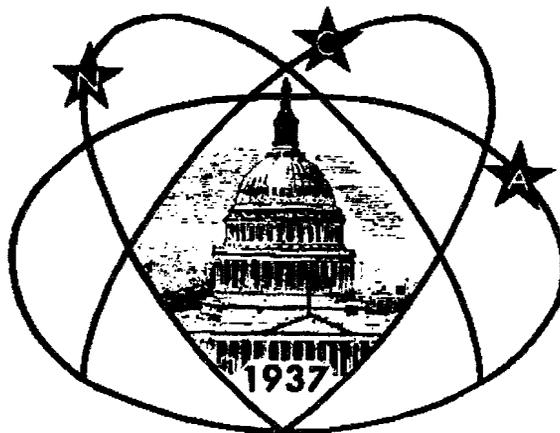


Star



Dust

National Capital Astronomers, Inc.

Phone: 301/565-3709

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## “Limits on the Age of the Universe”

*Submitted by Nancy Byrd*

The Saturday, October 2, 1999 meeting of National Capital Astronomers (NCA) will be held in the Lipsett Auditorium in Building 10 (Clinical Center) of the National Institutes of Health in Bethesda at 7:30 PM. This month's speaker will be NCA's own member and former president, John Graham. Dr. Graham will speak on the subject, “Limits on the Age of the Universe”. The talk will deal with three ways of constraining the age of the Universe. Special reference will be made to the final results from the Hubble Space Telescope Key Project on the Extragalactic Distance Scale. This has been a long-term effort

to determine the Hubble expansion constant by employing the distances determined for 18 nearby galaxies using Cepheid variable stars. Dr. Graham has talked about this project to NCA on two previous occasions, once when it was beginning in 1988 and again, with a progress report, in 1993. Other currently popular distance indicators to be discussed include the use of supernovae, exploding stars which temporarily become the brightest stars in the universe and a method using fluctuations in the surface brightness of distant star systems due to unresolved, individual stars.

Dr. Graham has been a staff astronomer with the Carnegie Institution of Washington, Department of Terrestrial Magnetism since 1985. Before coming to Carnegie, he served at Kitt Peak National Observatory and the Cerro Tololo Inter-American Observatory as well as others. He obtained his B.Sc. in Physics at the University of Sydney and his Ph.D. in Astronomy from the Australian National University, Canberra, Australia.

Next month's speaker will be Dr. John Vranish of NASA, taking on the subject of Telescope Gadgets. ○

## A First-Time Totality on the Bulgarian Coast

*Submitted by William Chandler<sup>1</sup>*

Work-related travel in August 1999 took me to the Bulgarian Black Sea coast where I viewed my first total eclipse of the Sun. My Bulgarian colleagues chose the rocky cliffs of Kamen Brjag north of Varna for a vantage point, and we arrived one hour before “first contact,” to set up my 1400 mm Maksutov catadioptric telescope with camera, along with two video, one digital, and a few point-and-shoot cameras. The sky was cloudless but with a high white haze and some dust and smoke from crop burning on the horizon. The air temperature was unusually high for

this region, as was the humidity. We made photographic records of the partial phases, the corona and prominences during totality, and the sky and horizon throughout both. We measured the change in temperature, watched for changes in animal behavior, noted our perception of the light and colors in the sky, and could not help but notice the crowd. We wrote down some of these observations.

I came away with three strong impressions. The first was stunning darkness, approaching from the north, blacker than any storm. Nothing in my

reading had prepared me for the deep black, inverted cone approaching from the northwest. The sky had dimmed noticeably during the 75 minutes or so of the penumbral shadow during partial phase, but the Moon's umbra quickly transformed the sky from late afternoon to evening in a matter of seconds . . . at just after two in the afternoon.

The second was the “explosive,” theatrical character of the 125-second-long total eclipse. I looked with naked eyes at the Sun for the first time just as the

*BULGARIA, continues on page 2*

## Calendar of Monthly Events

The Public is Welcome!

NCA Home Page: <http://myhouse.com/NCA/home.htm>

**Fridays, October 1, 8, 15, 22, and 29, 7:30 PM** - Telescope making classes at American University, McKinley Hall Basement. Information: Guy Brandenburg, 202/635-1860.

**Fridays, October 1, 15, and 29, 8:30 PM** - Open nights with NCA's Celestron C-14 telescope at Ridge View Observatory; near Alexandria, Virginia; 6007 Ridge View Drive (off Franconia Road between Telegraph Road and Rose Hill Drive). Information: Bob Bolster, 703/960-9126. Call before 6:00 PM.

**Saturday, October 2, 5:30 PM** - Dinner with the speaker, and NCA members at O'Donnell's, 8301 Wisconsin Ave., Bethesda, MD. See map and directions on back page.

**Saturday, October 2, 7:30 PM** - NCA meeting, at Lipsett Auditorium in Building 10 at NIH, will feature Dr. John Graham, speaking on "Limits on the Age of the Universe" See map and directions on back page.

**Mondays, October 4, 11, 18, and 25, 7:30 PM** - Public nights at U.S. Naval Observatory (USNO), in Northwest Washington, D.C. (off Massachusetts Av-

enue). Includes orientation on USNO's mission, viewing of operating atomic clocks, and glimpses through the finest optical telescopes in the Washington-Baltimore region. Held regardless of cloud cover. Information: USNO Public Affairs Office, 202/762-1438. Home page: <http://www.usno.navy.mil>.

**Saturday, October 9, beginning 6:00 PM** - Open House at Hopewell Observatory. See article in September issue for directions.

**Saturday, October 9, 7:30 PM** - Exploring the Sky at Rock Creek Park in the field south of the intersection of Military and Glover Roads near the Nature Center. Information: 202/426-6829. Note the time change.

See page 6 for more Washington area astronomical events. Other events too numerous to list in *Star Dust* are listed in the publications, *Sky & Telescope*, the *Astronomical Calendar 1999*, the *Observer's Handbook 1999*. NCA members can purchase all these (and much more) at a discount. Information can also be found in numerous software packages, and links available on the NCA Home Page (see above for address). To join NCA, use the membership application on page 7.

*BULGARIA, continued from page 1*

Moon seemed to slot into place over the Sun. It was like a theatre lighting trick, or the sudden appearance of a "first one," a la "Babylon 5." A burst of light on the northeast quadrant, the "diamond ring effect," expanded and quickly disappeared.

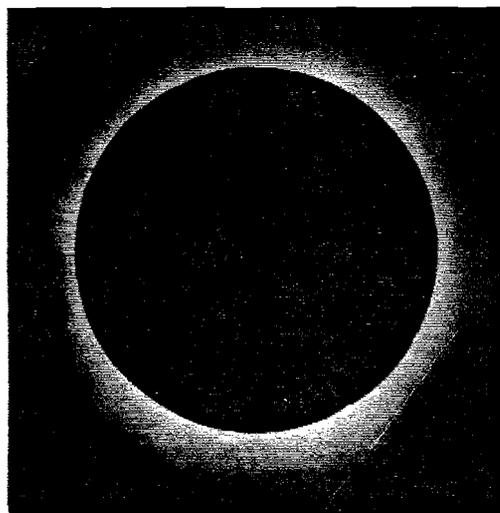
But the strongest impression came from a telescopic view of the chromosphere's reddish jets and curls of flame thinly ringing the jet black disc of the Moon and the fluorescent white corona of the Sun. Prominences circled the Moon like licks of fire, including one off the southeast limb that seemed to begin above the chromosphere and stretch into the corona like a thin jet, and a large curving prominence on the west. (See photograph at right.)

The corona itself was less spectacular. It reached only one-quarter to one-

half solar radius and appeared mainly round, or smudged. I did not see it but others in my group reported viewing only one "star," which they identified as Venus, and more than one person reported a red and pink horizon in the east over the sea. We observed no shadow bands, despite use of a bed sheet borrowed from the Albena Hotel Praga and spread on the ground. On that background, however, we photographed crescents of light projected with a camera obscura made from a sheet of Fred Espenak's excellent guide to this eclipse; we punched holes in the paper using a Pentel pen.

We watched for changes in animal behavior, but there were only swallows and sparrows to be seen. Both were quite active one hour before the eclipse. The sparrows went to roost first, in groups.

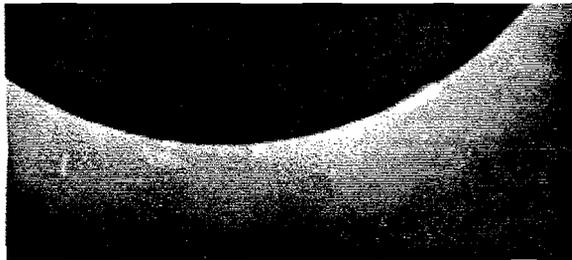
The swallows no longer flew (except for one) at the time of total eclipse. This behavior was confirmed by persons in my group and by an Irish amateur astronomer who had viewed the eclipse



one-half kilometer inland with an astronomy group from his country. He reported that birds before totality had flown to roost in trees behind the farmhouse yard where he was set-up, and roosters crowed at the end of totality. Birds had returned by 14:20, only 8 minutes after third contact.

I was also struck by the bizarre behavior of some of the humans assembled to watch this rare event. Many barked like dogs or yipped like savages at the beginning of the eclipse. I have a poor idea of how many people traveled to this spot but it was certainly more than a few thousand and perhaps as many as 10,000. The crowd was festival-like, playing radios, swimming, some naked. Bulgarian Prime Minister Ivan Kostov arrived in a large military ship immediately off-shore below us at this centerline of totality. One person lifted off in a noisy ultra-lite just at second contact.

I prepared for this event for more than one year, reading and re-reading Espenak's *Total Solar Eclipse, the Solar*



*Astronomy Handbook*, and various articles from my *Sky & Telescope* archive<sup>2</sup>. Following expert advice, I had practiced my photographic routine two dozen times, including exposing a dozen roles of film on the Sun and full Moon, all under the pressure of a stop watch set to 125 seconds.

**Eclipse Observations, 11 August 1999**  
Kamen Brjag, Bulgaria

**Local**

Time	Comment
12:46	First contact (eclipse begins).
13:30	Sky had noticeably darkened.
13:35	Horizon more gray.
13:45	Noticeable darkening relative to 13:30.
14:10	North sky suddenly looms menacingly dark, the most surprising and disturbing observation of the entire eclipse. Captured by video camera.
14:11	Second contact (totality be-

gins) Sky darkens as if a light had been extinguished.

14:11 Diamond ring effect appears on the Sun at an angle of ten o'clock (northeast), naked eye-view; explosive quality to appearance and disappearance.

14:12 Group reports dull red and dull pink on the eastern horizon at totality. There was little color.

14:12 Corona appears round and relatively small, extending one-quarter to one-half solar diameter. Digital photographs, however, showed the diameter of the corona to extend one full solar width.

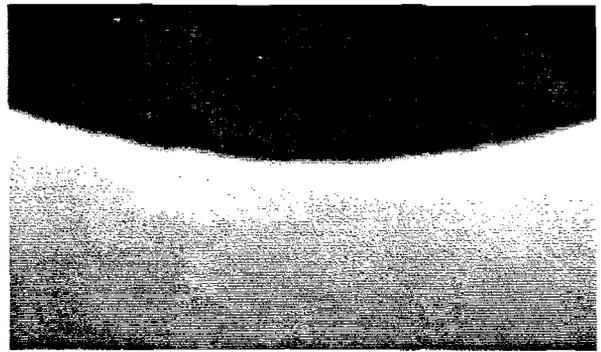
14:12 Excellent view of prominences through telescope. Chromosphere seemed in motion in a narrow band between the black disk of the Moon and the bright corona. A long jet appeared to form above the photosphere at an angle of about 7 o'clock on the Sun. It appeared above the surface on the southeast quadrant and seemed to extend into the corona. Many flame-like figures rose from the surface, one at an angle of 3:30-4:00 on the Sun, quite large, curving back to the

surface.

- 14:13 Third contact (totality ends).
- 15:34 Fourth contact (partial phase ends).

**Temperature Readings** (simple commercial digital alarm clock thermometer)

Time	Reading
13:00	31.5° C. in shade.
13:33	30.5° C. in shade. (37° C. in Sun.)
13:50	29.0° C. in shade.
13:55	28.0° C. in shade.
14:00	27.0° C. in shade.
14:05	26.5° C. in shade.
14:55	31.0° C. in shade.
14:58	31.5° C. in shade.
	(return to pre-eclipse level; end of temperature recording)
	Maximum differential about 5.0° C.



**Guide to Photographs by William Chandler**

Prominences: Questar 3.5" with Olympus OM-1 close-coupled (1400 mm focal length) working at f/16 (t/22), with 1/250 second exposure on Kodak Gold 400 ISO developed for 100 ISO. North is up and east is right. (Digital enlargements of 200% and 300% of William Chandler's photographs are provided by Gary Joaquin.)

**Footnotes**

1. William Chandler is a senior staff scientist with the Battelle Memorial Institute, Pacific Northwest National Laboratory
2. Fred Espenak and Jay Anderson, *Total Solar Eclipse of 1999 August 11*, NASA Center for AeroSpace Information, 1998, obtained from the Internet; Rainer Beck, Heinz Hilbrecht, Klaus Reinsch, and Peter Völker, *Solar Astronomy Handbook* (Richmond, Virginia: Willmann-Bell, Inc., 1995), purchased from Sky Publishing; Edwin L. Aguirre, "Imaging Totality," *Sky & Telescope*, July 1999, Vol. 98, No. 1, pp. 136-141; B. Ralph Chou, "Solar Filter Safety," *Sky & Telescope*, February 1998, Vol. 95, No. 2, pp. 36-40. ○

**Newsletter Deadline for November *Star Dust*, October 15, 1999**

Please send submissions to Alisa & Gary Joaquin, at [ajglj@erols.com](mailto:ajglj@erols.com) or fax submissions to 703/658-2233. Text must be in ASCII or Word. Graphics submitted must be in TIFF, GIF, or JPEG. Thank you.

## Total Lunar Occultations

DATE	Day	EDT/ EST	Star	Mag	%	alt	CA	Notes
Sep 29	Wed	22:42	R Aldebaran	0.9	72-	5	30S	Az. 73; Last 1st mag. to 2005
Oct 1	Fri	01:44	R 127 Tauri	6.7	60-	29	35S	ZC 0863
Oct 1	Fri	06:51	R ZC 0888	6.0	58-	70	28N	Sun -3; Graze, s. Penn., Sun -6
Oct 2	Sat	05:33	R SAO 78788	8.4	47-	61	63S	
Oct 3	Sun	06:31	R ZC 1186	6.0	36-	61	85N	Sun alt. -7 deg.
Oct 15	Fri	16:44	D mu Sgr	3.8	34+	28	75N	Sun alt. +18 deg.
Oct 15	Fri	18:12	R mu Sgr	3.8	34+	30	-60N	Sun alt. +2 deg.
Oct 16	Sat	20:16	D pi Sgr	2.9	44+	26	54N	12x camcorders
Oct 16	Sat	21:27	R pi Sgr	2.9	44+	18	-59N	
Oct 21	Thu	01:44	D ZC 3339	6.7	83+	17	28S	Sp. M0, good for PC23C camera
Oct 25	Mon	20:40	R ZC 0462	6.0	98-	15	80S	
Oct 26	Tue	23:26	R ZC 0627	6.6	92-	38	86N	Hyades passage tonight
Oct 27	Wed	01:02	R 55 Tauri	6.9	92-	55	79N	dbl., mags 7.4&8.0, sep. 0.6"
Oct 27	Wed	03:03	R 63 Tauri	5.6	91-	68	87N	Other 8th mags. not listed
Oct 27	Wed	05:01	R SAO 93938	6.9	91-	58	82N	Sp. K5
Oct 29	Fri	03:11	R nu Gem	4.1	74-	59	75S	
Oct 30	Sat	02:11	R ZC 1135	6.7	63-	37	5S	
Oct 31	Sat	00:14	R 20 Cancr	5.9	53-	4	68S	Azimuth 262 deg.
*** Dates and times above are EDT, those below are EST ***								
Oct 31	Sun	02:55	R theta Cnc	5.3	51-	44	39S	Possible close double
Nov 3	Wed	04:01	R ZC 1625	5.8	21-	22	76N	
Jan 2	Sun	04:40	D gamma Lib	3.9	16-	10	-76S	Moon Az. 118 deg.; 2000
Jan 2	Sun	05:52	R gamma Lib	3.9	15-	21	90S	12x camcorders; 2000

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. 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>.

## Planned Grazing Occultation Expeditions

DATE	Day	EDT/ EST	Star	Mag	%	alt	CA	Location
Oct 1	Fri	06:36	ZC 0888	6.0	59-	69	6N	Lisburn, PA; Sun -6
Oct 2	Sat	05:45	ZC 1048	8.5	48-	63	8N	Barnesv., Ellicott C., Balto., MD
Oct 29	Fri	02:07	16 Gem	6.2	75-	48	13N	Toano & Onancock, VA
*** Dates and times above are EDT, those below are EST ***								
Nov 6	Sat	05:37	SAO 139480	8.1	3-	8	11N	Onancock, VA
Jan 2	Sun	05:10	gamma Lib	3.9	16-	19	8S	Long Key, FL (year 2000)
Jan 9	Sun	17:54	delta Cap	2.9	9+	20	5S	Hancock, MD & Allentown, PA

## Asteroidal Appulses

DATE	Day	EDT	Star	Mag	Asteroid	dmag	dur. s	ap. in.	Occultation Location
Oct 1	Fri	04:28	ACT18850275	10.0	Peraga	2.9	6	7	L.Erie - s.Maine
Oct 4	Mon	04:19	ACT24030249	10.6	Amphitrite	0.6	23	8	Bahamas, Bermuda
Oct 6	Wed	04:15	ACT02011155	10.0	Eunike	3.1	6	7	Florida
Oct 9	Sat	21:14	ACT62781529	11.0	Aemilia	3.4	7	8	Pennsylvania
Oct 10	Sun	03:03	SAO 92746	7.8	Jupiter	*	6?		U.S.A.
Oct 10	Sun	18:50	S16 7318	11.4	Doris	2.1	12	8	Maine (DC Sun-3)
Oct 24	Sun	03:56	SAO 96397	9.0	Cheruskia	4.6	7	3	S. Carolina
Oct 24	Sun	21:56	SAO 142082	9.9	Siegena	3.4	5	8	S. Carolina (DC Alt 7)
Oct 27	Wed	01:16	SAO 109603	8.3	Tekmessa	4.4	8	2	Lake Erie, N.Y.
Oct 29	Fri	03:58	SAO 114572	9.2	Corduba	4.5	12	4	Mississippi
*** Dates and times above are EDT, those below are EST ***									
Nov 4	Thu	17:25	S02 11304	11.4	Adelheid	3.5	4	8	N. Virginia
Jan 3	Mon	03:11	14 Monocer.	6.4	Cheruskia	6.0	8	1	central Florida

Phone the IOTA occultation line, 301-474-4945, for updates and details, or check IOTA's local Web site at <http://iota.jhuapl.edu>.

David Dunham, 1999 September 24

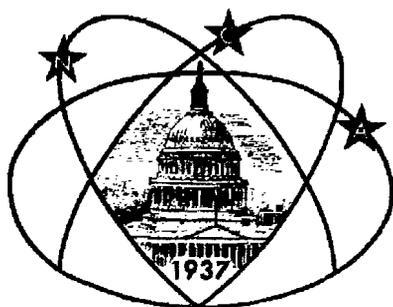
### Looking for New Editor of *Star Dust*

Alisa Joaquin, editor of *StarDust*, will be taking some much needed leave time. The reason being, she and Gary Joaquin, her husband, are expecting their first child, a daughter, in March. She does not know if she will be able to continue her duties as editor for some time.

In the mean time, she would like someone to take over as newsletter editor starting in January, 2000. The person must have experience with PageMaker 6.0 or higher. Experience can come from either Mac or PC. Other duties include, searching the web for images, and calendar information of astronomical events happening in the Washington-Baltimore area to be included in the newsletter.

It would be helpful if the person who is interested would contact Alisa Joaquin at 703/750-1636 and arrange to meet with her to discuss in full the newsletter production and what it entails. To arrange for an appointment, you may either call her at the above telephone number or email her at [ajglj@erols.com](mailto:ajglj@erols.com).

Alisa Joaquin, Editor



## National Capital Area Astronomical Events

Free Lectures at the Einstein Planetarium and Other Daily Events  
National Air & Space Museum

202/357-1550, 202/357-1686, or 202/357-1505 (TTY)

Home page: <http://www.nasm.edu>

### Other Area Astronomical Events

**Maryland Space Grant Observatory**  
— Open House every Friday evening (weather permitting), Bloomberg Center of Physics and Astronomy, Johns Hopkins University, Baltimore, MD. Information: 401/516-6525 or check their web site at [www.pha.jhu.edu/facilities/observatory/telescope.html](http://www.pha.jhu.edu/facilities/observatory/telescope.html).

**Montgomery College's Planetarium, Takoma Park** — "How are Stars Born?" Oct. 16, 7:00 PM.

**Associated Universities Incorporated and National Radio Astronomy Observatory Conference** — "Science with the Atacama Large Millimeter Array," Oct. 6-8. Carnegie Institute, Washington, DC. Registration fee for the conference is \$95.00. Cost for the dinner is \$40 per person. Total cost is \$135.00. Register online at their website at: [www.mma.nrao.edu/science.html](http://www.mma.nrao.edu/science.html). Send questions or comments to [kwether@nrao.edu](mailto:kwether@nrao.edu).

**10th Annual Astrophysics Conference in Maryland** — "Cosmic Explosions," Oct. 11-13. University Conference Center, University of Maryland,

College Park, MD. Registration fee will be \$300. Registration fee includes lunches and light refreshments served during the conference (including an informal reception on the evening of Monday, October 11), a banquet on Tuesday evening, October 12, a souvenir t-shirt, a book bag, and one copy of the published (hardcover) Proceedings available. You may register using the form at their website located at: [www.astro.umd.edu/october.html](http://www.astro.umd.edu/october.html). For additional information, email at [october@astro.umd.edu](mailto:october@astro.umd.edu) or call 301/405-1507.

**High Energy Solar Physics Workshop** — "Anticipating HESSI," Oct. 18-20. University Conference Center, University of Maryland, College Park, MD. Send abstracts and registration e-mails to [ramaty@gsfc.nasa.gov](mailto:ramaty@gsfc.nasa.gov). Registration fee is \$150 payable at the meeting. For more information, check out their website at [heawww.gsfc.nasa.gov/users/ramaty/hessisymp.html](http://heawww.gsfc.nasa.gov/users/ramaty/hessisymp.html).

**Goddard Scientific Colloquia** — "All colloquia will be held in Building 3

Auditorium at 3:00 PM. Coffee and tea will be served in the Lobby.

"Recent Developments in SAR Remote Sensing," speaker Diane Evens, October 8.

"Exploring the Environments of Nearby Stars," speaker Glenn Schneider, October 15.

### More on MASP '99

*The Mid-Atlantic Star Party is scheduled to take place, October 7-12, rain or shine.*

SERAL (SE Region Astronomical League) Annual Meeting will be held on Saturday at 10:00 am.

*Astronomy Magazine and Sky and Telescope are expected to participate.*

NCIDA (NC members of the International Dark Sky Association) will be present to discuss light pollution issues and solutions.

Daily Fee is \$10 per adult  
Event Fee is \$20 per adult  
Children under 15 years old are free if accompanied by an adult.

#### Directions:

About 8 miles West of Carthage and 8 miles south of Robbins, NC. The entrance will be the west most gate along SR 1261.

Pre-register by mailing your fees to:

Mid-Atlantic Star Party  
244 Deerfield Rd.  
Apex, NC 27502

Information: [www.masp.org](http://www.masp.org),  
[john@bsa.net](mailto:john@bsa.net) or call 919/362-5194.

## Meteor Showers

### Major Activity

Radiant	Duration	Maximum
Orionids	Oct. 15-25	Oct. 21 at 15:30 UT

### Minor Activity

Arietids	Sept. 7-Oct. 27	Oct. 8/9
Delta Aurigids	Set. 22-Oct. 23	Oct. 6-15
Eta Cetids	Sept. 20-Nov. 2	Oct. 1-5
October Cetids	Sept 8?-Oct. 30?	Oct. 5/6
October Cygnids	Sept. 22-Oct. 11	Oct. 4-9
Draconids	Oct. 6-10	Oct. 9/10
Epsilon Geminids	Oct. 10-27	Oct. 18/19
Northern Piscids	Oct. 5-16	Oct. 12/13

### Daylight Activity

Sextantids	Sept. 24-Oct. 9	Sept. 30-Oct.4
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Don't throw this newsletter away. If you're finished with it, pass it on to someone else to read or recycle it. It's right for astronomy and the environment.

# National Capital Astronomers, Inc.

## SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a non-profit, membership supported, volunteer run, public-service corporation dedicated to advancing space technology, astronomy, 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 as skilled observers frequently deploying to many parts of the National Capital region, and beyond, on campaigns and expeditions collecting vital scientific data for astronomy and related sciences. They also serve locally by assisting with scientific conferences, judging science fairs, and interpreting astronomy and related subjects during public programs.

**Discussion Groups** exchange information, ideas, and questions on preselected topics, moderated by an NCA member or guest expert.

**Publications** received by members include the monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

**NCA Information Service** answers a wide variety of inquiries about space technology, astronomy, and related subjects from the public, the media, and other organizations.

**Consumer Clinics** on selection, use, and care of binoculars and telescopes, provide myth-breaking information, guidance, and demonstrations for those contemplating acquiring their first astronomical instrument.

**Dark-Sky Protection Efforts** educate society at large about the serious environmental threat of light pollution, plus seek ways and means of light pollution avoidance and abatement. NCA is an organizational member of the International Dark-Sky Association (IDA), and the National Capital region's IDA representative.

**Classes** teach about subjects ranging from basic astronomy to hand-making a fine astronomical telescope. NCA's instructors also train educators in how to better teach astronomy and related subjects.

**Tours** travel to dark-sky sites, observatories, laboratories, museums, and other points of interest around the National Capital region, the Nation, and the World.

**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, the Smithsonian Institution, the U.S. Naval Observatory, and others.

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

**Fine Quality Telescopes** up to 36-cm (14-inch) aperture are available free for member's use. NCA also has access to several relatively dark-sky sites in Maryland, Virginia, and West Virginia.

## YES! I'D LIKE TO JOIN THE NATIONAL CAPITAL ASTRONOMERS

Enclosed is my payment for the following membership category:

Regular

*Sky & Telescope* and *Star Dust*. (\$54 per year)

*Star Dust* only (\$27 per year)

Junior (Only open to those under age 18) Date of birth: \_\_\_\_\_

*Sky & Telescope* and *Star Dust*. (\$42 per year)

*Star Dust* only (\$15 per year)

_____	_____	(____)	_____	_____
First name(s)	Last name		Telephone	E-mail
_____	_____	_____	_____	_____
Street or Box	Apartment	City	State	Zip Code + 4

If family membership, list names of additional participating immediate family members in same household, with birthdates of all those under 18 years old: \_\_\_\_\_

**Note:** If you already subscribe to *Sky & Telescope*, please attach a recent mailing label. You may renew this subscription through NCA for \$27 when it expires.

Make check payable to: **National Capital Astronomers, Inc.**, and send with this form to:

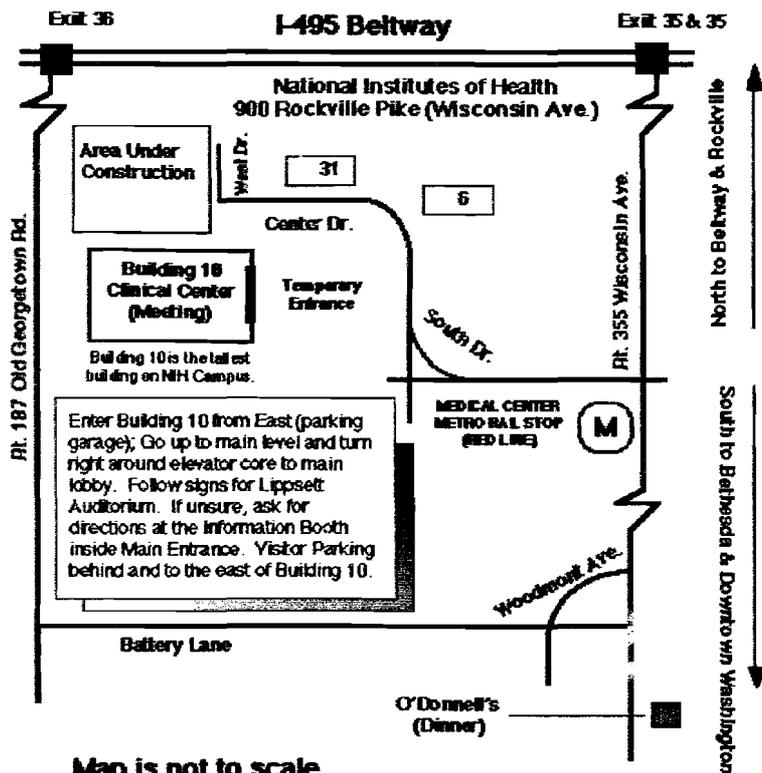
**NCA c/o Jeffrey B. Norman, 5410 Connecticut Avenue, NW, Apt. #717, Washington, D.C. 20015-2837.**

The following information is optional. Please indicate briefly any special interests, skills, education, experience, or other resources which you might contribute to NCA. **Thank you, and welcome to NCA!**

# Getting to the NCA Monthly Meeting

**Metrorail Riders** - From Medical Center Metro Station: Walk down the hill, pass the bus stops and turn right at the anchor onto Center Drive. Continue uphill to Building 10, the tallest building on campus (walking time about 10 minutes). Also, the J2 bus line connects the Bethesda (7:16 PM) and NIH (7:23 PM) Metro stops with Building 10 (7:25 PM).

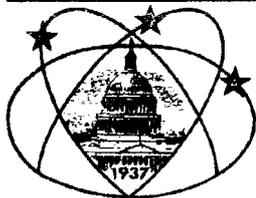
**To O'Donnell's** - From the beltway, take Wisconsin Avenue toward Bethesda. The address is 8301 Wisconsin Avenue (301/656-6200). There are parking garages nearby and parking across the street. Seats are not guaranteed after 5:30 PM.



Map is not to scale.

A more current map for parking at NIH may be found at: [www.cc.nih.gov/cc/waytogoh/update1.html](http://www.cc.nih.gov/cc/waytogoh/update1.html)

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