Star Dust

National Capital Astronomers, Inc. http://capitalastronomers.org

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April Speaker: Dr. Alan N. Bunner, "Reflections on the Anthropic Principle"

Submitted by Dr. Walter L. Faust

Dr. Alan N. Bunner, former Science Program Director, Structure & Evolution of the Universe, Office of Space Science, NASA Headquarters, will present the talk "Reflections on the Anthropic Principle" at the April 8 meeting of the National Capital Astronomers.

Abstract of Talk

A few years ago, the Anthropic Principle - the idea that the Universe is to some degree designed around us as a huge selection effect — was only discussed in hushed voices, a topic of some embarrassment among physicists, in part because the idea seemed to be either an empty tautology, or, at least, completely untestable.

Today, however, you will find this listing in the indexes of many reputable physics and cosmology texts. What has led to this aura of semi-respectability? Is there any content worth a second look? Should this "principle" be locked away in the cupboard as a hypothesis of last resort, trotted out only when physics can offer no better explanation? Or are there serious implications that deserve more thorough consideration?

I offer a light-hearted opportunity to explore the arguments, the bits of evidence, and the implications that we might live in a universe dominated by anthropic selection effects, a universe in which we have perhaps unwittingly survived a minefield of improbable escapes in order to be here today.

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Review of talk — Dr. Michael F. A'Hearn: "Deep Impact: Excavating Comet Tempel 1"

Reviewed by Dr. Nancy Grace Roman

Dr. A'Hearn presented the talk "Deep Impact: Excavating Comet Tempel 1" at the March 11 meeting of the National Capital Astronomers at the University of Maryland Astronomy Observatory.

Dr. A'Hearn started by apologizing that he had nothing new to report since his last talk – the preceding evening. (He ended his talk by saying that he hoped to have something new to report by his next talk on the following Wednesday.)

The primary objectives of the experiment were: to understand the differences between the surface and the interior; determine basic cometary properties; and search for pristine material below the surface. The spacecraft was launched on January 12, 2005 and impacted on July 4, 2005.

The basic spacecraft, the fly-by, was diverted to miss the surface by 505 km after being decelerated. The probe was released gently from the spacecraft 24 hours before impact. It hit the comet at an angle of about 30^{o}. As a movie showed, dust particles caused the probe to bounce around as it neared the comet. The three hits by 1 - 10 mg particles and one by a 100 – 1000 mg particle agreed with predictions. Dust impacts on the mirror decreased the transmission of the camera by 5 – 10 %.

There are craters that may or may not be impact craters that are about 300m across. The effective radius of the nucleus is 3.0 +/- 0.1 km with the maximum and minimum diameters about 7.6 and 4.9 km respectively. Large portions of the surface are smooth. There are round features that may be craters, old stripped areas, or scarps. There is also evidence of layers. The old cratered terrain is lower than the high smooth terrain. There are smooth areas that have signs of flow, but this seems impossible. The topography is not understood yet. Less than 10% of the data have been analyzed. For the most part, the color is quite uniformly reddish, but the northern area is brighter in the ultraviolet. The albedo is mostly about 4% with an albedo of 8% in the brightest areas. A picture showed white spots that may be high. Several bluish areas appear to contain a few percent of ice. This looks like frost but ice cannot survive at the surface temperature. There appear to be outgasing in these areas. Si is seen, consistent with the low albedo. There is very little thermal inertia. Before impact, the ratio of CO_2 to water was asymmetric. In the preimpact photometry, nearly instantaneous bursts were seen at one of two constant phases. There

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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, April 7, 14, 21, and 28, 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.

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.

Next NCA Meeting: Saturday, April 8 at 7:30 P.M., at the University of Maryland's Observatory on Metzerott Road: Dr. Alan N. Bunner will present the talk "Reflections on the Anthropic Principle." See map and directions on Page 6.

Dinner with NCA members and speaker: Saturday, April 8 at 5:30 P.M., preceding the meeting, 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—Saturdays
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 301-526-2648 or email him at mcnealmi@verizon.net.

We need a new volunteer to house NCA's C-14, make it available for weekly viewing, and transport it to other sites, e.g., Exploring the Sky and star parties.

The deadline for the May Star Dust is April 26. 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.

Dr. Alan N. Bunner, "Reflections on the Anthropic Principle"

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Bio

Dr. Bunner previously served as Chief of the High Energy Astrophysics Branch at NASA Headquarters. His duties have included Program Scientist responsibilities for the Compton Gamma Ray Observatory, Astro-E, and the Chandra X-ray Observatory. He came to NASA Headquarters in 1985 after holding the position of Principal Scientist at the Perkin-Elmer Corporation, where he led a variety of research programs and studies. From 1967 to 1979, Dr. Bunner was an Associate Scientist at the University of Wisconsin, specializing in x-ray astronomy research.

Dr. Bunner received his B.A. in mathematics and physics from the University of Toronto in 1960 and his Ph.D. in physics from Cornell University in 1967.
Since retiring, Dr. Bunner is enjoying life with traveling, some consulting, writing, and family history research. He lives in Alexandria, Virginia.

Eyes on the Sky 2006: Unveiling the Unseen Universe

Scheduled 7 p.m., Thursday Evenings, through May 4

[Your editor was prompted to include this information by Jeffrey Guerber. The material that follows was extracted from information at the web site at http://university.gsfc.nasa.gov/eyesonthesky/]

NASA's Goddard Space Flight Center invites you to a second exciting season of public lectures. Join us as we continue to celebrate the legacy of Einstein, the spirit of science, and the amazing new vistas space has to offer for observing and understanding the Earth and the universe it inhabits in stunning detail.

Time and Location:
Colloquia will be held through May 4 at 7 p.m. in the Goddard Visitor Center Auditorium. (For the last two lectures, the location is subject to change. Check the web site for updated information.) Refreshments and informal interaction with speakers will follow each lecture. Appropriate for high school/college level and above. Free parking is available at the Visitor Center.

Upcoming Lectures
Thursday, April 6, 7 P.M. Kim Weaver, GSFC, "Peering Past Hubble: Revealing the Universe Through Infrared and X-ray Eyes"

Thursday, April 20, 7 P.M. Max Tegmark, MIT, "The History of the Universe in One Hour"

Thursday, May 4, 7 P.M. John Mather, GSFC, "The Origins of Everything, As Seen by the James Webb Space Telescope"

Reservations:
Admission is free but on-line reservations are requested to help us plan for the event. Please help us avoid chaos! RSVP at http://

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Review of talk — Dr. Michael F. A'Hearn: "Deep Impact: Excavating Comet Tempel

(Continued from page 1)
is a great deal of water in these outbursts. The temperature of the comet surface ranges from 335 K at the subsolar point to 225 K at low sun angles with no thermal lag. 15 days before impact, the coma was symmetrical.

There was a sharp, substantial burst of water at impact. The maximum extent of the water cloud, more than 90 km, was asymmetric toward the north. CO is possible in the out-burst material, but uncertain. Many spectral peaks have not yet been identified although CH_3CN and H_2CO may be present. The composition is not uniform over the entire surface.

The ejecta cone was optically thick. The first rapidly ejected material reached a temperature of 3500 K and was possibly liquid Si but the nucleus cooled quickly. The later material was slower and cooler. The ejecta, which was cold except for the first second, contained about $1 – 2 \times 10^7$ kg of ice grains and was observed for about 90 min. The particles seemed to be a mixture of silicates and volatile solids. The gases included water vapor, CO_2 and organics with the CO_2 enhanced more than the water. Altogether, about 4000 tons of water were removed. The impact crater was probably gravity controlled with most of the energy going into the ejecta. The kinetic energy of the impactor was much less than the binding energy of the comet. The comet has about the strength of talcum powder. The average density of 0.4 +/- 0.1 gm/cc indicates a porosity of 75%. The acceleration of gravity is 0.05 cm/s. This should make sample collection easy. It means that this comet formed gently. It is not clear how the grains could have accumulated without destroying the porosity.

The comet was a weak x-ray source. The shift in the brightest region after impact indicated a velocity of ~0.37 km/s for the ejecta into the sunward hemisphere. The plume speed downrange ranged from 5 km/s to 8 km/s. The hot vapor that appeared in the first 0.5 second and detached from the nucleus had half the impact speed. The abundance of small grains reached a maximum 1½ hours after the impact, the large grains, 3 hours later. Most grains are much smaller than 10 microns, appreciably smaller than the natural outgassing material. All of the ejecta remained attached to the nucleus.

Comets differ. In Temple 1, the carbon abundance is less than 1/3 that of comets from the Kuiper Belt. There may be a difference in the CO abundance between comets from the KB and those from the Oort cloud. There is enough organic material in Temple 1 that 10^9 such comets could provide the seed for life on earth.

Eyes on the Sky 2006: Unveiling the Unseen Universe

Scheduled 7 p.m., Thursday Evenings, through May 4

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university.gsfc.nasa.gov/eyesonthesky/rsvp.jsp.

DVDs for 2005 Eyes on the Sky:
If you are interested in a DVD set for the 2005 "Eyes on the Sky" series, please contact Lubna Rana at LRana@pop600.gsfc.nasa.gov. Supply is limited.

Request for Volunteers:
We are looking for volunteers to help us with logistics on the evening of the lectures right before the talk from 6:00 - 7:00 p.m. If you would like to get involved with the program, get community service hours, would like a pizza dinner before the lecture, and get your top pick for a seat in the main auditorium, please contact us as soon as possible.

Contact Information:
For questions, contact us by phone at 301-286-2893/ 9690 or via e-mail at LRana@pop600.gsfc.nasa.gov.

Sign Language Interpreter Request:
To request a sign language interpreter, please send an email request to Lubna Rana at lrana@pop600.gsfc.nasa.gov. Goddard employees should call 301-286-8313.

Source: http://university.gsfc.nasa.gov/eyesonthesky/.

Exploring the Sky
by Joe Morris

2006 Schedule

Date	Time	Things of interest
4/15	8:30 P.M.	Moon just past full; Jupiter and Saturn; Orion
5/20	9:00 P.M.	Last quarter Moon; Saturn near the Beehive
6/17	9:00 P.M.	The Big Dipper and the Summer Triangle
7/22	9:00 P.M.	Mars disappearing but Jupiter still good
8/26	8:30 P.M.	Pegasus and Andromeda rising; Hercules
9/30	8:00 P.M.	Rock Creek Park day
10/21	7:30 P.M.	Orionoid meteor shower peak
11/4	7:00 P.M.	Moon (in Aries) near full; Pleiades

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, starting shortly after sunset. We meet in the field just south of the intersection of Military and Glover Roads NW, near the Nature Center. A parking lot is located immediately next to the field.

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

Questions? Call the Nature Center at (202) 895-6070 or check the Internet sites: http://www.nps.gov/rocr/planetarium
http://www.capitalastronomers.org

A presentation of the National Park Service and National Capital Astronomers.

Mid-Atlantic Occultations and Expeditions

by David Dunham

Asteroidal Occultations

Date	Day	EDT	Star	Mag	Asteroid	dmag	dur. s	Ap. in.	Location
Apr 5	Wed	0:01	TYC4978109	10.9	Lova	3.9	4	7	e.&n.NC; swVA
Apr 11	Tue	21:57	lambda Vir	4.6	Gordonia	8.7	4	0	n. GA, s. SC
Apr 19	Wed	23:40	TYC61210106	11.0	Bronislawa	3.1	5	7	DE,MD,cen&nwPA
Apr 24	Mon	21:17	TYC07770134	10.4	Olga	5.1	3	6	s. WV, cen. VA
Apr 26	Wed	1:25	TYC55900437	11.2	Euterpe	0.4	10	8	e&n VA, WV
Apr 28	Fri	1:42	2UC25776625	12.1	2002 GZ31	10.7	7	8	TNO; N.America
May 5	Fri	5:02	16 Piscium	5.8	Iris	4.5	5	2	MD,DC,PA,nVA
May 6	Sat	23:43	PPM 228372	10.0	Atala	3.1	5	6	DE,MD,DC,nVA

The May 5th event is the best asteroidal occultation of 2006 in the USA

Grazing Occultations

DATE	Day	EDT	Star	Mag	%	alt	CA	Location
May 1	Mon	20:37	SAO 78233	7.5	20+	42	14N	Narvon&ChaddsFord,PA;Sun -7d
May 5	Fri	21:13	ZC 1450	8.0	57+	64	18N	Ashland&Chesapeake,VA;Sun-13

Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Apr 3	Mon	23:50	D	ZC 885	5.6	36+	20	21S	G7	mg2 11.6 15",PA 231
Apr 4	Tue	22:40	D	ZC 1035	6.7	46+	43	5S	K3	Close double
Apr 6	Thu	0:02	D	76 Gem	5.3	56+	37	72S	K5	ZC 1169
Apr 7	Fri	21:39	D	SAO 98510	7.2	74+	70	31S	G5	
Apr 16	Sun	5:34	R	SAO 183565	7.1	93-	17	55S	A3	Sun-11;close triple
Apr 16	Sun	5:34	R	ZC 2220	7.0	93-	17	55S	A3	R 20s after above;dbl.
Apr 18	Tue	5:12	R	ZC 2519	7.3	78-	22	37N	M0	
Apr 19	Wed	4:59	R	ZC 2677	6.9	69-	21	60N	F5	
Apr 24	Mon	5:12	R	ZC 3422	6.7	16-	6	70N	F0	Azimuth 105 deg.
Apr 29	Sat	20:25	D	SAO 76559	7.8	6+	28	78S	B9	Sun alt. -6 deg.
Apr 29	Sat	21:25	D	X05643	8.5	6+	11	24S	F8	20" from chi Tauri
Apr 29	Sat	21:25	D	chi Tauri	5.4	6+	11	22S	B9	ZC 647;24s after above
Apr 30	Sun	20:36	D	ZC 797	6.4	12+	31	73N	B9	Sun -8; spec. binary
Apr 30	Sun	23:03	D	ZC 812	8.0	13+	6	53S	F8	Az. 301; close double
May 1	Mon	20:24	D	SAO 78233	7.5	20+	44	36N	A3	Close triple; Sun -5
May 1	Mon	20:25	D	SAO 78240	8.6	20+	44	57S	K0	
May 1	Mon	21:35	D	SAO 78291	7.7	20+	31	64S	K0	
May 2	Tue	20:25	D	SAO 79256	7.8	29+	54	51N	K0	Sun alt. -5 deg.
May 2	Tue	21:12	D	ZC 1108	7.0	29+	45	81S	G8	Maybe close double
May 3	Wed	1:06	D	ZC 1131	7.3	30+	3	86N	A2	Azimuth 302 deg.
May 4	Thu	22:52	D	SAO 80631	7.6	49+	41	75S	K0	
May 7	Sun	23:02	D	ZC 1643	7.2	76+	49	67S	F2	
May 8	Mon	2:57	D	80 Leonis	6.4	77+	9	41S	F3	Az.268; spec. binary
May 10	Wed	18:28	D	Spica	1.0	95+	6	75S	B1	ZC 1925; Az.110; Sun+18
May 10	Wed	19:34	R	Spica	1.0	95+	18	-70N	B1	ZC 1925; Sun +5 deg.

David Dunham, e-mail dunham@starpower.net, more info. http://iota.jhuapl.edu
Phone home 301-474-4722; office 240-228-5609; cell 301-526-5590

Other National Capital Area Meetings

Northern Virginia Astronomy Club

Please note: For the April 9 meeting only, we will meet in a different room in a different building. The room is Science and Technology 1, Room 131

Sunday, April 9, 7:00 p.m.
Dr. Chris Palma and Dr. Derek Fox of Penn State University will be our guest speakers. They will be talking to us about their work with the SWIFT satellite and the discovery of the cosmic explosion GRB 060218.

The Swift Gamma Ray Burst Explorer carries three instruments to enable the most detailed observations of gamma ray bursts to date. Two of these instruments, the X-ray Telescope (XRT) and the UV/ Optical Telescope (UVOT) were built by Penn State and collaborators at Leicester University and the Mullard Space Science Laboratory (both in England) and at the Osservatorio Astronomico di Brera (in Italy). In addition, Penn State is responsible for leading the Education and Public Outreach component of this mission, as well as the Mission Operations Center, which operates the satellite.

The three co-aligned instruments are known as the BAT, the XRT, and the UVOT. The XRT and UVOT are X-ray and a UV/optical focusing telescopes respectively which produce sub-arcsecond positions and multi-wavelength light curves for gamma ray Burst (GRB) afterglows. Broad band afterglow spectroscopy produces redshifts for the majority of GRBs. BAT is a wide Field-Of-View (FOV) coded-aperture gamma ray imager that produces arcminute GRB positions onboard within 10 seconds. The spacecraft executes a rapid autonomous slew that points the focusing telescopes at the BAT position in typically ~ 50s.

The positions and images derived by the various instruments are sent as soon as they are available from the spacecraft via the TDRSS system to the Gamma Ray Coordination Network (GCN). The GCN broadcasts the results to the world via the Internet for rapid response by the world astronomy community for follow up observations by other ground and space based telescopes. At the next satellite pass over Malindi, the more detailed data is sent to the data center where it will be processed for public access within 30 minutes of the pass.

Outreach: Nuts and Bolts
Everything you always wanted to know about outreach but were afraid to ask! Ed Witkowski will give members tips on how to prepare for an outreach event.

Professor Harold Geller's sky tour can be found at http://physics.gmu.edu/ ~hgeller/NOVACsky .

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.

Please Join Us for Dinner!
Since February 1995, a number of NOVAC members have been congregating on the night of our regular meetings for dinner. Hopefully this assists in getting to know one another, at a more relaxed location than at the meeting itself. It's also nice to see who it is you're talking to for a change and be able to connect faces with names — unlike the usual observing situation. All are welcome to attend, whether NOVAC members or prospective members, guests or whoever — just be prepared to discuss a little astronomy or any other topic that pops up!

If you'd like to join us, stop by the Red, Hot and Blue restaurant at 5:30 P.M. See you there!
Source: http://novac.com/

Montgomery College Planetarium

is located at the Takoma Park/Silver Spring Campus Maryland.

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
Thursday, April 6 at 1 P.M.
"Astrolabes in Islam" celebrating Arab-American Heritage Month.

Tuesday, April 11 at 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, April 15 at 7 P.M.
"Space-time Invariance and Quantum Gravity" discover the smallest distances and times measurable and how the universe is pixilated.

Friday, April 28 at 11 A.M.
"Astrolabes in Islam" celebrating Arab-American Heritage Month.

Saturday, May 20 at 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.

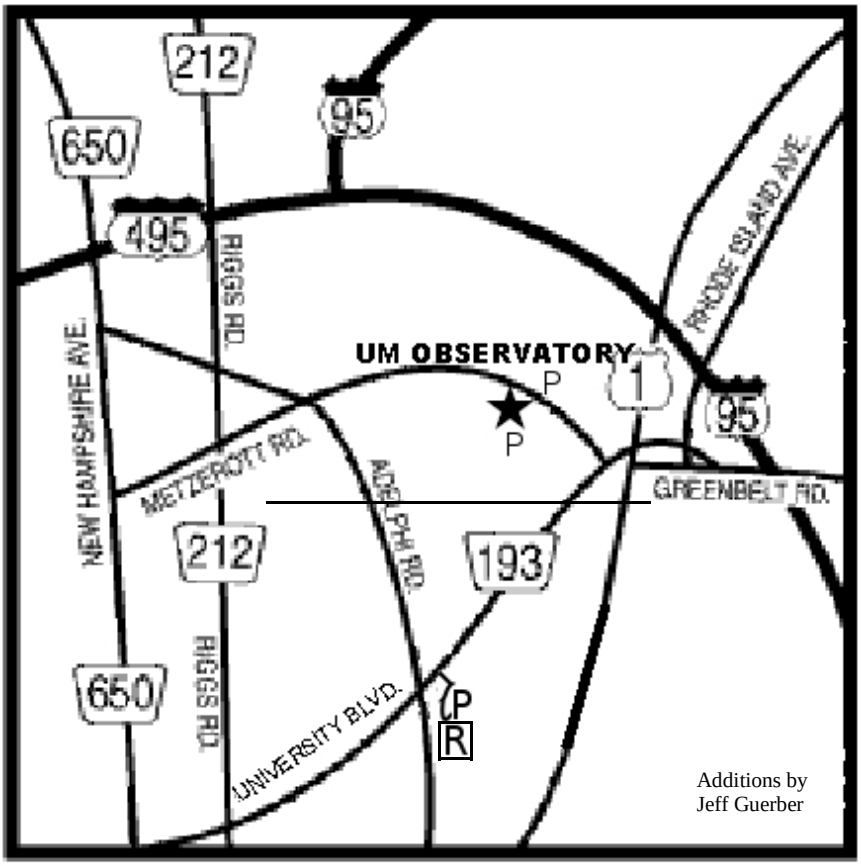
Source: www.montgomerycollege.edu/ departments/planet/

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

Jeff Guerber

NCA meetings are now held 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.



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.

Are You Coming to Dinner?

If you are planning to come to the dinner before the meeting, please tell Benson J. Simon, telephone: 301-776-6721, e-mail bjs32@cornell.edu so that we can make reservations for the right number of people.

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).

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.)

Star Dust is published ten times yearly, September through June, by the National Capital Astronomers, Inc. (NCA).
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National Capital Astronomers, Inc.

http://capitalastronomers.org

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NCA Web Page: http://capitalastronomers.org/.
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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. 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."

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You are welcome to make contributions in any amount in addition to the dues shown above.
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NCA Will Meet on April 8 !

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