Star Dust

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Two NCA Meetings in January 2006

by Dr. Harold Alden Williams

January 7 Meeting

On January 7, 2006 at 7:30 P.M. at the University of Maryland's Observatory on Metzerott Road; we will have a bonus meeting of NCA where Dr. Joel Tohline will speak on "Contact Binary White Dwarfs Exchanging Matter." He will show us some spectacular visualization of complex fluid flows in this astrophysical system before he presents it to the 207th meeting of the AAS, American Astronomical Society. The AAS meets in the Washington Metro area once every four years, so we are taking advantage of this infrequent event to draw an out of area speaker to a NCA meeting. We will eat with the speaker at 5:30 P.M. at the "Garden Restaurant" at the Inn and Conference Center at the University of Maryland.

Dr. Joel Tohline

Dr. Joel Tohline is Alumni Professor at the Department of Physics and Astronomy at Louisiana State University in Baton Rouge. Dr. Tohline has authored over ninety articles in scientific journals and proceedings on problems related to complex fluid flows in astrophysical systems. His expertise in utilizing high-performance computers to accurately simulate the processes by which stars form and to simulate catastrophic events that will give rise to bursts of gravitational radiation is recognized worldwide. A dozen students have completed their doctoral dissertation research under his direction (the first of which was Dr. Harold Williams, the current president of NCA) and he has been a lead investigator on grants that have brought over nine million dollars in federal and state funding to LSU.

Dr. Tohline earned a B.S. in Physics from Centenary College of Louisiana in 1974 and a Ph.D. in Astronomy from the University of California, Santa Cruz in 1978. Before joining the LSU faculty in 1982, Dr. Tohline held a J. Willard Gibbs Instructorship in the Astronomy Department at Yale University and a postdoctoral fellowship in Group T-6 at Los Alamos National Laboratory. He has served as a member of the Publications Board of the American Astronomical Society, as a member of the Applications Strategy Council of Internet2, on the Program

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Review of Talk by Dr. H. John Wood: "Fifteen Years of Astounding Images from the *Hubble Space Telescope*"

by Dr. Wayne H. Warren Jr.

Dr. John Wood of the Instrument Synthesis and Analysis Laboratory at NASA's Goddard Space Flight Center was the featured speaker at the December 10 monthly meeting of the National Capital Astronomers.

Since Dr. Wood's presentation consisted mostly of images taken by the Hubble Space Telescope (HST) over the years, this review will be short and will consist mostly of just mentioning the different kinds of objects shown, with occasional commentary provided by Dr. Wood.

Dr. Wood's first image was of a house in Baltimore just a few doors from where he lived as a boy. The house was owned by a Mr. Joseph Woods, who owned a machine shop in Baltimore. Mr. Woods built an observatory dome atop his house and made a beautiful 12-inch telescope with mostly brass parts using his skills and the machines in his shop. The really important thing was that Mr. Woods often invited little Johnny Wood over to look through his telescope to see the wonders of the heavens; this was the beginning of a lifelong interest in astronomy for the little boy.

Dr. Wood briefly discussed NASA's space shuttle and described some design modifications that might be considered for the shuttle's successor. The HST was launched in April of 1990 by the shuttle. The satellite weighs about 25,000 pounds (11,364 kg) and is about the size of a school bus. We all know about the flaw in the primary mirror that limited HST's work for its first three years before the COSTAR system was installed. Dr. Wood described the HST servicing missions and the successful corrective optics system. Newer instruments were installed during these missions, as were improved solar panels made of iridium.

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NCA Events This Month

The Public is Welcome!

NCA Home Page: http://capitalastronomers.org

NCA Mirror- and Telescope-making Classes: Fridays, Jan. 6, 13, 20, and 27, 6:30 to 9:30 P.M. 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 gfbrandenburg @yahoo.com.

Observing with NCA's 14-inch telescope: See schedule and information at right.

Open house talks and observing at the University of Maryland Observatory in College Park on the 5th and 20th of every month at 9 P.M. The talks are non-technical. There is telescope viewing afterward if the sky is clear.

Dinner with NCA members and speaker: Saturday, January 7 and Saturday, January 14 at 5:30 P.M., preceding the meetings, at the Garden Restaurant in the University of Maryland University College Inn and Conference Center. See map and directions on Page 6.

Upcoming NCA Meetings
January 7: Dr. Joel Tohline, Alumni Professor at the Department of Physics and Astronomy at Louisiana State University in Baton Rouge, "Contact Binary White Dwarfs Exchanging Matter"
January 14: Dr. Harold Williams, Adjunct Professor of Astronomy, Montgomery College, MD, "Things that Excited Me at the 207th AAS Meeting, January 8-12."
February 11: Vera Rubin, Carnegie Institution: "Polar-Ring Galaxies"
March 11: Michael A'Hearn, Astronomy Department, University of Maryland: "Deep Impact"
April 8: Alan Bunner, NASA HQ (retired): "The Anthropic Principle"
May 13: Robert W. Farquhar, The Johns Hopkins University, Applied Physics Laboratory, Space Department: "The Lagrange Points"
June 10: TBA.

Observing with the NCA C-14

Mike McNeal

Schedule is open, generally, Saturdays at 7:30 P.M. Call to set up a time.

In Mike McNeal's backyard, 5410 Grove St, Chevy Chase, MD, (Friendship Heights Metro).

Please make reservations by 10 p.m. the Friday before.

Call Mike at 301-907-9449 or email him at mcnealmi@verizon.net.

The deadline for the February Star Dust is January 25. Please send your material to Elliott Fein by that date to ensure inclusion. Send submissions to Elliott Fein at elliott.fein@verizon.net.

Articles submitted may be edited to fit the space available.

Two NCA Meetings in January 2006

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Advisory Council of LIGO, as Chairman of LSU's Department of Physics & Astronomy, and as Interim Director of LSU's Center for Applied Information Technology and Learning (now the Center for Computation & Technology).

January 14 Meeting
On January 14, at 7:30 P.M. at University of Maryland's Observatory on Metzerott Road; we will have the regular, second Saturday of the month, meeting of NCA, where Dr. Harold Williams will speak on "Things that Excited Me at the 207th AAS Meeting, January 8-12." Hopefully he will show us a panoply of images and ideas that he has acquired at the meeting. We will eat with the speaker at 5:30 P.M. at the "Garden Restaurant" at the Inn and Conference Center at the University of Maryland as we usually do.

Dr. Harold Williams
Dr. Harold Williams is the director of the Montgomery College Planetarium, MCP, (since 1990) at MCTPSS, Montgomery College Takoma Park/Silver Spring Campus, Maryland and the physics lab coordinator. This is a staff job so he is also an adjunct professor, and teaches astronomy every regular semester at Montgomery College. He sometimes teaches a mathematics course and occasionally a physics or geology courses as well as astronomy at the same time. Since he is a full time staff member at Montgomery College, he has been active in the Montgomery College Staff Union where he was on the organizing committee and has served as web master, executive board member, vice-president, president, and is now vice-president again. He is also a member educator and trains union stewards for AFSCME, American Federation State County and Municipal Employees, Council 67 in Maryland. He has also run numerous teacher workshops in the summer, with the title "Astronomy Across the Curriculum" when he can raise money through grants to finance this. He is mentor to the Science Club at MCTPSS. He has also been vice president and president for two years each of NCA and is now the first recycled officer as president again. And this time as president he has led a change in the NCA constitution and by-laws to modernize the organization so we can survive. He has also been an Internet evangelist putting the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, DTM/CIW, and Montgomery College, MC, on the Internet by making proposals to NASA and NSF, National Science Foundation. He now writes and maintains the extensive web pages for the MCP, NCA, and AFSCME local 2380. He is also the registered domain owner of capitalastronomers.org, mcstaffunion.org, and astrolabes.org through at least August 2012. Most of the web pages at astrolabes.org are done by a collaborator, Jim Morrison of Rehoboth Beach, Delaware, who founded a company called Janus that makes the most accurate astrolabes on the planet for the public. Dr. Williams may be Janus' best customer. Recently Dr. Williams has become inter-

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Two NCA Meetings in January 2006

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ested in Mayan Astronomy and has developed a new planetarium program on such, (after he traveled to Tikal, Guatemala on family business) and plans to spend six weeks of the coming summer in Mexico, Guatemala, Honduras, and Belize if he gets admitted to a special study program.

Dr. Williams earned a BS from Florida State University in 1973 with a double major in mathematics and physics. He then got a MS from the State University of New York at Stony Brook in 1979 while trying unsuccessfully to formulate a renormalizable quantum field theory of Einstein-Cartan space-time invariant local gauge theory. He became depressed when this proved unworkable. It was not generally appreciated at the time that all General Relativistic, GR, theories are nonrenormalizeable because of the fundamental appearance of dimensionality in gravity, of the Planck length, $(G\hbar/c^3)^{1/2} = 1.6 \times 10^{-35}$ meters, Compton wavelength equal to the Swartzchild radius (quantum foam).

"Supersymmetry" in "String Theory" and "Quantum Loop Gravity" are two attempts to bypass this problem, through third quantization. He maintains some low level interest in this insanity still, and thinks that physics will have to abandon the use of real numbers in addressing quantization of the space-time manifold, since distances smaller than the Planck length make no sense, since real numbers have the property that given any two real numbers, no matter how close, there are an infinite number of real numbers between them. Actual measurement of lengths and time do not follow this property of the real numbers. So it will be back to integer arithmetic at this small level, 10^{-20} smaller than a Fermi=10^{-15} meters (size of hadrons: neutrons and protons and such). The curious public planetarium program in April of every year "Space-Time Invariance and Quantum Gravity" demonstrates this interest. In 1988, Williams was back on track getting a Ph.D. from LSU with Joel Tohline, as his major professor, with a thesis titled "Star formation, using 3-D Explicit Eulerian Hydrodynamics." He then spent two years working at DTM/CIW making Alan Boss first order star formation hydrocode second-order in space and time as he had done for Dr. Tohline. Following this, he came to work for MC and has been employed there since then. At MC he originally did not have a college computer in his office and for several years he supported the planetarium and his own need for e-mail communications with his own Amiga computers until the coming of the personal computers and then the Internet revolution came to community colleges. He still does not have a college FORTRAN compiler. All hydrocodes are still in FORTRAN. If and when hydrocodes have been coded in C he will try and run them on his dual G5 processor Macintosh (in his office), which he bought with teacher workshop money. If he worked at an institution with UNIX clusters he would do hydrodynamic calculations again. He may start applying for jobs again at such institutions. At the moment he is kind of like an astronomer without telescope access, a former computational astrophysicist without computers that have compilers. He is an excellent amateur astronomer, though, and does have use of a nice 10-inch portable telescope now; with a 4-color filter CCD camera that he has yet to master the use of. But he is working on it.

Review of Talk by Dr. H. John Wood

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Dr. Wood then began his presentation of Hubble images, starting with the Solar System and proceeding outward to the stars, nebulae, galaxies, and clusters of galaxies. A comparison image containing all of the planets except Pluto was shown to provide a size comparison. The HST has imaged all of the planets except Mercury, which is too close to the Sun to be an HST target. Several beautiful images of Mars were shown. The major surface features could be clearly seen and identified. A close-up image (not taken with HST) showed many features caused by running water. A planet-wide dust storm that occurred in 2001 was also shown, as well as images from the favorable opposition of 2003, which was said to be the best in 60,000 years.

Images of Jupiter are so good that the motions of the Great Red Spot can be studied. The images that HST captured of Comet Shoemaker-Levy 9 crashing into Jupiter's upper atmosphere are spectacular. We also saw images of Jupiter's polar regions and aurorae.

A recent collection of images of the largest asteroid, Ceres, shows the object's rotation clearly.

Images of Saturn as Earth moved through its ring plane were quite amazing, as we saw the rings edge-on and several moons in silhouette against them. Several views of auroral phenomena near Saturn's poles showed that the aurora on Saturn is not as strong as on Jupiter, but is still quite spectacular. The rings were shown at many different angles in images taken at different times in Saturn's orbit.

A Galileo image of Saturn's satellite Phoebe was shown. The satellite not only revolves in a retrograde orbit, but appears severely distorted and pock-marked from impacts. It appears that ice is exposed in several areas where impactors have penetrated the surface of Phoebe.

Uranus and Neptune both show significant changes in their atmospheres over time. Images of Pluto taken before and after the optics correction were quite a contrast in showing the resolution of the moon Charon. Recent images by HST showed the two new moons just discovered and multiple images clearly show the revolution of the new moons around Pluto.

Dr. Wood briefly discussed the far-out object Sedna as well as other objects that reside in the outer Solar System.

Stars having dust disks, such as β Pictoris, have been imaged clearly by HST. Some of the disks even show bright spots, which leads to speculation that planets may be forming in those disks.

A resolved image of Betelgeuse (α Orionis) was shown. Images of a brown dwarf taken at Mount Palomar and by the HST show how much higher the resolution of the latter is. Several images of globular clusters (M 80, 47 Tucanae) show that, in certain cases, the central area is resolved by HST imaging. White dwarfs inside the clusters can be identified and

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Review of Talk by Dr. H. John Wood

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measurements show that the brightnesses predicted are observed. Beautiful images of the Trapezium region of the Orion Nebula show the small regions (named proclids) in which new stars are condensing from the interstellar medium. Areas similar to Orion can be seen in distant galaxies and in distant regions of the Milky Way. Similar structures can be seen in images of the Large Magellanic Cloud (LMC), even though it is about 180,000 light years away. Dark nebulae and small globules can be seen silhouetted against bright regions behind them, as can elephant-trunk structures and pillars that are brightly illuminated at their ends, such as those in the famous image of the Eagle Nebula.

A gallery of planetary nebulae of all different shapes and sizes was shown. Each structure is a product of the interstellar medium in its area. Variations in the density and composition of interstellar space determine how the nebula expands and what its structure eventually becomes. Images of the supernova 1987A in the LMC were shown and it was demonstrated how the expansion of the shock front can be measured. A series of images shows how bright knots in the outer ring developed over time. Several other supernova remnants were shown, all with different structures. Several images of Kepler's supernova taken with different satellites were shown. The images were then superposed to show structures in the X-ray region (from Chandra), the visible (HST), and the infrared (Spitzer Space Telescope). The contrasting structures yield a lot of information about the temperatures and ionization levels within the remnant. A beautiful mosaic of three different images of the Crab Nebula taken at different times and combined showed intricate structures and spectacular colors.

We then moved on to galaxies. Images of several dwarf galaxies in the vicinity of the Milky Way were shown. These galaxies will eventually be gobbled up by our Galaxy, as will the Magellanic Clouds. Images by HST have clearly demonstrated that galaxy collisions and mergers are very common in the Universe. We then saw spectacular images of giant spiral galaxies such as M 51, NGC 4414, M 104 (the Sombrero Galaxy), M 31, and spirals with distorted disks. A recent Hubble image of the center of M 31 shows that three black holes reside there. Several images of merging galaxies taken by the new advanced camera for surveys were shown.

Images of clusters of galaxies, such as Abell 2218, show many examples of arcing caused by gravitational lensing of distant objects. A gallery of lensed galaxies showed many different examples of the structures produced. There was also a collection of high-redshift objects, one with a redshift of 6.7, shown.

The Hubble Deep Field, which required 10 days of continuous exposure of a region near the Big Dipper, was analyzed to find that about 3000 galaxies were visible. The more recent Ultra Deep Field, a small area in the southern hemisphere, shows about 6000 galaxies. The faintest objects in these images are at 32nd magnitude, which is more than ten magnitudes fainter than the limit of the famous 48-inch Schmidt telescope on Palomar mountain.

Many images of distant supernovae have been analyzed and used to calibrate the distance scale of the Universe. They also demonstrate that the Universe was not expanding as rapidly in the past as it is now, perhaps because of the effects of gravity when the objects were closer to each other. The significant finding that the Universe is accelerating was first indicated by the analysis of HST data.

This wonderful instrument, expensive as it has been, is still working and producing very high-quality results. Another servicing mission is scheduled, but is presently on hold until the shredding foam problems on the shuttle can be solved. Hopefully, we can look forward to many more astounding images and spectacular discoveries from this marvelous telescope.

The NCA thanks John Wood for spending an evening with us and for presenting this wonderful collection of results from the Hubble Space Telescope.

GSFC Colloquia
by Dr. Nancy Grace Roman

From: "Nancy Roman"
Subject: Access to GSFC Colloq.

Goddard has made attending the colloquia a little easier for US citizens. The directions now are: Contact Carol Kruger, 301-286-6878, Carol.A.Kruger@nasa.gov or Dave Thompson, 301-286-8188, David.J.Thompson@nasa.gov at least 72 hours in advance. Provide contact information to receive confirmation of attendance. On the day of the colloquium, come to the Goddard Security Desk at the main gate. Bring a photo ID such as a driver's license.

The Scientific Colloquium

All Colloquia will be held at 3:30 p.m. on Fridays in the Building 3 (Goett) auditorium, except as noted.

Coffee and tea will be served at 3:00 p.m., courtesy of GEWA. If you plan to attend and do not have a NASA badge, please contact Carol Krueger, at (301) 286-6878, at least 48 hours beforehand. To be added to our mailing list, call the same number.

Access to Goddard Space Flight Center is limited to those holding Goddard badges or official visitors. You can become an official visitor by finding a badged Goddard employee to escort you. The Scientific Colloquium Committee cannot promise to provide escorts. We regret the inconvenience to our regular guests.

Date, Speaker, Affiliation, Topic,
Jan. 13 Fred Lamb, University of Illinois, RXTE Tenth Anniversary Celebration "The Impact of Rossi XTE on General Relativistic and High Energy Astrophysics,"
Jan. 20 Christof Koch, California Institute of Technology, "The Quest for Consciousness---A Neurobiological Approach"
Jan. 27 James Smith, GSFC, "Space Based Ornithology -- On the Wings of Migration and Biophysics"
Feb. 3 Tom Brown, Space Telescope Science Institute, "The Age of Andromeda"
Feb. 10 Penelope Boston, New Mexico Institute of Mining and Technology, "Astrobiological Aspects of Caves"
Feb. 17 John Rundle, University of California, Davis, "Earthquake Prediction"
Feb. 24 Hasso Niemann, GSFC, "Huygens and Cassini Results at Titan"

Other National Capital Area Meetings

Northern Virginia Astronomy Club
Bob Parks was elected the new NOVAC President.

The next General Meeting is the 8th of January at George Mason University.

Please note: GMU has two parking lots designated as B. One of them has closed temporarily. Please continue further around Patriot Circle to the 2nd lot B or park in the Patriot center lot and walk to Enterprise Hall. Handicapped parking remains the same.

General membership meetings are open to the public, and are held at Enterprise Hall, Room 80, on the campus of George Mason University in Fairfax, Virginia. The meeting hall is in the basement floor of the building. It is best to park in parking Lot B and walk up the hill to the rear of Enterprise Hall (see note above).

Meetings start at 7:00 P.M., on the second Sunday of every month. If you come earlier, you can do a little socializing. The first part of the meeting is club business, during which the officers make reports about their activities and areas of responsibility. The next part of the meeting usually includes:

- Show and Tell, where members share gadgets, books, techniques, etc.
- The Observing Report, describing the astronomical events for the next month
- Q&A, where beginning astronomers are encouraged to ask questions to be answered by more experienced members
- The Sky Tour, describing what's where in the sky for the next month.

The final part of the meeting is a program, usually by one of the members, but sometimes by "outside experts." We've had presenters from all aspects of Astronomy.

There's a good deal of socializing before and after meetings, allowing members to put faces with the voices they've heard in the dark.

For more information, see http://www.novac.com

Planetarium at Montgomery College
Astronomy is the oldest science and one of the few sciences that welcomes amateurs. ***Everyone who looks up at the stars with wonder is an astronomer.*** The planetarium is open from the last week in August until the Friday before Memorial day in May. This is an academic institution so there are a few holidays like Thanksgiving and around Christmas and New Year's Day when the entire institution is closed.

All evening planetarium programs include a star party after the show, if it is clear. Star party means we look at the sky with telescopes. We have a 10 inch (2540mm) Meade LX200-GPS-SMT, a 3 1/2 inch (88.9mm) Questar, and a 4 1/8 inch (105mm) Edmund Astroscan telescopes that we bring outside the planetarium when clear. Bring your telescope to the star party, and we can have even more fun sharing, the more the merrier.

Free Public Shows
Saturday, 28 January 7 P.M. "How are Stars Born?" not the celebrities, but the gravitational controlled thermonuclear fusion reactors that are real stars.

Saturday, 4 February 7 P.M. "African Skies" Hear creation myths and how at least 40,000 people got their freedom using the Drinking Gourd, the Big Dipper.

Tuesday, 21 February 6:30 P.M. A Montgomery College Community Colloquium: "Faith in Science?", not in the planetarium, but in the Health Science Building Room 122 at 7977 Georgia Avenue, Silver Spring, MD 20910

Monday, 20 March 7 P.M. "The Rites of Spring, the Vernal Equinox" The vernal equinox is at 1:26 P.M.

Tuesday, 11 April 6:30 P.M. A Montgomery College Community Colloquium: "Navigating Uncertainties" not in the planetarium, but in the Health Science Building Room 122 at 7977 Georgia Avenue, Silver Spring, MD 20910

Saturday, 15 April 7 P.M., "Space-time Invariance and Quantum Gravity" Discover the smallest distances and times measurable and how the universe is pixelated.

Saturday, 20 May 7 P.M., "The Search for Extraterrestrial Intelligence" Discover how you can help look for ET using your computer at home and how it all is tied together.

The planetarium shows 1,834 naked-eye stars, the Milky Way (the diffuse band of light caused by the disk of our own galaxy), and the five naked eye planets (Mercury, Venus, Mars, Jupiter, and Saturn) under a twenty-four-foot dome with forty-two comfortable chairs.

The planetarium is located on Fenton Street on the Takoma Park/Silver Spring campus of Montgomery College. It is attached to the Science South building on the ground level and has a conspicuous silver colored domed roof. The stars are the province of all of mankind. An **astrophysicist** will answer questions about the universe. ***There is no admission charge for these public planetarium programs.***

Getting to the NCA Monthly Meeting and the Dinner Before the Meeting

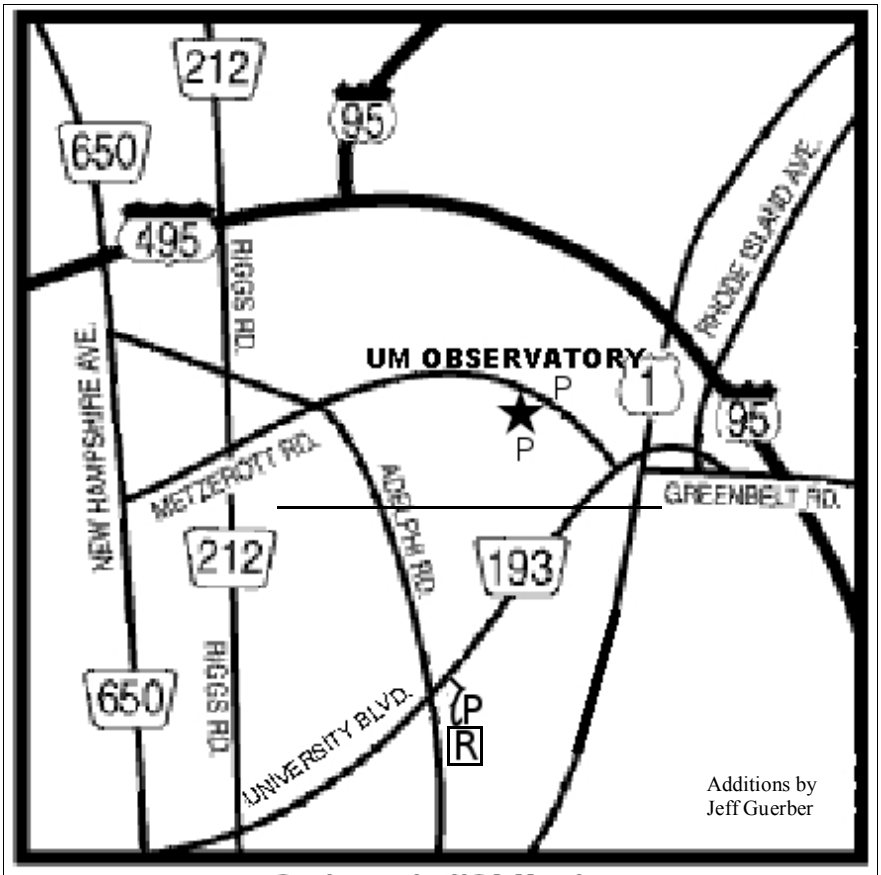
Jeff Guerber

NCA meetings are now held on Saturdays at 7:30 p.m. at the University of Maryland Observatory, in College Park on Metzerott Rd. between University Blvd. (MD-193) and Adelphi Rd. To get there from the Capital Beltway (I-495), either take US Rt. 1 south about a mile, turning right onto MD-193 West, then at the first light turn right onto Metzerott; or, take New Hampshire Ave. (MD-650) south, turn left at the second light onto Adelphi Rd., two more lights, turn left onto Metzerott, and proceed about a mile to the observatory. The observatory is on the south side of Metzerott Rd., directly opposite the UM System Administration building; you can park there if the observatory lot is full, but be careful crossing Metzerott Rd.

At 5:30 p.m., before the meeting, please join us for dinner at the Garden Restaurant in the UMD University College Inn and Conference Center, 3501 University Blvd. East at Adelphi Rd. From the Beltway, either take New Hampshire Ave. south, turn left onto Adelphi, and at the third light (passing Metzerott) turn left onto University then immediately right into the garage; or, take US-1 south, turn right onto University Blvd. west, and take it to the intersection with Adelphi Rd. Park either in the garage (costs), or in Lot 1 nearby (free). To get to the Observatory, exit to the right onto University Blvd. (MD-193) east, and at the second light turn left onto Metzerott Rd.

Do You Want to Get *Star Dust* 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 nancy.roman6@verizon.net or 301-656-6092 (home).



Getting to the NCA Meeting
Star=Observatory R=Restaurant P=Parking

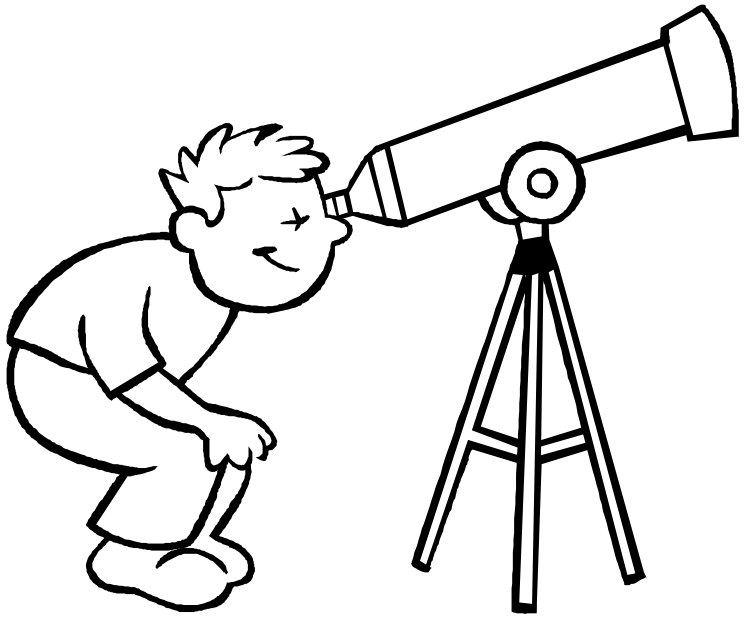
Observing after the Meeting

Elizabeth Warner

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.

Do You 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 email at rigel1@starpower.net.)



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Editor: Elliott Fein, Co-editor: Adele Fein, Editorial Advisor: Nancy Byrd. Consultant: Jeffrey Norman

National Capital Astronomers, Inc.

http://capitalastronomers.org

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. NCA is an IRS Section 501(c)(3) tax-deductible organization. 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.

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).

Classes: Some NCA members are available for educational programs for schools and other organizations. The instruction settings include star parties, classroom instruction, and school-teacher 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.

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."

Yes, I'd like to join NATIONAL CAPITAL ASTRONOMERS!

Name: _____ Date: ____/____/_____
Street address: _____ ZIP Code:_____
Telephone: ____-____-_____ E-mail: _____
Would you prefer to get *Star Dust* by e-mail? ____
Present or Former Occupation (or, If Student, Field of Study): _____
Academic Degrees: _____ Field(s) of Specialization: _____
Employer or Educational Institution: _____

MEMBERSHIP CATEGORIES AND ANNUAL DUES RATES

All members receive Star Dust*, the monthly newsletter announcing NCA activities. As an added optional benefit to extend your knowledge of astronomy you may also choose* Sky and Telescope *magazine at the discounted rate of $33.*

Student Membership: ……..… $15 ……..with *Sky and Telescope*....$48
Standard Individual or Family Membership: ….……..… $27 ……...…...with *Sky and Telescope*....$60

You are welcome to make contributions in any amount in addition to the dues shown above.
Contribution amount:_____

Please mail this form with your check payable to National Capital Astronomers, to:
Mr. Jeffrey Norman, NCA Treasurer; 5410 Connecticut Avenue, NW #717; Washington, D.C. 20015

National Capital Astronomers, Inc.
If undeliverable, return to
NCA c/o Nancy Roman
4620 N. Park Ave., #306W
Chevy Chase, MD 20815-4551

FIRST CLASS
DATED MATERIAL

There will be NCA Meetings on January 7 and 14 !

Inside this issue: