titan's atmosphere is 90% Nitrogen, which may have come from ammonia (NH₃) deposited by comets which is easily broken down into hydrogen and nitrogen by the Sun's ultraviolet light. Since Titan's gravitational field is too weak to hold on to it, the hydrogen is free to escape into space or to recombine with other elements.

Methane is the next most common gas in Titan's atmosphere. Voyager discovered an extensive region of energetic

electrons and protons surrounding Saturn, trapped in the planet's magnetic field. Titan passes in and out of this field, causing its atmosphere to be irradiated with charged particles. The combination of sunlight, energetic particles, and methane produce a variety of hydrocarbons, molecules containing hydrogen and carbon. Voyager detected small amounts of ethane (C₂H₆), acetylene (C₂H₂), ethylene (C₂H₄) and propane (C₃H₈).

Mr. Mayo spoke of Carl Sagan who hypothesized that Titan's cloud layers could be composed of complex organic molecules and provided experimental evidence to support this. Sagan and his colleague, Bishon Khare, irradiated various mixtures of nitrogen and methane with ultraviolet light or electrons to produce reddish or brownish solids. He called them "tholins" which is the Greek word for "muddy". These tholins resembled the chemical composition of the murky haze that surrounds Titan. Mr. Mayo demonstrated that tholins are quite tasty, by snacking on a gooey lab sample during his talk.

Of all of the hydrocarbon byproducts in Titan's stratosphere, ethane is the most abundant. Radiative transfer modeling of Titan's lower stratosphere suggests that ethane may condense into droplets which fall to Titan's surface to form a liquid. Over the life span of Titan, enough ethane may have been produced to form lakes and rivers.

Nitrogen combines with these hydrocarbons to form compounds called nitriles. One of the best known nitriles is HCN or hydrogen cyanide. Many of these nitrogen compounds are the building blocks of the organic molecules upon which life is based. Given that the surface temperature of Titan is a frigid 95°K. (-300°F.) it is unlikely that life exists on Titan, however the presence of these compounds gives us the opportunity to study an environment in its prebiotic or pre-life form, which may resemble Earth in its early days of biological evolution.

Some molecules join together to form long repeated chains of molecules called polymers. Many of these compounds remain suspended in Titan's atmosphere to form its opaque aerosol haze. Carl Sagan suggested that the heavier sus-

pending polymer particles fall and settle on Titan's surface, covering exposed surfaces with a thick layer of tar-like goo.

Computer Modeling

Mr. Mayo has added to the understanding of this body of knowledge by reanalyzing the infrared data between 250 and 600 cm⁻¹ (wave numbers) taken from Titan's north polar hood by Voyager 1's IRIS instrument. He then generated computer models of Titan's atmosphere that employed a radiative transfer method appropriate for spherical atmospheres that included scattering and collision-induced absorption. It is important to emphasize that all of his conclusions are inferred from these models. Essentially, by sticking in a scattering cloud at a specific altitude, the resulting model either matches observed atmospheric data or it doesn't. Where correlations occur, inferences can be made about the size and abundance of the condensate particles. Mr. Mayo's models draw the following conclusions:

- The presence of small condensate particles less than 5 microns in size suggest that we are in a region that is saturated;
- Seed nuclei may have been largely cleared out of the lower stratosphere;
- It is likely that at the time of the Voyager 1 encounter, the bulk of precipitation in the north polar region had occurred before the time of these observations;
- If ethane is responsible for the condensate, then the model suggests that we are seeing a lower stratosphere cleared of aerosol; and
- If HCN is responsible, then we can still have an aerosol down to the tropopause for 1-micron-size particles.

The Future

The Cassini spacecraft launched in 1997 presently offers the greatest hope for providing more data about the structure of Titan's atmosphere. The Cassini spacecraft is transporting the European Space Agency's Huygens Probe, appropriately named after the discover of Titan. In 2004, the probe will be released and allowed to enter Titan's atmosphere

(Continued on page 4)

Lou Mayo

(Continued from page 3)

and parachute a fully instrumented laboratory down to the surface. Its mission will be to collect data about the clouds, atmosphere, and surface of Titan. Additionally, the Cassini orbiter has a number of instruments including CIRS, the Composite Infrared Spectrometer, to investigate the atmosphere and surface of Titan.

Lou Mayo believes that Titan is an excellent test case for future study of prebiotic environments. In addition, given our recent discoveries of life in abundance in extreme environments on Earth, life may be possible or may have existed at one time on Titan, which lends support to future missions to explore this possibility.

Special Thanks

Special thanks go to our speaker, Lou Mayo, for a fascinating presentation and for his personal and professional time in reviewing this article and for answering my numerous questions. Special thanks also go to Dr. Harold Williams for spending 3 1/2 hours with me to give me the basic technical background that enabled me to ask technical questions about this subject matter, and, equally importantly, to understand the replies to my questions. In summary, researching and writing this article was a tremendous experience. I learned so much about spectroscopy, chemistry, weather and Titan that I would recommend volunteering to write a review to any NCA member.

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www.darksky.org

Dark Sky Reserves

Submitted by
Nancy Grace Roman

Mr. Peter Goering of the Muskoka Heritage Foundations, in Canada, recently contacted NGDC (The National Geophysical Data Center) about the development of Dark Sky Reserves. He has been heading an effort to have a Dark Sky Park created in Canada. Beneficiaries include amateur astronomers and anyone interested in limiting the use of electrical power. Their initial efforts have been successful, as the Torrance Barrows Conservation and Dark Sky Reserve, 150 miles north of Toronto, was created in the last year. A subset of the DMSP Radiance Calibrated Nighttime Lights, developed by NGDC, was used by Mr. Goering and his colleagues in their presentations to Canadian Province and National legislative groups. This year the reserve will be expanded, increasing the area five-fold.

Additional success has become evident as many of the communities surrounding Georgian Bay, a body of water attached to Lake Huron, have made applications to become Dark Sky Reserves. Mr. Goering and his colleagues are particularly excited about these areas because the communities themselves have voluntarily asked for this designation, and they currently have no major problem with light pollution.

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Star Dust Is Now Available Electronically

Any member wishing to receive *Star Dust*, the newsletter of the National Capital Astronomers, via e-mail as a PDF file attachment, instead of

hardcopy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at ngroman@erols.com, or via telephone at 301-656-6092 (home)

Come See the Stars!

by Joe Morris

Exploring the Sky 2001 Schedule

Date	Time	Notes
10/13	7:30 P.M. (EDT)	Mars bright in the constellation Sagittarius
11/10	7:00 P.M. (EST)	Leonids peak 11/18

Exploring the Sky is an informal program that for nearly fifty years has offered monthly opportunities for anyone in the Washington area to see the stars and planets through telescopes from a location within the District of Columbia.

Sessions are held in Rock Creek Park once each month on a Saturday night from April through November, in the field south of the intersection of Military and Glover Roads, near the Nature Center.

Beginners (including children) and experienced stargazers are all welcome - and it's free!

Questions? Call the Nature Center at (202) 426-6829 or check the Internet sites: <http://www.nps.gov/rocr/planetarium> or <http://www.capitalastronomers.org>

Other National Capital Area Meetings

Northern Virginia Astronomy Club (NOVAC) meets 7:00 p.m. on the second Sunday of every month.

The new meeting site is Enterprise Hall, Room 80 on the Fairfax campus of George Mason University.

October 14 - John Nusbaum, "The Astronomy Life Style" What it takes to be an amateur astronomer, for you and your family, from newbie to dark-sky freak. 703 803-3153. Source: <http://novac.com>

Greenbelt Astronomy Club

The Greenbelt Astronomy Club meets at 7:30 p.m. on the last Thursday of each month (except when it falls on a holiday) at the H.B. Owens Science Center on Greenbelt Road east of Greenbelt, Maryland.

October 25 Richard Moore, "The Basics of Spectra".

Source: lheawww.gsfc.nasa.gov/docs/outreach/gac/GAC.html

Stellar & Extragalactic Astronomy Lunch

Talks are Wednesdays at 12:00 Noon in Room 242 of Building 21, GSFC

October 10 Alex Kutnyrev, GSFC/RITSS, "Programmable Masks for NGST Spectroscopy"

October 17 Ted Gull, GSFC, "Lyman Pumping in Nebulae"

October 24 Joel Offenberg, "GSFC/RITSS, "Cosmic Ray Rejection and IR Detectors"

October 31 George Sonneborn, GSFC FUSE, "Deuterium Studies"

For more information, contact Jonathan P. Gardner, email gardner@harmony.gsfc.nasa.gov.

Source: <http://hires.gsfc.nasa.gov/~gardner/seal>

Goddard Scientific Colloquia

The Scientific Colloquia will be held at 3:30 p.m. on Fridays. Due to construction in Building 3, the Colloquium will be held in the Building 8 auditorium, except as noted. For the time being, access to Goddard Space Flight Center is limited to those holding Goddard badges or official visitors. We regret the inconvenience to our regular guests.

October 5 Charles Whitney, Harvard University, "The Milky Way: An Elephant in the Sky"

October 12 Bruce Kane, University of Maryland, "Quantum Computing"

October 19 James Fleming, Colby College, "Carbon Dioxide and Climate: the First 100 Years"

October 26 Wallace Broecker, Columbia University, "Circulation Pattern in the Glacial Ocean"

If you plan to attend and do not have a NASA badge, please contact Carol Krueger, at (301) 286-6878, at least 24 hours beforehand. Source: lheawww.gsfc.nasa.gov/users/djt/colloq/

University of Maryland at College Park Astronomy Colloquia

All Astronomy Colloquia are held in Room CSS 2400 on Wednesdays at 4:00-5:00 p.m. unless otherwise noted.

October 10 Dr. Adam Riess, Space Telescope Science Institute, "Cosmological Implications of the Most Distant Supernova (known)"

October 17 Prof. Julian Krolik, Johns Hopkins University, "The Last Gasp: Dynamics of Matter in the Final Stages of Accretion onto a Black Hole"

October 31 Dr. Jeffrey Linksky, JILA, University of Colorado, "TBD"

Special accommodations for individuals with disabilities can be made by calling (301) 405-3001. It would be appreciated if we are notified at least one week in advance. Parking: Most parking meters in Parking Garage 2 have been removed. Parking for visitors is available in the Cashier-Attended Parking Lot at the intersection of Paint Branch & Technology Drive. It is a 5-10 minute walk from the parking lot to the Computer & Space Sciences building.

Source: <http://www.astro.umd.edu/colloquia/colloquium.html>

LHEA Goddard's Tuesday Seminar Series

NASA Goddard Space Flight Center Building 2, Ground Floor Conference Room 3:30 P.M. Cookies, Coffee and Tea 3.45 P.M. Seminar

October 9 Dr. M. Coleman Miller - U. Md., C.P. "Origin and Implications of Intermediate-Mass Black Holes"

October 16 - Dr. Vikram Dwarkadas - U. Del. TBA

October 23 - Dr. Andy Ptak - JHU TBA

October 30 - Dr. Edward Brown- U. of Chicago "Towards an Understanding of Superbursts from Accreting Neutron Stars"

Space Telescope Science Institute

(STScI) Free public lectures at the Space Telescope Science Institute (STScI).

Each month a noted scientist discusses a different cosmic topic. Lectures are at 8 p.m. the first Tuesday of every month in the STScI auditorium, on the campus of Johns Hopkins University. Free parking is available. For directions, call 410-338-4700.

October 2 Kailash Sahu, STScI, "Gravitational Microlensing".

Source: http://hubble.stsci.edu/about_us/open-night.shtml

NASM Public Information: Claire Brown (202) 357-1553 (202) 357-2700

Sixth Street and Independence Avenue, SW, Washington, DC 20560

Public Events at the National Air and Space Museum: All programs are free unless otherwise noted.

Thursday, October 4, 12:20 p.m., What's New? Einstein Planetarium: Solar System Update. Join staff astronomer Sean O'Brien for an overview of recent discoveries and developments about our closest neighbors in space.

Saturdays, October 6, 13, 20, 27,

11:30 a.m. to 12 noon, "Flights Of Fancy" Storytime for Children, "How Things Fly" (Gallery 109). Can you imagine planning a trip to Mars? What should you bring with you? Stories and activities just for children ages 3 to 7 (and their adult companions) answer these fun questions and more. Reservations required one week in advance.

Saturday, October 20, Evening Stargazing, Dusk to 11 p.m., Sky Meadows State Park. As darkness falls join Sean O'Brien, staff astronomer of the Einstein Planetarium, for a public stargazing event. The evening begins with an orientation to the night sky, followed by a telescopic viewing of star clusters, planetary nebulae, galaxies and more. Local astronomers will be on hand to guide you through the sky. There is a \$2 park entrance fee per vehicle. For complete information and directions, contact Sky Meadows State Park at (540) 592-3556. Saturday, October 27 6 p.m., Einstein Planetarium *Monthly Star Lecture:* "Voyage Through the Solar System". Wednesday, October 17 Premier of a new permanent outdoor exhibition:

(Continued on page 6)

Other National Capital Area Meetings

(Continued from page 5)

“Voyage-A Journey Through Our Solar System”. At the premiere, Dr. Jeff Goldstein, project director, will discuss the science involved in the exhibition located on the National Mall just outside the museum. Public telescopic observing follows the Monthly Star Lecture, weather and time of sunset permitting.

Department of Terrestrial Magnetism

Carnegie Institution of Washington
5241 Broad Branch Road, N.W.
Washington, D.C. 20015

(202) 478-8820

October 3 Stacy S. McGaugh, Department of Astronomy, University of Maryland, “Galaxy Dynamics and the Cosmic Microwave Background: Small Bumps and Shallow Cusps”

October 24 John D. Monnier, Harvard-Smithsonian Center for Astrophysics, “Interferometric Imaging of Wolf-Rayet Stars and their Pinwheel Nebulae”
Seminars are all at 11:00 a.m. and are held in the Seminar Room of the Main Building. DTM is located on 32nd Street one block south of its intersection with Military Road. Proceed south on 32nd Street one

Mirror Making by Guy Brandenburg

NOTE the NEW DATES AND TIMES: Mirror-Making classes during October will be on Wednesday evenings instead of Friday evenings as in the past. This change is an experiment. See the next issue of *Star Dust* to see whether we will continue on Wednesdays or revert back to Fridays. Classes are very informal (and fun), and you can start or finish a mirror at any time. We can also give good advice on construction of the mounting and optical tube assembly, and help you to collimate (i.e., align) and/or test your current telescope's optics. Making a mirror through us is even cheaper than ordering an entire kit from a commercial establishment such as Newport, Willmann-Bell, or ASM, and trying to grind and polish it entirely on your own. Call Guy Brandenburg at 202-635-1860 (evenings) or email him at fbranden@earthlink.net for more information.

block to Jocelyn Street, turn left on Jocelyn and right into the parking lot. Coffee and tea will be served at 10:45 a.m. Please call to confirm that there have been no cancellations.

Source: esparza@dtm.ciw.edu

Open House at Hopewell Observatory by Bob Bolster

NCA members, families, and guests are invited to enjoy the autumn sky at Hopewell Observatory on Saturday evening, October 20. View the Milky Way and deep-sky objects as well as the planets Mars, Uranus, Neptune, and Saturn; and the crescent Moon. Sunset will be at 6:25 pm. Astronomical twilight ends at 7:54, but the Moon will not set until 9:21.

If you wish, come any time after 6:00 pm and bring your prepared picnic dinner. Coffee, tea, and cocoa will be provided by the Hopewell Corporation.

Directions:

(1) From the Beltway (I-495) go west on I-66 25 miles to Exit 40 at Haymarket onto U.S. 15. (2) Turn left on U.S. 15 at the end of the exit ramp. (3) Go 0.3 mile to traffic light, turn right onto Va. 55. (4) Go 0.8 mile to Antioch Road (Rt. 681) and turn right. (5) Go 3.2 miles to the end of Antioch Rd. and turn left onto Waterfall Road (601). (6) Go one mile and bear right onto Bull Run Mountain Rd. (Rt. 629). (7) Go 0.9 mile on 629 to narrow paved road at right with an orange pipe gate (Directly across from an entrance gate with stone facing). (8) Turn right through pipe gates, go 0.3 mile to top of ridge, and around the concrete building and towers. (9) Continue on dirt road through the white gate and woods a few hundred feet to the observatory. Park along the road short of the buildings.

If it is raining or hopelessly cloudy the events will be cancelled. For further information call (703) 960-9126. Observatory phone: (703) 754-2317.

Meteor Showers

October Radiants

Full Moon: October 2

Major Activity

Radiant	Duration	Maximum
Orionids (ORI)	October 15-29	Oct. 21 at 03:44 UT

Minor Activity

Radiant	Duration	Maximum
Arietids (Autumn)	September 7-October 27	Oct. 8/9
Delta Aurigids (DAU)	September 22-October 23	Oct. 6-15
Eta Cetids	September 20-November 2	Oct. 1-5
October Cetids	September 8?-October 30?	Oct. 5/6
October Cygnids	September 22-October 11	Oct. 4-9
Draconids (GIA)	October 6-10	Oct. 9/10
Epsilon Geminids (EGE)	October 10-27	Oct. 18/19
Northern Piscids	October 5-16	Oct. 12/13

Daylight Activity

Radiant	Duration	Maximum
Sextantids	September 24-October 9	Sept. 30-Oct. 4

Source: <http://comets.amsmeteors.org/meteors>

Deadline for November *Star Dust*: October 15

Please send submissions to Elliott Fein at elliott.fein@erols.com. Text must be in ASCII, MS Word, or WordPerfect.

Thanks.

Mid-Atlantic Occultations and Expeditions for September

by David Dunham

Asteroidal Occultations

DATE	Day	EDT	Star	Mag	Asteroid	dmag	Dur	Ap. s in.	Location
Oct 10	Wed	0:08	TYC00240805	9.9	Hamburga	3.1	7	5	Florida
Oct 10	Wed	7:03	TYC06290071	11.3	Kythera	2.7	9	8	Ohio (dawn)
Oct 10	Wed	18:50	TYC05700048	10.8	Arachne	2.0	19	6	Maine (dusk)
Oct 12	Fri	0:26	SAO 110171	9.2	Lucia	4.8	4	3	Virginia
Oct 18	Thu	0:52	TYC05430855	10.6	Henrietta	2.7	10	6	Texas
Oct 19	Fri	6:51	SAO 111369	10.1	Rockefellia	4.1	6	5	W. Virginia
Oct 23	Tue	5:09	HIP 20546	10.7	Fragaria	4.0	5	6	James Bay
Oct 27	Sat	22:23	TYC18501464	10.8	Hale	3.7	6	8	Georgia
*** Dates and times above are EDT, those below are EST ***									
Nov 1	Thu	4:47	TYC19471075	10.2	Pandora	2.7	5	6	n. Florida

Lunar Grazing Occultations and a Grazing Annular Solar Eclipse

DATE	Day	EDT	Star	Mag	% alt	CA	Location
Oct 7	Sun	2:14	epsilon Tau	3.5	80-	54-17S	Greenbelt, MD; DC; Arlington, VA
Oct 7	Sun	2:14	epsilon Tau	3.5	80-	54-17S	Greenbelt, MD to Arlington, VA
Oct 9	Tue	1:04	11 Gem	6.9	60-	78 13N	Urbana & Westminster, MD
Oct 13	Sat	5:31	ZC 1535	6.8	16-	24 8N	Corning, NY
Oct 13	Sat	7:05	46 Leonis	5.4	16-	43 5N	n. Staunton, VA; Sun alt. -4
*** Dates and times above are EDT, those below are EST ***							
Dec 14	Fri	17:30	The Sun	-27	0	13 N	Liberia, Costa Rica*
* see http://iota.jhuapl.edu for more about this annular solar eclipse							

Total Lunar Occultations

DATE	Day	EDT	Star	Mag	% alt	CA	Sp.	Notes
Oct 6	Sat	5:52	R ZC 0527	6.2	86-	55 62N	K0	
Oct 6	Sat	22:38	R ZC 0639	6.1	80-	14 86N	F3	Az. 77 deg.
Oct 7	Sun	0:52	R ZC 0654	6.0	79-	39 65S	F4	
Oct 7	Sun	2:14	G epsilon Tau	3.5	79-	54 -17S	K0	bright side graze
Oct 9	Tue	1:05	R SAO 78211	7.9	60-	24 32S	B0	
Oct 9	Tue	1:10	R 11 Gem	6.9	60-	25 26N	B0	graze, Urbana, MD
Oct 9	Tue	1:29	R 12 Gem	7.0	60-	28 90N	A0	2nd star mag. 8.5
Oct 9	Tue	4:30	R ZC 0983	6.1	59-	62 41S	A2	double; Metis, Sept. 7
Oct 9	Tue	4:40	R ZC 0982	6.6	59-	64 68S	K1	Close triple
Oct 11	Thu	2:09	R ZC 1253	7.3	37-	13 72N	K0	Possible close double
Oct 13	Sat	5:47	R ZC 1535	6.9	16-	28 46N	K0	Graze, Corning, NY
Oct 14	Sun	6:30	R ZC 1659	6.7	8-	23 67S	K0	Sun alt. -10 deg.
Oct 23	Tue	20:12	D SAO 188948	7.5	49+	26 81S	F7	
Oct 26	Fri	22:36	D ZC 3323	7.5	76+	34 44N	A5	2nd star mag. 8.9
Oct 26	Fri	22:43	D AB Aqr	7.9-10	76+	34 36N	M7	
Oct 28	Sun	1:52	D ZC 3458	6.2	85+	19 69S	K0	
*** Dates and times above are EDT, those below are EST ***								
Oct 28	Sun	18:12	D 33 Piscium	4.6	90+	24 72N	K1	ZC 0005; close triple??
Oct 28	Sun	22:10	D ZC 0018	5.8	90+	46 28S	K1	possible close double
Nov 2	Fri	23:54	R ZC 0617	6.6	96-	61 54S	F6	
Nov 3	Sat	22:55	R ZC 0755	6.2	91-	43 64S	K0	possible close double
Nov 4	Sun	1:06	R 105 Tauri	5.8	90-	66 89N	B2	close double? ZC 0766
Nov 4	Sun	5:29	R 108 Tauri	6.3	90-	48 30N	A2	ZC 0784

D following the time denotes a disappearance, while R indicates that the event is a reappearance. When a power (x; actually, zoom factor) is given in the Notes, the event can probably be recorded directly with a camcorder of that power with no telescope needed. The times are for Greenbelt, MD, and will be good to within +/-1 min. for other locations in the Washington-Baltimore metropolitan areas unless the cusp angle (CA) is less than 30 deg., in which case, it might be as much as 5 minutes different for other locations across the region. Mag is the star's magnitude. % is the percent of the Moon's visible disk that is sunlit, followed by a + indicating that the Moon is waxing and - showing that it is waning. So 0 is new moon, 50+ is first quarter, 100+ or - is full moon, and 50- is last quarter. The Moon is crescent if % is less than 50 and is gibbous if it is more than 50. Cusp Angle is described more fully at <http://www.lunar-occultations.com/iota>. Sp. is spectral type-color, O,B,blue; A,F,white; G,yellow; K,orange; M,N,S,C red

Check IOTA's Web sites at <http://www.lunar-occultations.com/iota> or at <http://iota.jhuapl.edu> for weather go/cancel decisions, and other updates..

David Dunham, dunham@erols.com or 301-474-4722

Getting to the NCA Monthly Meeting

Saturday, October 6

3:00 P.M. - NCA Meeting in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane, Bethesda, MD.

Dr. Tom Van Flandern will present the featured talk, "Why Do Planets Explode?"

Following the meeting, dinner with the speakers and NCA members at the Moongate Restaurant, 4611 Willow Lane (across from the Farm Women's Market). Telephone: 301 657-3740

Directions to the New Meeting Place

From North of Bethesda, .

1. Take Rockville Pike/MD-355 South.
2. Rockville Pike/MD-355 S becomes MD-355/Wisconsin Ave.
3. Shortly after Cheltenham Dr. (and one block before reaching Rt. 410), turn right onto Commerce Lane.
4. Commerce Lane becomes Edgemoor Lane.
5. After crossing Old Georgetown Rd., 4805 is the second entrance on the right. (See **M** on map.)
6. To get to public parking, continue on Edgemoor Lane which will make a sharp right turn. The parking garage is then on your right.

From Old Georgetown Rd., .

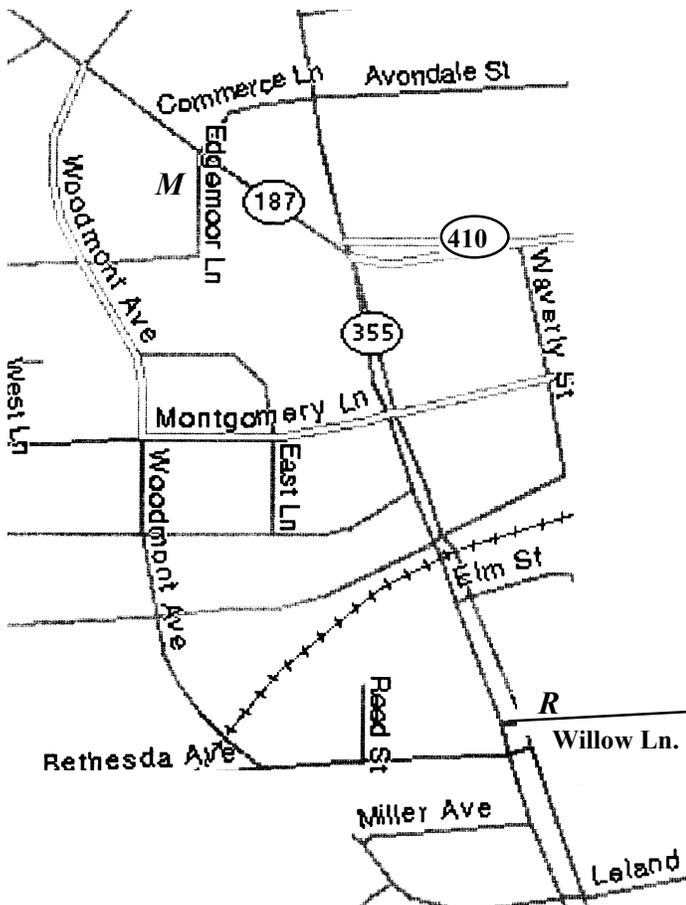
1. Go South toward Rt. 410 (East West Hwy.).
2. One block before reaching Rt. 410, turn right onto Edgemoor Lane. 4805 is the second entrance on the right. (See **M** on map.)
3. To get to public parking, continue on Edgemoor Lane which will make a sharp right turn. The parking garage is then on your right.

From South of Bethesda

1. Take MD-355/Wisconsin Ave. North.
2. Turn slight left onto MD-187/Old Georgetown Rd.
3. Turn next left onto Edgemoor Ln. 4805 is the second entrance on the right. (See **M** on map.)
4. To get to public parking, continue on Edgemoor Lane which will make a sharp right turn. The parking garage is then on your right.

Directions to the Restaurant

1. Following the meeting, turn left out of the parking garage.
2. Take the next left, which is still Edgemoor Lane.
3. Continue Northeast on Edgemoor Lane across MD-187/Old Georgetown Rd.
4. Edgemoor Lane becomes Commerce Lane.
5. Turn right onto MD-355/Wisconsin Ave.
6. Go south on MD-355/Wisconsin Ave.
7. After Rt. 410, watch Willow Lane, about four blocks down on your left. .
8. Turn left onto Willow Lane. The restaurant is #4611, on your left (white brick with white awning). (See **R** on map.)
9. A public parking lot is on your right.



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SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a nonprofit, membership-supported, volunteer-run, public-service corporation dedicated to advancing astronomy, space technology, and related sciences through information, participation, and inspiration, via research, lectures, presentations, publications, expeditions, tours, public interpretation, and education. NCA is the astronomy affiliate of the Washington Academy of Sciences. All are welcome to join NCA.

SERVICES & ACTIVITIES:

Monthly Meetings feature presentations of current work by researchers at the horizons of their fields. All are welcome; there is no charge. See monthly *Star Dust* for time and location.

NCA Volunteers serve in a number of capacities. Many members serve as teachers, clinicians, and science fair judges. Some members observe total or graze occultations of stars occulted by the Moon or asteroids. Most of these NCA members are also members of the International Occultation Timing Association (IOTA).

Publications received by members include the

monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

Consumer Clinics: Some members serve as clinicians and provide advice for the selection, use, and care of binoculars and telescopes and their accessories. One such clinic is the semiannual event held at the Smithsonian Institution National Air and Space Museum.

Fighting Light Pollution: NCA is concerned about light pollution and is interested in the technology for reducing or eliminating it. To that purpose, NCA is an Organization Member of the International Dark Sky Association (IDA). Some NCA members are also individual members of IDA.

Classes: Some NCA members are available for educational programs for schools and other organizations. The instruction settings include star parties, classroom instruction, and schoolteacher training programs that provide techniques for teaching astronomy. NCA sponsors a telescope-making class, which is described in the *Star Dust*

“Calendar of Monthly Events”.

Tours: On several occasions, NCA has sponsored tours of astronomical interest, mainly to observatories (such as the National Radio Astronomy Observatory) and to the solar eclipses of 1998 and 1999. Contact: Sue Bassett wb3enm@amsat.org

Discounts are available to members on many publications, products, and services, including *Sky & Telescope* magazine.

Public Sky Viewing Programs are offered jointly with the National Park Service, and others. Contact: Joe Morris. joemorris@erols.com or (703) 620-0996.

Members-Only Viewing Programs periodically, at a dark-sky site.

NCA Juniors Program fosters children’s and young adults’ interest in astronomy, space technology, and related sciences through discounted memberships, mentoring from dedicated members, and NCA’s annual Science Fair Awards.

Fine Quality Telescope, 14-inch aperture, see “Calendar of Monthly Events”.

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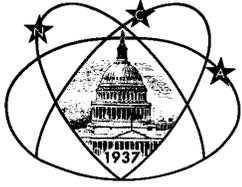
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