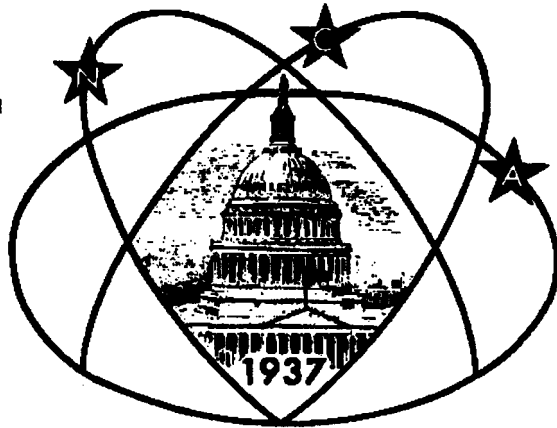


Star



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Seeing the First Objects With the Next Generation Space Telescope

by John Mather

Abstract

The Next Generation Space Telescope (NGST) is a part of NASA's Origins theme, seeking to understand the formation, growth, and evolution of galaxies, stars, and planets. It would be a successor to the Hubble Space Telescope, to be launched around 2007, with an aperture of at least 4 meters (preferably between 6 and 8 meters) and cooled for optimum performance in the 1 to 5 micron wavelength band. It would be capable of observing individual supernovae to redshifts of 10 or more and finding galaxies and globular clusters in the process of formation. It would also be a general purpose observatory, open to the worldwide community of astronomers. Many technological advances would be required; some are already in progress, including an adjustable glass mirror only 2 millimeters thick.

Biography

John Cromwell Mather was born in Roanoke, Virginia and grew up in New Jersey. He attended Swarthmore College, where he earned a BA degree with honors in 1968. He was granted a PhD in Physics from the University of California, Berkeley in 1974. Dr. Mather held a National Academy of Sciences/National Research Council Research Associateship at the Goddard Institute for Space Studies (GISS) (1974-1976), where he studied stellar silicon monoxide masers. He has been a staff scientist at the Goddard Space Flight Center since 1976, and is now in the Infrared Astrophysics Branch of the Laboratory for Astronomy and Solar Physics, where he is a Senior Scientist. John gained notoriety through his successful efforts to organize, propose, and lead the team that flew the now famous COBE (Cos-

mic Background Explorer) mission, which he described before the NCA in 1982 December.

Dr. Mather has won numerous awards for his outstanding work toward understanding our complex Universe. These include an honorary DSc degree from his alma mater, Swarthmore College, the Space Science Award (American Institute for Astronautics and Aeronautics 1993), the National Space Achievement award (Rotary 1991), the John Scott Award (City of Philadelphia 1995), the Dannie Heineman Prize (American Astronomical Society 1993), and the Rumford Prize (American Academy of Arts and Sciences 1996). Most notably, he has just recently been elected to the National Academy of Sciences. He currently serves as a Study Scientist for the Next Generation Space Telescope. ○

From the Secretary

by Leith Holloway

Sometimes I wonder whether anybody is actually reading my articles in *Star Dust*. When I was living in Vermont and writing popular science articles for the local weekly newspaper, I voiced the same concern to my editor. He said, "Don't worry Leith, you'll hear from them when you make a mistake."

My topic today is the NCA directory. It takes a lot of work and expense to produce this document, and it would be a shame if it were not well used by NCA members. The directory contains a great deal of information. For example, the names of all of the NCA officers and committee heads appear on the last page. If you have a question about the services provided by the NCA or when an event will occur, just look on this page for the name of the person responsible for this NCA activity. Then

you can look up his or her name in the eleven pages of names, phone numbers and addresses in this same document.

Secretary, Continued on page 2

Extrasolar Planets

The review of Extrasolar Planets was not available at press time. It will be published in the November newsletter.

Calendar of Monthly Events

The Public is Welcome!

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

Fridays, October 3, 10, 17, 24, and 31, 7:30 PM-Telescope making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 202/362-8872.

Fridays, October 3, 10, 24, and 31, 8:30 PM-Open nights with NCA's Celestron-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 (before 6:30). Jupiter and later, Saturn are featured objects this month.

Saturday, October 4, 5:30 PM-Dinner with the speaker and other NCA members at the Athenian Plaka, 7833 Woodmont Ave., Bethesda, MD. See map and description on back page.

Saturday, October 4, 7:30 PM-NCA meeting, will feature John Mather speaking on "Seeing the First Objects With the Next Generation Space Telescope." For directions, see map and description on back page.

Mondays, October 6, 13, 20, and 27, 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>.

Tuesdays, October 7, 14, 21, and 28, 7:30 PM-Telescope making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

Saturday, October 25, 7:30 PM-"Exploring the Sky," Rock Creek Park, near the Nature Center. Information: 202/426-6829

Thursday, October 30, beginning 8:30 AM-Washington Area Astronomers meeting. Held in the Johnson Center at George Mason University, Fairfax, VA. Registration cost is approximately \$10.00. One of the speakers featured will be Harold Williams (NCA President).

During questionable weather, call the IOTA Hotline (Phone: 301/474-4945) for NCA meeting status. The absence of a cancellation notice on the Hotline means the meeting will take place.

See page 4 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 1997*, the *Observer's Handbook 1997*, in numerous software packages, and other links available on the NCA Home Page (see above for address). NCA members can purchase all these (and much more) at a discount. To join NCA, use membership application on page 5.

Secretary, Continued from page 1

Our officers are dedicated to astronomy and public service, and they will be happy to hear from you unless, of course, you call during dinner time or too early in the morning or too late at night. A search of the directory may reveal that a neighbor is also an NCA member and may enjoy hearing from you. This search can be done using a computer and a disk with an ASCII file of the entire NCA directory, which I can lend to you. ○

Mayan Sky Watchers

Did you know the Mayans were prodigious builders and astronomers? Their knowledge of the sky was as detailed and accurate as that of any ancient people. They used the day as their fundamental unit of time. Using the day-unit, the Maya synchronized lunar months, solar years, planetary phases, eclipses, and other celestial phenomena. They became the first people to integrate celestial and terrestrial time in one, comprehensive system. ○

Volunteer Needed

We need a volunteer who would be willing to sell copies of the *Observer's Handbook* at a discount to the members during the December, 1997 and January, 1998 NCA meetings. The current volunteer is no longer available to do this. If you are interested, please call Jeff Norman at 202/966-0739. ○

Grazing Occultations, 1997 September - mid November

Date	Day	EDT/EST	Star	Mag	%	alt	CA	Location
Oct 19	Sun	1:21	75 Tauri	5.3	87-	49	12N	near Youngstown, OH
*** Times above are EDT, those below are EST ***								
Oct 29	Wed	5:46	SAO139075	8.5	4-	11	6N	La Plata, MD (Sun -10 deg.)
Nov 4	Tue	18:56	SAO161424	7.5	20+	16	2S	Chesapeake, VA (no DC exped.)
Nov 7	Fri	17:39	EW Aqr.	6.4	50+	35	1S	Nova, PA (Sun -8 deg.)
Nov 11	Mon	19:17	Saturn	0.6	91+	42	2N	Lexington Park, MD

“%” is the percent of the Moon’s disk that is sunlit, with - indicating waning phase, + waxing. When the Moon is waxing, the star approaches the Moon from the dark side, and when it is waning, it approaches from the bright side, passing over the cusp just before the graze begins for events near the cusp on the dark side, as most of the grazes are. “alt” is the altitude of the star above the horizon in degrees at the time of the graze, and “CA” is the cusp angle of the event, the angle from the nearest lunar cusp to the star at the time of central graze, or closest approach of the Moon’s center and the star. The nearest cusp is identified by letter as the north (N) or south (S) cusp. Cusp angle is positive on the dark limb and negative on the bright limb.

Notes:

Nov 7: Nova is 8 mi. nw of Hagerstown, MD & 75 mi. nw of DC.

Nov 11: This event, while interesting to see, has no scientific value and Saturn’s low surface brightness will make it a little difficult.

Asteroidal Appulses & Venus Occultation, October 1997 (none in late Sept.)

DATE	Day	EDT/EST	Star	Mag	Asteroid	dmag	dur. s	ap. in.	Location
Oct 2	Thu	5:03	SAO 146387	8.1	Frigga	4.1	9	2	Houston, TX area
Oct 4	Sat	4:02	GSC 08180534	10	Thisbe	3	7	5	James Bay
Oct 8	Wed	7:08	21Persei	5.1	Pretoria	8.4	17	1	James Bay (Sun-1)
*** Times above are EDT, those below are EST ***									
Oct 27	Mon	18:03	SAO 185305	7.8	Venus D	dark	522	4	DC alt. 12, Sun-10
Oct 30	Thu	3:41	GSC 28881043	11.4	Alauda	1.4	8	8	s. Virginia

“Mag” is the magnitude of the occulted star. “dmag” is the drop in brightness of the merged star and asteroid if the star disappears behind the asteroid. “dur. s,” is the expected duration of a central occultation in seconds. “ap. in.” is the minimum aperture that is needed to detect the occultation. All events can be observed visually. The location is only approximate, and for each of these events, there is a chance that an occultation will be visible from your location. For some events, astrometric updates will refine the paths 3 days to 3 hours before the events.

Phone the IOTA occultation line, 301-474-4945, for updates and details; also, meeting places and maps for grazing occultations are often given on IOTA’s Web site at <http://www.sky.net/~robinson/iotandx.htm> and detailed finder charts and other information for asteroidal occultations are given on IOTA’s asteroidal occultation Web site, generally a week or two before an event, at <http://www.anomalies.com/iota/splash.htm> (go to the Upcoming Events section, although some information may be given in a special events section).

Contact: David Dunham, phone: 301/474-4722, email: dunham@erosl.com.

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

Other Planetariums, Observatories, and Science Centers in the Area

Davis Planetarium — "Hubble's Greatest Hits" Maryland Science Center, 601 Light Street, Baltimore. Open 10-6. Mon.-Thurs, 10-8 Fri.-Sun. Adults \$9, Children 12 and under \$7.

Arlington Planetarium — "The Mars Show" 1426 N. Quincy ST., Arlington. Narrated by Patrick Stewart. Mid September to October.

Montgomery College Planetarium — "How Are Stars Born?" Takoma Park, MD. October 18. (See their web site at <http://myhouse.com/mc/planet.htm>.)

Washington County Planetarium — Program about the Voyager spacecraft and their observations of Jupiter and Saturn. Begins Sept. 4. 823 Commonwealth Ave., Hagerstown, MD. Open Labor Day thru Memorial Day. Open Tuesday evenings. Adults—\$2, Students and Children under 12—\$1.

Howard B. Owens Science Center & Planetarium — "Galaxies" 9601 Greenbelt Rd., Lanham. Friday night shows begin October 3 thru January 30. Shows start at 7:30. Adults \$4, \$2 for students, children under 12, and senior citizens.

Mount. Rainier Nature & Recreation Center — "Fall Stars" Oct. 3, 7:30-9:00 PM. Historic Bladensburg Waterfront Visitors Center, 4601 Annapolis Rd, Bladensburg, MD. Due to construction, activities at the Waterfront Center may be moved to an alternate site. Call Geof Lane at 301/927-2163 for information.

Capital Science Lectures — It Takes an Ocean: Submarine Volcanic Activity and Life in Our Solar System". Speaker: John R. Delaney, School of Oceanography, University of Washington. October 14, 6:30 PM. Due to renovation, of the Carnegie Institution's building, the lectures will be held at the District of Columbia Jewish Community Center at 16th & Q streets, NW, Washington, DC.

Check your local web sites for any other events that may be happening in the area.

Newsletter Deadline for November *Star Dust* October 15, 1997

Send submissions to Alisa & Gary Joaquin, at 4910 Schuyler Dr, Annandale, VA, 22003-5144, Leave a message on voice mail 703/750-1636. Text files or graphic files in .GIF or .TIFF may be sent via E-Mail to ajglj@erols.com or fax submissions to 703/658-2233. **No submissions will be accepted after the 20th.** There will be no exceptions. We need a reasonable amount of time to design, edit, and review this newsletter. We would appreciate everyone's help in this matter. Thank you.

Scientific Colloquia Series

Goddard Space Flight Center

Scientific Colloquium Series features Nobelist, Astronaut, and Nordberg lecture. Lectures in the Fall-Winter Series of Goddard Scientific Colloquia will cover a vast range of timely topics — from our planet to the early days of the Universe and from global warming to atom lasers. Listed here are those topics being discussed in October. All colloquia will be held in the Building 3 Auditorium at 3:30 pm. Coffee and tea will be served in the lobby beforehand, courtesy of GEWA. If you plan to attend, and do not have a NASA badge, contact Carol Krueger at 301/286-6878, at least 24 hours ahead.

Oct. 3 — "Our Planet: Vegetation Trends and Anomalies." Speaker, Compton J. Tucker, GSFC Laboratory for Terrestrial Physics

Oct. 10 — "Global Warming — Fact or Fiction?" Keven Trenberth, National Center for Atmospheric Research

Oct. 17 — "Ice Ages in Earth History." Speaker, Tom Crowley, Texas A&M University

Oct. 24 — "Results from the Hubble Space Telescope Imaging Spectrograph." Speaker, Bruce Woodgate, GSFC Laboratory for Astronomy and Solar Physics

Oct. 31 — "Scientific Results from the Infrared Space Observatory (ISO)." Speaker, Martin Haewit, ISO Science Team



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. For information: 703/841-4765.

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: _____

Junior members pay a reduced rate.

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

Star Dust only (\$15 per year)

_____	_____	_____	(____) _____
First name	Middle	Last name	Telephone
_____	_____	_____	_____
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.

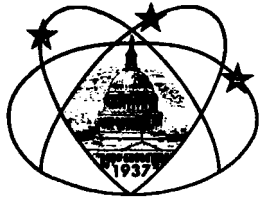
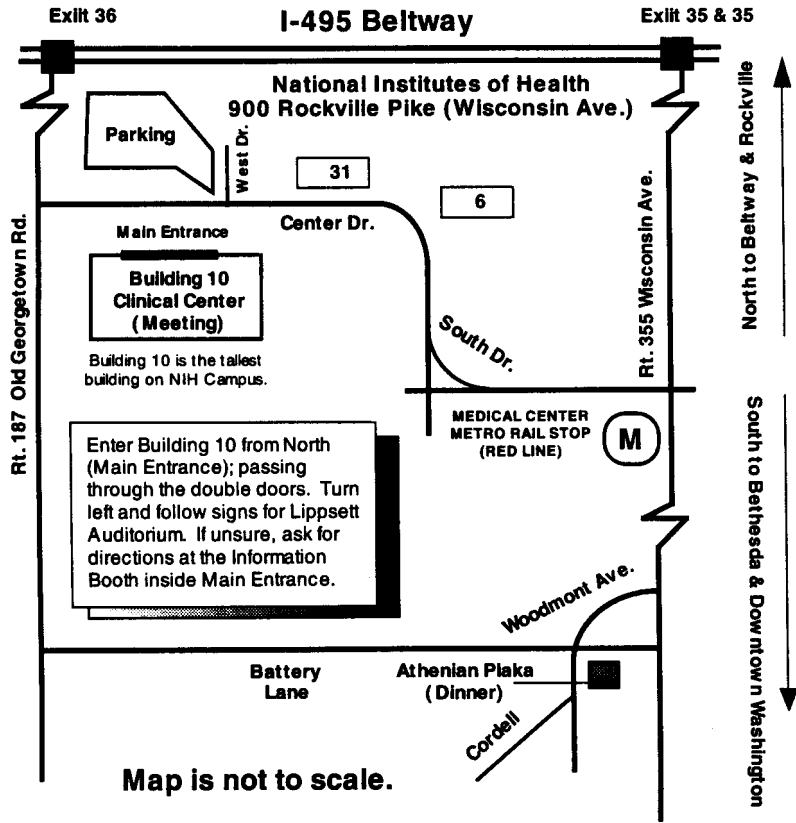
The following information is optional. Please indicate briefly any special interests, skills, education, experience, or other resources which you might contribute to NCA. **Thank you, and welcome to NCA!**

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).

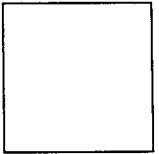
To Athenian Plaka - Take Wisconsin Avenue toward Bethesda and head right onto Woodmont. The restaurant is near Woodmont and Cordell (7833 Woodmont). There are parking garages nearby.

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. NCA's Phone Number 03/841-4765. President: Harold Williams, 301/565-3709. 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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FIRST CLASS

October 1997