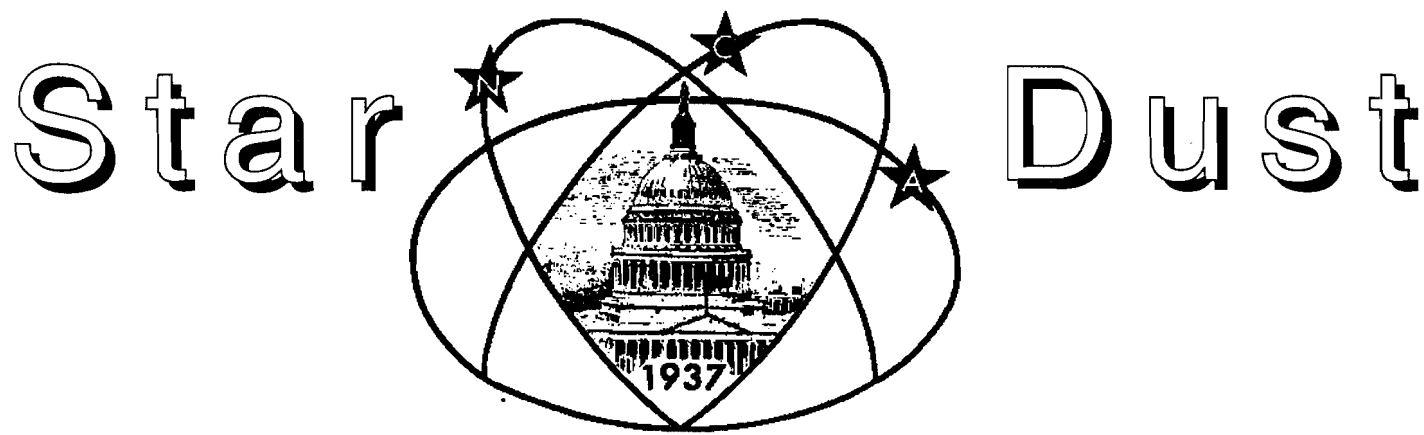


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Galaxy Evolution

A Talk Presented by Dan Kelson

Reviewed by John Graham

At the April 3rd meeting of NCA, Dr. Dan Kelson of the Carnegie Institute's Department of Terrestrial Magnetism gave a talk on the subject of galaxy evolution and the way in which new research facilities have changed the way many of us do astronomy now. Particular emphasis was placed on observations obtained with the Hubble Space Telescope (HST) and the Keck 10 meter telescope in Hawaii. These give us information on galaxies so distant that we see them as they were at times which are only a fraction of the current age of the Universe. For example, one wants to know what makes a galaxy become brighter with time. Is it due to the appearance of brighter stars or the birth of more faint ones?

Up until recently almost all work in this field has been limited by the resolution imposed by the terrestrial atmosphere and the faintness of the objects. Before HST, we were getting some insights as to how galaxies evolve with time by studying those which are seen in dense clusters. By segregating them according to apparent brightness and color, one found that in the more distant clusters there was an excess of faint blue galaxies. The traditional view of the Hubble sequence of galaxy types from elliptical to spiral galaxies was being undermined and the different galaxy types were now seen as not necessarily forming an evolutionary sequence.

GALAXY, continues on page 2

John Mather to Speak on Space Astronomy in the 21st Century

The Saturday, May 1, 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 meeting will be a double header, featuring DC area science fair winners presenting their astronomical science fair projects and Dr. John C. Mather of Goddard Space Flight Center. Dr. Mather has played a dominant role in defining space astronomy in the late 20th century. After graduating from Swarthmore College and earning his PhD in physics at UC Berkeley in 1974, he led the proposal effort for the Cosmic Background Explorer (COBE) satellite, 1974, and served as Study Scientist, Project Scientist, and Principal Investigator for the FIRAS (Far Infrared Absolute Spectrophotometer) on COBE. COBE, writes Dr. Mather, showed that the spectrum of the cosmic microwave background radiation, presumed to originate in the Big Bang, matches theoretical predictions within 50 parts per million; that the background radiation has hot and cold spots indicating density fluctuations in the Big Bang; and that there is a cosmic far infrared background radiation, presumably formed by previously unseen early galaxies. He is currently Project Scientist for the Next Generation Space Telescope.

Dr. Mather will speak to NCA and to the talented young students who,

hopefully, will be astronomers of the twenty-first century, on the subject of "Space Astronomy in the 21st Century." Dr. Mather submits the following abstract of his talk:

New technology and design approaches have enabled revolutionary improvements in astronomical observations from space. Worldwide plans and dreams include orders of magnitude growth in sensitivity and resolution for all wavelength ranges, and would give the ability to learn our history, from the Big Bang to the conditions for life on Earth. Space astronomy is the only way to overcome the limitations of the Earth's atmosphere, which absorbs or disturbs the signals

CENTURY, continues on page 3

NCA Slate of Officers

Submitted by Gladys Fuller

The Nominating Committee presents the following slate of NCA officers for 1999-2000, the majority of whom are willing to serve for the second term. Nominations may also be made from the floor.

President	Andrew Seacord
Vice-President	Nancy Byrd
Secretary	Nancy Roman
Treasurer	Jeffrey Norman
Trustee	Jay Miller

Calendar of Monthly Events

The Public is Welcome!

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

Saturday, May 1, 5:30 PM - Dinner with the speaker, the science fair winners and their families, and NCA members at Pizzeria Uno, 7272 Wisconsin Ave., Bethesda, MD. See map and directions on back page.

Saturday, May 1, 7:30 PM - NCA meeting, at Lipsett Auditorium in Building 10 at NIH, will feature Dr. John Mather, speaking on "Space Astronomy in the 21st Century" and area science fair winners presenting their astronomical science fair projects. See map and directions on back page.

Mondays, May 3, 10, 17, and 24, 7:30 PM - Public nights at U.S. Naval Observatory (USNO), in Northwest Washington, D.C. (off Massachusetts Avenue). 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>.

Monday, May 7, 8:00 PM - Skywatch at Patuxent River Park. Information: 301/627-6074. Volunteers with telescopes call Bob Bolster, 703/960-9126.

Fridays, May 7, 14, 21, and 28, 7:30 PM - Telescope making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 202/362-8872.

Fridays, May 14, 21, and 28, 8:30 PM - Open nights with NCA's Celestron C-14 telescope at Ridgeview

Observatory; near Alexandria, Virginia; 6007 Ridgeview Drive (off Franconia Road between Telegraph Road and Rose Hill Drive). Information: Bob Bolster, 703/960-9126. Call before 6:00 PM.

Saturday, May 15, 10:00 AM - 4:00 PM - Astronomy Day at Naval Observatory. For information or to volunteer call Jim Roy, 703/536-3926

Saturday, May 15, Beginning at 6:00 PM - Open House at Hopewell Observatory. See article in April issue of *Star Dust* for directions.

Saturday, May 15, 9:00 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.

Tuesdays, May 4, 11, 18, and 25 - Telescope making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

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.

GALAXY, continued from page 1

From the ground-based observatories, it is hard to distinguish the different galaxy types because of the blurred view through the Earth's atmosphere. As Dan put it, it is hard to know what is going on if you don't know what you are observing. In particular, it is difficult to make realistic comparisons between faint clusters of galaxies now seen as they were 10 billion years ago and those close by to us that are representative of the state of the Universe at the present time.

The HST observations have shown us:

- 1) More detail in the appearance of faint blue galaxies.
- 2) Stronger evidence for change in fraction of blue galaxies.
- 3) That there is little evolution in the colors of dwarf elliptical galaxies.
- 4) There is substantial evolution in the numbers of S0 and spiral galaxies in clusters.

Dr. Kelson presented HST images of a particularly spectacular cluster, CL11358 +62, which showed many individual galaxies at a redshift, $z = 0.33$ along with the distorted form of a gravitationally lensed background galaxy, which has a measured redshift of 5. Dan outlined how gravitational lens theory could correct for these distortions and give us images of what appear to be star forming knots only 10-15 parsecs across at this astounding distance.

GALAXY, continues on page 3

GALAXY, continued from page 2

While the Hubble Telescope gives incomparable spatial resolution, it has only a 2.4 meter mirror and is limited in its light collecting ability. Having located the interesting objects, we need to collect more light in order to do effective spectroscopic analysis, and it is here that the Keck telescope, with its 10 meter mirror and its 17-fold improvement in light collecting capacity, really comes into its own in studying faint galaxies so far away. Multi-slit masks, of which one was shown, enable hundreds of galaxies to be observed spectroscopically at one time. This would not have been possible but for the new large area CCD detectors, which provide digital images over the whole cluster field and the enormous improvement in our ability to handle and process them with present day computers. The spectra are dominated by the bright night sky lines from the terrestrial atmosphere which first have to be removed. Following the location of spectral lines in the faint galaxies, doppler velocities can be measured and used to

determine galaxy masses. The spectral lines can also tell us what sort of stars are the principal contributors to the galaxy light. As a result of this work we now have a sample of galaxies going out to redshifts of 3, 4 and 5 and a time base to map out the history of star birth in the Universe. Putting all the information together, we find stars were formed vigorously from the time when galaxies were first formed but that there has been a slowing down at redshifts less than 1 during the last several billion years. Elliptical galaxies evidently formed their stars very early, at redshifts much greater than 1, spirals were set up a long time ago and haven't changed much in the last several billion years, but the intermediate S0 galaxies have been producing stars up until much more recently.

Dan Kelson finally gave us a view of what to expect in the future with the development of new facilities such as the European Southern Observatory Very Large Telescope, made up of 4 telescopes, each 8.2 meters in aperture, the Subaru and Gemini 8 meter tele-

scopes, and the twin 6.5 meter telescopes being built at Carnegie's Las Campanas Observatory. A new Next Generation Space Telescope is now on the drawing board while new instruments are being put into service on the Hubble Telescope. Exciting times are ahead for observational astronomy. ○

CENTURY, continued from page 2

from the distant universe at almost all wavelengths. Coming soon are missions operating from far infrared to gamma rays, capable of showing the hearts of black holes, the places where stars and planets are born, the formation of the first luminous objects after the Big Bang, and even the tiny ripples in space time produced by the Big Bang itself. The Next Generation Space Telescope, for example, will be able to see the most distant galaxies as they were being assembled from tiny fragments. It will be 1/4 as massive as the Hubble, with a mirror 3 times as large, cooled to about 30 Kelvin to image infrared radiation. ○

Southern Star Party

May 14-16, 1999

*Formal and Informal Presentations • Equipment Display
Astrophotography Contest • Swap Table*

The Charlotte Amateur Astronomers Club (CAAC) will host the 13th Annual Southern Star Astronomical Convention in the Blue Ridge Mountains of May 14-16, 1999 and we are inviting you and your club members to join us. This will be an opportunity for southeastern astronomical societies to share their interests and club activities with each other and enjoy a variety of speakers and other events in a secluded mountain setting.

Featured Speakers:

Dr. Bill Gutsch, NASA Consultant.

Nagin Cox, Deputy Chief of the Engineering flight Team for NASA/JPL's Galileo mission to Jupiter.

Dr. Rene Plune, Radio Astronomer at the Center for Astrophysics.

Virginia Meader, science teacher, will conduct nature walks and nature study.

Information Presentations

Astronomical Contest

Star Parties

Equipment Displays & Swap Table

Cost (including 2 nights lodging and 5 meals at Wildacres):

\$125.00 (Adults)

\$75 (Ages 6-12) \$45 (Ages 3-5)

\$50 (Day Registration only)

Registration: Write checks payable to Southern Star/CAAC and mail to Todd Heavner, PO Box 1959, Davidson, NC 28036.

Hubble Images Collection to be Exhibited at the National Academy of Sciences

April 22 through August 31, 1999

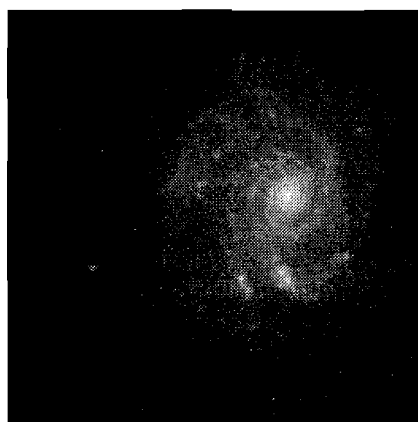
Featured images include the pillars of the Eagle Nebula, supernova 1987A, pinwheel-shaped galaxies M100 and NGC253, and many more. The exhibition is open to the public free of charge from 9 a.m. to 5 p.m., Monday through Friday. Arrangements for weekend viewing may be made by calling 202/334-2436.

Newsletter Deadline for June *Star Dust*, May 15, 1999

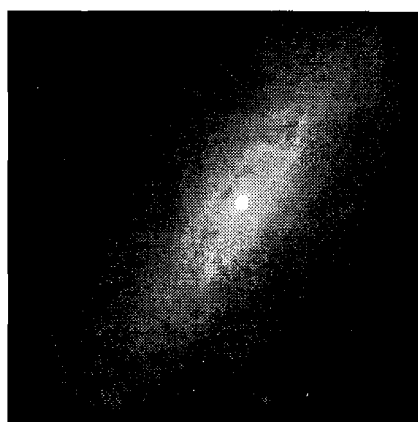
Send Submissions to Alisa & Gary Joaquin, at ajglj@erols.com or fax submissions to 703/658-2233. Text may be in ASCII or Microsoft Word and graphics submitted must be in TIFF, GIF, or JPEG. Thank you.

Hubble's Infrared Galaxy Gallery

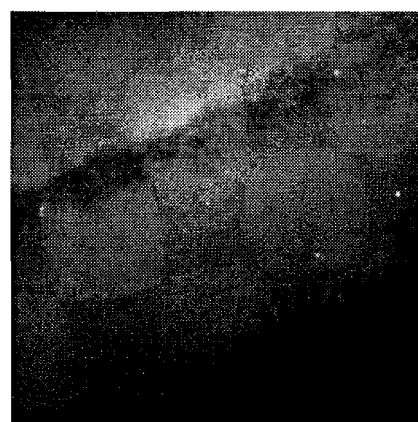
March 18, 1999



NGC 5653



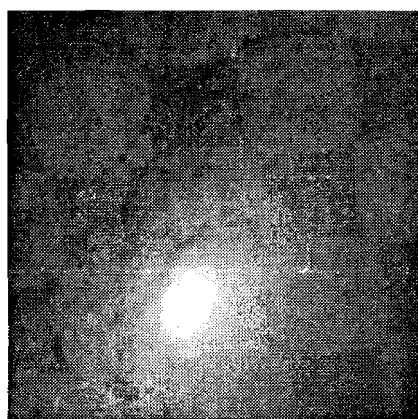
NGC 3593



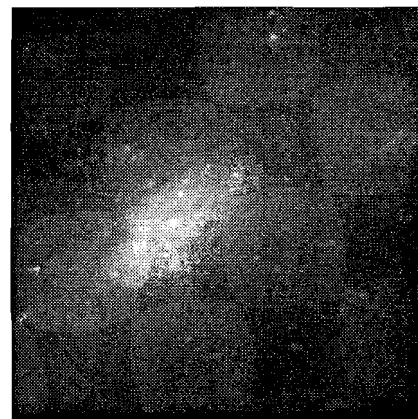
NGC 891



NGC 6946



NGC 4826



NGC 2903

Astronomers have used the NASA Hubble Space Telescope to produce an infrared "photo essay" of spiral galaxies. By penetrating Individual Images the dust clouds swirling around the centers of these galaxies, the telescope's infrared Related Links vision is offering fresh views of star birth. These six images, taken with the Near Infrared Camera and Multi-Object Spectrometer, showcase different views of spiral galaxies, from a face-on image of an entire galaxy to a close-up of a core. The top row shows spirals at diverse angles, from face-on, (left); to slightly tilted, (center); to edge-on, (right). The bottom row shows close-ups of the hubs of three galaxies. The knots outlining the curving spiral arms in NGC 5653 and NGC 3593, for example, pinpoint rich star-forming regions where the surrounding hydrogen gas is heated by intense ultraviolet radiation from young, massive stars. In visible light, many of these regions can be hidden from view by the clouds of gas and dust in which they were born. The glowing hydrogen found inside the cores of these galaxies, as in NGC 6946, may be due to star birth; radiation from active galactic nuclei (AGN), which are powered by massive black holes; or a combination of both. White is light from middle-age stars. Clusters of stars appear as white dots, as in NGC 2903. The galaxy cores are mostly white because of their dense concentration of stars. The dark material seen in these images is dust. These galaxies are part of a Hubble census of about 100 spiral galaxies. Astronomers at Space Telescope Science Institute took these images to fill gaps in the scheduling of a campaign using the NICMOS-3 camera. The data were nonproprietary, and were made available to the entire astronomical community. Distance of galaxies from Earth: NGC 5653 - 161 million light-years; NGC 3593 - 28 million light-years; NGC 891 - 24 million light-years; NGC 4826 - 19 million light-years; NGC 2903 - 25 million light-years; and NGC 6946 - 20 million light-years.

Credit: Torsten Boeker, Space Telescope Science Institute (STScI), and NASA

Occultations in the Mid-Atlantic States Region

by David Dunham

Total Lunar Occultations

The better total lunar occultations through the end of May visible from throughout the Washington-Baltimore greater metropolitan area are listed below. They can be accurately timed by aiming a camcorder into a low-power eyepiece of your telescope and recording WWV with the audio:

DATE	Day	EDT	Star	Mag	%	alt	CA	Notes
						0		
May 5	Wed	04:14	R 21 Sgr.	4.8	81-	30	28N	7.6 magnitude secondary R's 4 s before
May 8	Sat	03:34	R 21 Cap.	6.1	54-	15	58S	
May 10	Mon	05:18	R 70 Aquarii	6.2	33-	21	90S	Sun altitude -8 degrees
May 19	Wed	22:32	D ZC 1241	6.5	27+	22	26S	9.1 magnitude secondary D's 2 m before
May 21	Fri	00:37	D pi Cancr	5.4	39+	8	27S	Low in west, azimuth 283 degrees
May 22	Sat	00:13	D SAO 98966	7.6	49+	20	84N	Distant Regulus companion
May 22	Sat	00:19	D Regulus	1.3	49+	19	87N	8x; *** Naked-eye event ***
May 22	Sat	01:17	R Regulus	1.3	49+	8	-87N	Low in west, azimuth 279 degrees
May 28	Fri	22:14	D gamma Lib.	3.9	99+	29	68N	
May 29	Sat	04:53	D eta Librae	5.4	99+	7	67S	Low, azimuth 243; Sun altitude -9
Jun 2	Wed	00:14	R xi1 Sgr.	5.0	92-	16	33N	xi2 miss in DC; see grazes

"D" following the time denotes a disappearance, while "R" indicates that the event is a reappearance. When a power (x) 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 minute for other locations in the Washington-Baltimore metropolitan areas unless the cusp angle (CA) is less than 30 degrees, in which case, it might be as much as 5 minutes different for other locations across the region. Mag is the star's magnitude. % is the percent of the Moon's visible disk that is sunlit, followed by a + indicating that the Moon is waxing and - showing that it is waning. So 0 is new Moon, 50+ is first quarter, 100+ or - is full Moon, and 50- is last quarter. The Moon is crescent if % is less than 50 and is gibbous if it is more than 50.

Planned Grazing Occultation Expeditions

DATE	Day	EDT	Star	Mag	%	alt	CA	Notes
						0		
Jun 2	Wed	00:09	xi2 Sgr	3.6	92-	13	14S	Bordentown & Trenton, NJ
*** Approximate data below for better grazes later in 1999 ***								
Sep 4	Sat	04:28	64 Orionis	5.2	34-	36	10N	Pittsburgh, PA
Sep 18	Sat	19:50	ZC 2697	6.5	60+	30	4N	Reston, McLean, VA; Largo, s. Bowie, MD

Notes:

June 2: 5.0 magnitude xi1 Sagittarii will reappear near the end of the grazing observing period, at 00:15.

Asteroidal Appulses

DATE	Day	EDT	Star	Mag	Asteroid	dmag	dur.	ap.	Occultation
							s <td>in. <td>Location</td> </td>	in. <td>Location</td>	Location
May 1	Sat	21:52	SAO 059397	6.9	Panopaea	7.3	4	1	Greenland
May 27	Thu	0:36	PPM 127077	11.2	Harmonia	1.1	5	8	s. New England

Notes:

May 27: The star is a close double with PPM 127076, both components being mag. 11.2; they are separated by 4" and PPM 127076 will be occulted 5 minutes earlier in Newfoundland. If the seeing is poor so that the two stars can not be resolved, the event will be more difficult, with the effective mag. drop being only 0.7. The star's altitude will be 15 degrees in azimuth 279 deg.

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

Arlington Planetarium — “Worlds in Motion,” April 9 — May 23, Fri., Sat., Sun., 7:30 PM, Admission: Adult \$2.50, Children & Seniors \$1.50. Information 703/228-6070.

Carnegie Institute of Washington/ Department of Terrestrial Magnetism (DTM) — Seminars are held on Wednesdays at 11:00 AM in the Seminar Room of the Main Building. DTM is located in Washington, DC, on 32nd Street one block south of Military Road.

“The Search for Geochemical Clues to Conditions in the Early Solar Nebula,” Speaker, Conel Alexander, May 19.

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/fa

cilities/observatory/telescope.html.

Montgomery College’s Planetarium, Takoma Park — “The Search for Extraterrestrial Intelligence,” May 15, 7:00 PM.

NASA Goddard Scientific Colloquia — All Colloquia will take place in Bldg. 3 Auditorium, with coffee and cookies at 3:30 PM.

“40 Years of Science at Goddard”, Speaker, Frank McDonald, May 7.

“Polar Plumes of the Sun,” Speaker, Craig DeForest, May 14.

“In Pursuit of Pulsars,” Speaker, Jocelyn Bell Burnell, May 28.

U.S. Naval Observatory — All Colloquia will take place in Bldg. 52 Auditorium, with coffee and cookies at 10:00 AM, talk at 10:30 AM, and lunch at noon:

“Space Interferometry Mission: Taking the Measure of the Universe”, Speaker Dr. Stephen Unwin, May 14.

University of Maryland, Dept. of Astronomy Open House — “NEAR-miss: NEAR’s Flyby of Asteroid 433 Eros”, Speaker, Dr. Lucy McFadden, May 5, 9:00 PM.

“To Be Arranged” Speaker, Dr. John Trasco, May 20, 9:00 PM.

Information: 301/405-3001 (days), 303/405-0355 (evenings).

Supernovae and Gamma Ray Bursts Symposium

The Largest Explosions Since the Big Bang

May 3-6, 1999

Presented by
The Space Telescope Science Institute
Baltimore, MD

Early Registration & Reception
May 2, 1999, 4:00 - 6:00 PM
For all registered participants

Cost: \$200 (including dinner)
Student Discount: \$100
(not including dinner)

For more information go to STScI’s website or e-mail garcia@stsci.edu.

Upcoming Event

Universe 99—Toronto, Ontario, July 1-7. IOTA presentations are sought. RASC, AAVSO, and the Astronomical Society of the Pacific will also meet. For more information, see <http://www.aspsky.org>.

Meteor Showers

Major Activity

Radiant	Duration	Maximum
Eta Aquarids	April 21-May 12	May 5/6

Minor Activity

Radiant	Duration	Maximum
Epsilon Aquilids	May 4-27	May 17/18
May Librds	May 1-9	May 6/7
N. May Ophiuchids	April 8-June 16	May 18/19
S. May Ophiuchids	April 21-June 4	May 13-18

Daylight Activity

Radiant	Duration	Maximum
Episilon Arietids	April 25-May 27	May 9/10
May Arietids	May 4-June 6	May 16/17
Omicron Cetids	May 7-June 9	May 14-25
May Piscids	May 4-27	May 12/13



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.

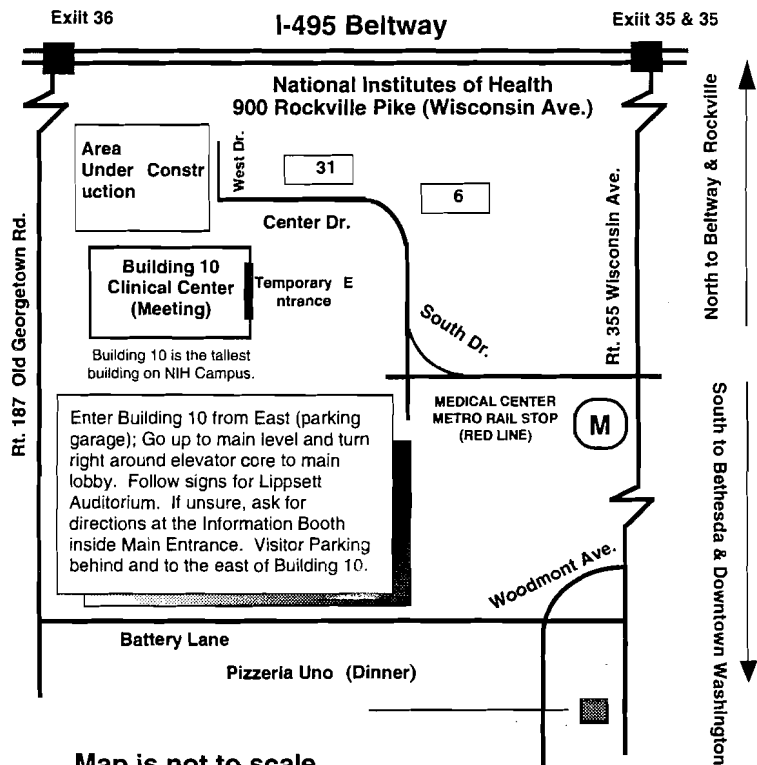
The following information is optional. Please indicate briefly any special interests, skills, education, experience, or other resources which you might contribute to NCA. **Thank you, and welcome to NCA!**

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).

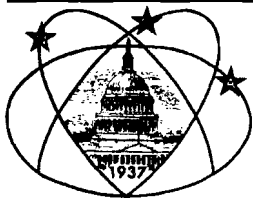
To Pizzeria Uno - From the beltway, take Wisconsin Avenue toward Bethesda. The address is 7272 Wisconsin Ave. (301/951-0670). There are parking garages nearby. Seats are not guaranteed after 5:30 PM.

Star Dust is published ten times yearly (September through June) by the National Capital Astronomers, Inc. (NCA), a nonprofit, astronomical organization serving the entire National Capital region, and beyond. NCA is the astronomy affiliate of the Washington Academy of Sciences and the National Capital region's representative of the International Dark-Sky Association. President: Andrew Seacord, 301/805-9741. Deadline for *Star Dust* is the 15th of the preceding month. Editors: Alisa & Gary Joaquin, 4910 Schuyler Dr., Annandale, VA 22003, 703/750-1636, E-mail: ajglj@erols.com. Editorial Advisor: Nancy Byrd
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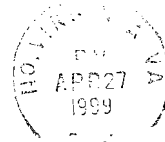
Map is not to scale.

A more current map for parking at NIH may be found at: www.cc.nih.gov/cc/waytogo/update1.html



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

Wayne H Warren, Jr
 8001 Brett Place
 Greenbelt MD 20770-3001
 3/31/00