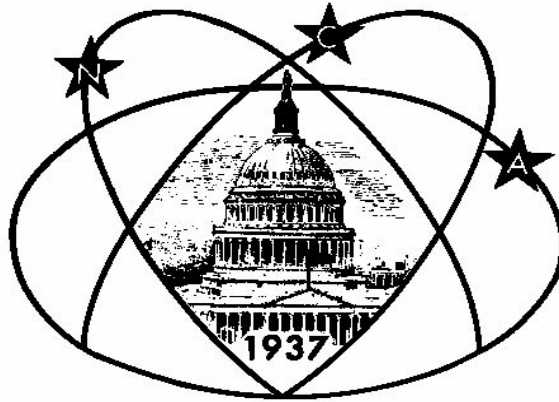


# Star



# Dust

National Capital Astronomers, Inc.

<http://capitalastronomers.org>

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## November Speaker: Dr. Randy A. Kimble Robotic Servicing of the Hubble Space Telescope *Submitted by Jeff Guerber*

Dr. Randy Kimble, Project Scientist for the HST Development Project, NASA-Goddard, will present the featured talk at the November 6 meeting of the National Capital Astronomers. The meeting will be held at 7:30 P.M. in the University of Maryland Astronomy Observatory on Metzert Road in College Park, MD.

### Abstract

The Hubble Space Telescope continues to provide spectacular astronomical data and results for the astronomical community and the general public. However, unless the telescope is serviced, its observing lifetime is expected to end after the next few years. Plans for carrying out another in the series of highly successful space shuttle-based servicing missions were disrupted by the loss of the shuttle Columbia in February

2003. Instead, NASA is currently planning an ambitious robotic servicing mission to HST, which is intended to provide a safe de-orbit capability for the telescope, to extend the telescope's observing lifetime (by installing new batteries and gyros), and to augment its scientific capabilities with two powerful new instruments, Wide Field Camera 3 and the Cosmic Origins Spectrograph. In this talk, he will discuss the status and plans for the robotic servicing mission and the scientific potential of the new instruments.

### Bio:

Dr. Kimble did his undergraduate work at MIT and received his Ph. D. at the University of California, Berkeley (1983), all degrees in physics. From 1983-1990, he was on the research staff at the Johns Hopkins

University, where he worked on the Hopkins Ultraviolet Telescope, which flew as a shuttle-attached payload in 1990 and 1995. In 1990, he joined the Laboratory for Astronomy and Solar Physics at Goddard Space Flight Center, where he has worked primarily on HST ever since. He served as Instrument Scientist for the Space Telescope Imaging Spectrograph during most of its development and through its observing lifetime after its installation onto HST in Servicing Mission 2 in 1997. He was also a member of the Advanced Camera for Surveys team. In 2002, he became HST Development Project Scientist; in that capacity he also serves as Instrument Scientist for Wide Field Camera 3. His primary interests are in astronomical instrumentation, detectors in particular.

## Astrobiology and Astrochemistry: A talk by Dr. Anthony J. Remijan *Reviewed by Jay H. Miller*

This is a review of the talk at the October 2 NCA meeting by Dr. Anthony J. Remijan, NASA/GSFC.

This talk was very timely because NPR's TV series, *Nova*, had just aired a four hour program entitled "Origins" on the formation of and life in the universe.

Dr. Remijan's expertise is in the radio and microwave portions of the electromagnetic spectrum, where he does interferometry and spectroscopy. Normally when one hears spectroscopy mentioned, it is with optical telescopes, but he showed that data can also be obtained at the longer wave-

lengths.

Before the 20th century, astronomy was concerned with areas such as astrometry. In the early 1900's, physics and astronomy came together and astronomers began using techniques such as spectroscopy. One of the first finds was that Halley's comet, which came by in 1910, had cyanogen, the CN radical, in its tail. Since the Earth was to go through its tail, this greatly upset the public. People thought that the cyanide would kill them. This, obviously, did not happen.

Dr. Remijan began his discussion with the

Murchison meteorite, a carbonaceous chondrite meteorite. This meteorite contained amino acids along with complex organic molecules. While this meteorite was found in Australia, Antarctica is a good source, because they are found on the surface. Another source of complex organic molecules is comets. Hale-Bopp contained ethylene glycol, anti-freeze.

In the 1950's, Stanley Miller and Harold Urey performed a very famous experiment in which they mixed methane, ammonia and water along with heat and a spark in an

*(Continued on page 2)*

## NCA Events This Month

The Public is Welcome!

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

**Fridays, November 5, 12, 19, and 26,** 6:30 to 9:30 P.M. NCA mirror- and telescope-making classes 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 [gbrandenburg@yahoo.com](mailto:gbrandenburg@yahoo.com).

**Saturdays in November** Observing with NCA's 14-inch telescope in Chevy Chase, MD., and Rock Creek Park. For more information, see article this page.

**Saturday, November 6 at 7:30 P.M.** NCA meeting at the University of Maryland Astronomy Observatory on Metzerott Road in College Park, MD. Speaker: Dr. Randy Kimble - Robotic Servicing of the Hubble Space Telescope. See map and directions on Page 6.

**Saturday, November 6 at 5:30 P.M.,** preceding the meeting, dinner with the speaker and NCA members at the Garden Restaurant in the UMD University College Inn and Conference Center. See map and directions on Page 6.

**University of Maryland Observatory, in College Park** on the 5th and 20th of every month at 9 P.M. The November 5 talk will feature Dr. Chul Gwon of UMD who will talk about CARMA, which is a radio telescope array partially operated by UMD. The talks are non-technical. (JHM)

### Upcoming NCA Meetings

2004: December 4;  
2005: January 8, February 12, March 12, April 2, May 7, and June 4

## Observing with the NCA C-14

**Mike McNeal**

### All at 8:45 p.m. Prime Objects

November 20 M39, Double Double

November 27 M31, M15

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 [mnealmi@verizon.net](mailto:mnealmi@verizon.net) to let him know you are coming.

Note: On November 13, the NCA C-14 will be at *Exploring the Sky* in Rock Creek Park

## Astrobiology and Astrochemistry Review, continued

(Continued from page 1)

attempt to duplicate what they thought were the conditions in the early Earth. It produced amino acids and other organic compounds. We're no longer sure these were the conditions and we're not sure how the planet got the required compounds, possibly through comets and meteorites. Comets certainly do contain water. Life seems to have started, though, only about 600-700 million years after the formation of the planet. The Miller-Urey experiment did show how easy it was to make organic compounds, even amino acids, from simple common ingredients.

Other sources of organic molecules that are studied are the interstellar medium (ISM), evolved stars, and external galaxies. Dr. Remijan's research focus is comets, the ISM, and evolved stars. While it's uncertain which of the telescopes Dr. Remijan has used, he mentioned the NRAO single dish telescope, the 100m Greenbank telescope (GBT), the largest fully steerable radio telescope in the world, the BIMA array (Berkeley, Illinois, Maryland Array), the Very Large Array (VLA) at Socorro, NM and a new array called CARMA which will include the BIMA dishes.

What can be measured? He is measuring

various motions of molecules. These include the rotation of the molecules, which is quantized, that is, it has discreet values, electronic transitions (measured in the visible portion of the spectrum), vibrations of the bonds in which the bonds move up and down or in and out and can be observed in the infrared portion of the electromagnetic spectrum. What Dr. Remijan is looking for are the particular lines in the radio or microwave bands that indicate the presence of particular compounds or ions. Each molecule has a unique set of lines for the various transitions its atoms can go through. The problem is that the spectra he obtains contain many lines and we don't have the standard spectra of all of the possible molecules or molecular fragments that could be present, so we don't always know what the lines mean.

One excellent source of organic molecules is the large cloud Sagittarius B2N, also called the LMH or "Large Molecule Heimat" (Homeland). This is the largest repository of large molecules in the ISM. The first molecule detected was formaldehyde, in 1969, in Sagittarius. This started people searching for organic molecules in space. Ethanol was detected in 1975 in Sag B2N and it had multiple transitions and

lines, which made positive identification easier. Since this is alcohol, for fun the researchers calculated the "proof" of the alcohol in the cloud and came up with 0.002. While this is low, the cloud is very big, so it's a lot of ethanol. About 300 molecules and ions have been detected. Even though they want many lines to be certain of a molecule, they're running into the problem that their detectors have gotten so sensitive that more extraneous lines from other unknown molecules are being found.

Dr. Remijan did his thesis on acetic acid, which is structurally similar to amino acids. Replace one hydrogen in acetic acid with NH<sub>2</sub> and you have glycine, the simplest amino acid. It should be noted, however, that no amino acids have been definitively detected in the ISM.

In summary, over 300 organic molecules have been observed in space over the last 35 years, but the basic biologically important molecules such as amino acids, have eluded detection so far, even though they have been found in meteorites. He did express dissatisfaction at one report indicating the detection of amino acids. He says the conclusions are wrong, and that he was preparing a rebuttal paper.

## The President's Letter

Welcome to the third meeting of our year. I got a very nice thank you note from the Girl Scouts for NCA's participation in their Eco-Expo on October 2. They will also be having Girl Scout Day at NASM's Udvar-Hazy Center on March 12, 2005 and they would like our participation. A telescope with a solar filter would be fine. I'll remind you of this as it gets closer.

I've been recording the lectures on my mini-DV camera. It would be nice if there were someone who was interested in video who could do a better job than I'm doing. The recordings can be used to write reviews of the talks. and since I now have my new iMac with its Superdrive, I can make DVDs which members can view. I

hope we can have a little archive of the talks.

Lastly, don't forget that NCA has a Yahoo group, which can be useful for exchanging thoughts and for between meeting messages. To cut down on spam, you can opt for no e-mail and just read the messages on the web. And don't forget, if you have any astronomical questions we can put them in Stardust along with answers from our knowledgeable members. If you've come across something interesting astronomical, we'd like to put that in Stardust, also.

*Jay Miller, President NCA*

## Dark-Sky Sites Nelson R. Wallace

I have found several possible dark-sky locations (parks) in southern Maryland approximately 30 miles from the district line, South of La Plata. I have already spoken to the persons responsible for management of the parks and they have expressed interest in having star parties that are open to the public. I would like some people to come out to see these dark sites to confirm that they are good for dark-sky viewing. I have found five locations. Call me so that we can arrange a meeting/trip. (Phone number: 301 374-2582 (H), cell phone number 240-441-0570 (leave no messages at that number).

Nelson R. Wallace.  
nelsonwallacejr04@yahoo.com

## RASC Publications Elizabeth Warner

Last year's order of RASC publications was quite successful. So, I have ordered the following publications from the Royal Astronomical Society of Canada (details <http://www.rasc.ca/publications.htm>)

- The Beginner's Observing Guide (5th rev.)
- Observer's Handbook 2005
- Observer's Calendar 2005 (color wall calendar)

All items are in and will be available at the November meeting.

The prices are

- \$17 The Beginner's Observing Guide (5th rev)
- \$21 Observer's Handbook 2005
- \$15 Observer's Calendar 2005 (color wall calendar)

## Powerful Merger of Galactic Clusters Nancy Grace Roman

From: owner-press-release+AEA-spinoza.public.hq.nasa.gov on behalf of NASA News+AEA-hq.nasa.gov  
Subject: Massive Merger Of Galaxies Is The Most Powerful On Record  
Nancy Neal  
Goddard Space Flight Center, Md.  
(Phone: 301/286-0039)

Irina Bruckner  
European Space Agency, Noordwijk, Netherlands  
(Phone: +31/71/56-3273)

NASA News Release: 04-310  
**Massive Merger Of Galaxies Is The Most Powerful On Record**  
An international team of scientists, led by a NASA-funded researcher, announced today,

they observed a nearby head-on collision of two galaxy clusters. One is the cluster Abell 754 in the constellation Hydra. The clusters smashed together thousands of galaxies and trillions of stars. It is one of the most powerful events ever witnessed. Such collisions are second only to the Big Bang in total energy output.

The event was captured with the European Space Agency's XMM-Newton observatory. Scientists are calling the event the perfect cosmic storm: galaxy clusters that collided like two high-pressure weather fronts and created hurricane-like conditions, tossing galaxies far from their paths and churning shock waves of 100-million-degree gas through intergalactic space. Data from the observations were released today.

## Girl Scout Event -- A Blast! Guy Brandenburg

From: <gfbrandenburg@yahoo.com>  
Sent: Sunday, September 26, 2004 13:10  
Subject: [capitalastronomers]

I went out last night to the Girl Scout stargazing event out at Shenandoah Meadows in Fort Valley, VA in the Massanutten Range, as I had promised to do. Despite the iffy weather forecast and the huge backup on I-66 because of some concert at the Nissan Pavilion that made me much later than I had anticipated, and the fact that the anticipated borrowing of a green laser pointer never happened, and the fact that my contacts' cell phones were com-

pletely in the shadow of the mountains, so I couldn't contact them remotely before I left, and couldn't let them know I was going to be later than I had anticipated, I thought the event was a blast. I had a great time, and it certainly seemed like the girls there did, also.

Given that it was fairly hazy and nearly a full Moon, just about the only sky object we could see was the Moon, but towards the very end I was able to find Albireo and the Double Cluster, even though the dew was literally dripping off the scope and all of the finders were fogged up. So my plan

wasn't to spend too much time looking through the scope anyway.

What we spent the most time on was a walking (or should I say, "Giant-Stepping") an accurate scale-model tour of the Solar System based on some calculations I had made and a smallish yellow kickball the Girl Scouts had, that was the model of the Sun. I had about 60 little Girl Scouts (Brownies? I donno - about 4th through 6th grade) and their chaperones enthusiastically following me and the girls who had volunteered to be the "Planets".

*(to be continued next month)*

# Mid-Atlantic Occultations and Expeditions

by David Dunham

## Asteroidal Occultations

Date	Day	EST	Star	Mag	Asteroid	dmag	s	in.	Location
Nov 2	Tue	4:43	SAO 99303	9.2	Alfaterna	7.1	1	3	WV,nVA,sMD
Nov 9	Tue	4:45	TYC13741622	11.4	Sulamitis	2.9	9	8	WV,nMD,sePA,NJ
Nov 11	Thu	2:19	TYC06600147	10.7	Goffin	4.7	2	6	OH,nPA,seNY,MA
Nov 14	Sun	18:49	TYC57130824	11.3	Boliviana	1.7	4	7	WV,VA,DC,MD,DE
Nov 15	Mon	21:47	TYC57401844	11.1	Scheherezade	5.2	3	8	sWV,nVA,DC-low
Nov 24	Wed	1:08	SAO 55560	7.0	Ursina	7.3	3	2	OH,PA,sNY,CT
Nov 28	Sun	23:16	81 Aquarii	6.2	Christophe	11.1	2	2	S. Carolina
Dec 3	Fri	4:08	TYC24020097	10.0	Buchar	5.2	3	5	Penn.,nwMD,DE

## Grazing Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Location
Nov 4	Thu	0:13	SAO 80677	7.6	50- 10	7N	Chester, VA; Assateague, NC
Nov 7	Sun	3:10	SAO 99316	8.8	30- 22	1S	Frederick & Reisterstown, MD
Nov 8	Mon	5:18	ZC 1693	7.5	20- 33	8S	s.Selinsgrove&Doylestown, PA
Nov 9	Tue	5:46	SAO 138804	9.4	12- 40	10S	Ellicott City & Odenton,MD
Nov 16	Tue	18:33	SAO 188621	8.2	24+ 16	13S	Morgantown,WV & Johnstown,PA

## Total Lunar Occultations

DATE	Day	EDT/ EST	Ph Star	Mag	% alt	CA	Sp.	Notes
Nov 3	Wed	5:29	R upsilonGem	4.1	67- 75	14N	K5	ZC 1149
Nov 4	Thu	4:51	R 24 Cancri	6.9	58- 72	60N	F0	ZC 1263 mag2 7.3,5.4",50
Nov 4	Thu	6:33	R 28 Cancri	6.1	57- 71	74S	F0	ZC 1270; spec. binary
Nov 5	Fri	2:35	R ZC 1373	6.5	49- 39	85N	A2	ZC 1373
Nov 7	Sun	3:46	R ZC 1578	6.9	29- 29	79S	K0	close double?
Nov 8	Mon	2:58	R ZC 1684	6.8	20- 9	71N	K0	Azimuth 89 deg.
Nov 9	Tue	11:08	D Jupiter	-1.7	11- 42	-42S		duration 90 seconds
Nov 9	Tue	12:11	R Jupiter	-1.7	11- 34	69S		duration 85 seconds
Nov 17	Wed	18:14	D ZC 3052	6.4	35+ 26	80S	K0	mag2 8.5 1.6",PA 18deg.
Nov 18	Thu	19:30	D ZC 3202	6.2	47+ 29	45N	F0	
Nov 18	Thu	22:26	D ZC 3214	6.8	48+ 8	57N	A0	Azimuth 240 deg.
Nov 21	Sun	23:21	D10Ceti=ZC55	6.4	79+ 35	65S	G8	mag2 8.7 0.4",PA 272deg
Nov 22	Mon	17:59	D 77 Piscium	6.4	86+ 36	55N	F4	ZC 155
Nov 22	Mon	20:50	D 80 Piscium	5.5	86+ 57	-3N	F0	ZC167;dark sideD s.ofDC
Nov 25	Thu	1:09	D pi Arietis	5.3	97+ 51	50N	B6	ZC416 m2 8.4 3.3",PA119
Nov 25	Thu	5:12	D rho Ari	5.6	98+ 6	58N	F6	ZC433;Az288;m2 8.1,0.2"
Nov 30	Tue	2:18	R ZC 1093	6.6	89- 77	87N	F8	mag2 7.3 1.1",PA 312deg
Nov 30	Tue	23:12	R omega Cnc	5.9	83- 36	58S	G8	ZC 1206

## Observations

Date	Star	Mag	Object	Location	Observers	Result
Sep 24	SAO 190159	9.8	Toutatis	Woodstown, NJ	D. Dunham	video, occ?
Sep 29	TYC58140435	11.1	Rosa	Raleigh, NC	D. Dunham	video, miss
				Drug Store, NC	remote	video, miss
Oct 5	TYC52770812	10.9	Ute	Rodanthe, NC	D. Dunham	video, 8s occ
				Nags Head, NC	remote	video, R timed
Oct 16	TYC00100323	10.0	Hollandia	Adamstown, PA	D. Dunham	video, miss
				Yocumtown, PA	J. Guzman	video, miss

David Dunham, e-mail [dunham@starpower.net](mailto:dunham@starpower.net), more info. <http://iota.jhuapl.edu>  
Phone: home 301-474-4722; office 240-228-5609; car 301-526-5590.

## 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 [st88@ioip.com](mailto:st88@ioip.com), so that we can make reservations for the right number of people.

## Do You Need a Ride?

Please contact Jay Miller, 301-530-7942, 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 [jhmiller@os2bbs.com](mailto:jhmiller@os2bbs.com).)

## 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](mailto:nancy.roman6@verizon.net) or 301-656-6092 (home).

*The deadline for the December Star Dust is November 15.*

*Please send your material to Elliott Fein by that date to ensure inclusion.*

*Send submissions to Elliott Fein at [elliott.fein@erols.com](mailto:elliott.fein@erols.com).*

*Text must be in ASCII, MS Word (97 or earlier), or WordPerfect.*

*All articles submitted may be edited to fit the space available.*

## Meteor Showers

### November Radiants

**Full Moon: November 26**

**Important Note:** The Leonids were in a cycle of strong activity up to 2002. Although no "storm" level activity is predicted during the next few years, above-normal displays may be present through 2006.

#### Major Activity

Radiant	Duration	Maximum
Leonids (LEO)	November 13-20	Nov. 17 @ 07:50 UT

#### Moderate Activity

Radiant	Duration	Maximum
Northern Taurids	October 12-December 2	Nov. 4-7
Southern Taurids	September 17-November 27	Oct. 30-Nov. 7

#### Minor Activity

Radiant	Duration	Maximum
Andromedids	September 25-December 6	November 14/15
Alpha Monocerotids	November 13-December 2	November 21
Alpha Pegasids	October 29?-November 17?	November 1-12

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

# Support the IDA

Join the International  
Dark-Sky Association  
3225 N. First Avenue  
Tucson, AZ 85719-2103

[www.darksky.org](http://www.darksky.org)

## RAS Nancy Grace Roman

Items from *Observatory* 2004 April (vol. 124, No. 1179). Reports of meetings of the Royal Astronomical Society

Mr. T. McWalter, MP reported on a study of the House of Commons Select Committee on Science and Technology endorsing prevention of unnecessary sky illumination. Unfortunately, he was pessimistic about the chances of any results from the study because the leadership is not enthusiastic.

Dr. I. A. Crawford reported on a summer study in 2003 by the Human Spaceflight Directorate of ESA. A gathering of international experts met to consider possible future human space activities. They agreed that the eventual goal should be a human landing on Mars but that for the time being, the effort should be limited to establishing a long term human presence on the moon. There is a great deal of science to be done there but not in the short time spans provided by Apollo.

# 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 Metzertott 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 Metzertott; or, take New Hampshire Ave. (MD-650) south, turn left at the second light onto Adelphi Rd., two more lights, turn left onto Metzertott, and proceed about a mile to the observatory. The observatory is on the south side of Metzertott Rd., directly opposite the UM System Administration building; you can park there if the observatory lot is full, but be careful crossing Metzertott 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 Metzertott) 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 Metzertott Rd.

## HUDF

**Nancy Grace Roman**

(From abstract of a talk by Steven Beckwith (STScI) for a Goddard colloquium.)

The Hubble Ultra Deep Field is the deepest image ever taken of the universe. It contains over 10,000 galaxies in an area of 200" X 200" (1/69 times the size of the moon) with the most distant confirmed object at a redshift of 6.7 corresponding to a time when the universe was only about 700 million years old.

# Come See the Stars!

## Exploring the Sky 2004 Schedule

by Joe Morris

Date	Time	Notes
11/13	7:00 P.M.	Leonid meteor shower 11/14-11/21

*Exploring the Sky* is an informal program jointly sponsored by National Capital Astronomers and the National Park Service 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>

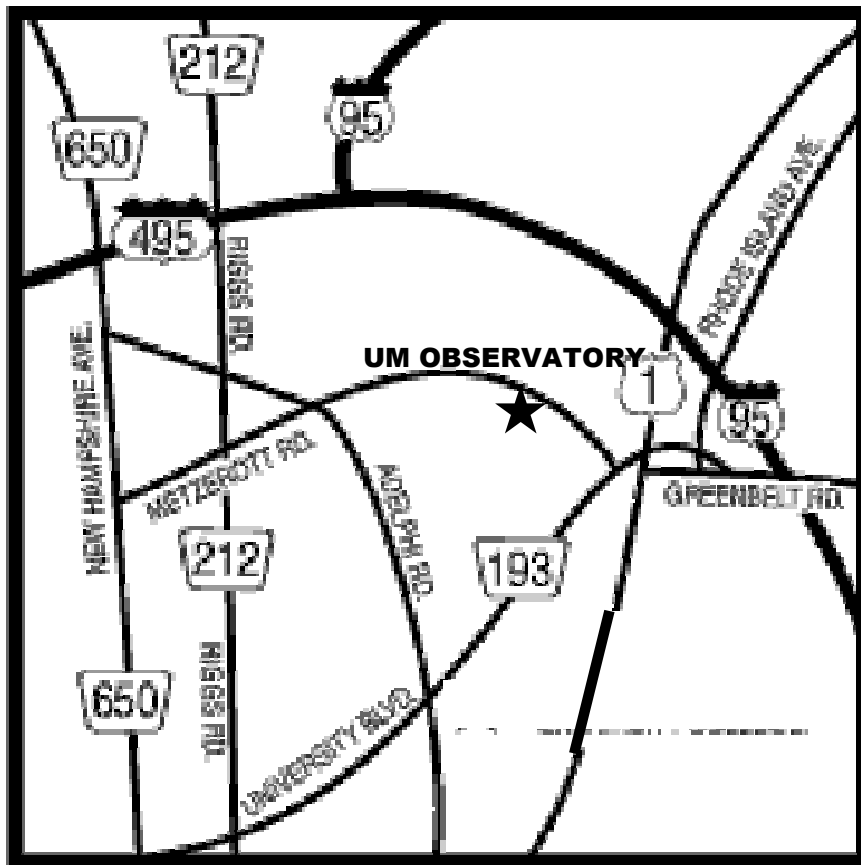
or

<http://www.capitalastronomers.org>

## 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.



Getting to the NCA Meeting

*Star Dust* is published ten times yearly, September through June, by the National Capital Astronomers, Inc. (NCA).  
Editor: Elliott Fein, Co-editor: Adele Fein, Editorial Advisor: Nancy Byrd. Consultant: Jeffrey Norman  
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## National Capital Astronomers, Inc.

<http://capitalastronomers.org>

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Observing - Michael McNeal, [mcnealmi@verizon.net](mailto:mcnealmi@verizon.net); Telescope Making - Guy Brandenburg; *Star Dust* Editor - Elliott Fein

### 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.

**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](mailto: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 the NATIONAL CAPITAL ASTRONOMERS**

**Date:**

Name(s): \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ E-mail: \_\_\_\_\_

Other family members who should receive a membership card: \_\_\_\_\_

\_\_\_\_\_ I prefer to receive *Star Dust* by e-mail

Dues:

\_\_\_ \$27 With *Star Dust*.

\_\_\_ \$60 With *Star Dust* and a discount subscription to *Sky & Telescope*.

\_\_\_ \$15 Junior membership with *Star Dust*.

\_\_\_ \$45 Junior membership with *Star Dust* and a discount subscription to *Sky & Telescope*.

\_\_\_ \$100 Contributing member (with *Sky & Telescope*) (\$40 tax-deductible).

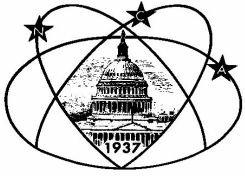
\_\_\_ \$150 Sustaining member (with *Sky & Telescope*) (\$90 tax-deductible).

Junior members only: Date of Birth: \_\_\_\_\_ Only members under the age of 18 may join as juniors.

Tax deductible contribution: \_\_\_\_\_ Thank You.

Please send this form, with your check payable to National Capital Astronomers, Inc., to:

Mr. Jeffrey Norman, NCA Treasurer, 5410 Connecticut Ave NW #717, Washington DC 20015-2837



## **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**

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