

National Capital Astronomers, Inc.

Phone: 301/320-3621

Volume 55, Number 7

March, 1997

ISSN 0898-7548

The Structure of the Solar Corona

by Joseph M. Davila

The Solar Extreme-ultraviolet Rocket Telescope and Spectrograph (SERTS) is a stigmatic spectrograph which records spatially resolved emission line spectra of the solar corona in the wavelength range from 170 to 450 Å. It is flown on a Black Brant rocket, launched and recovered at White Sands Missile Range. SERTS has flown successfully four times since 1989, providing a wealth of data which has been used to infer some fundamental properties of the solar corona.

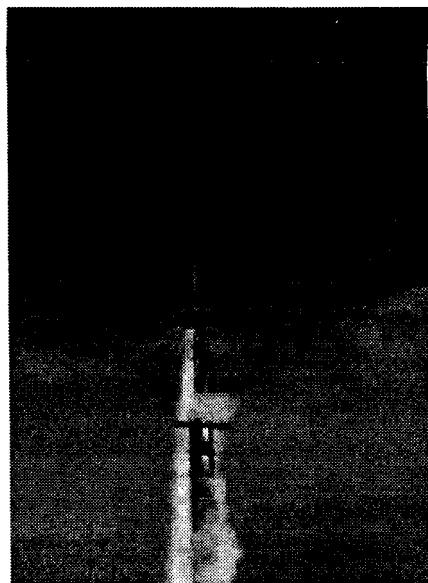
Dr. Davila will describe how SERTS observations have been used to derive the temperature and density for both active and quiet corona structures and their comparison with temperatures derived from Yohkoh Soft X-ray Telescope (SXT) images. Observations off the limb have been used to measure the average radial temperature gradient, and provide constraints on coronal heating models, showing that the temperature increases with radius in the low corona. Abundance variations have been observed, which could be due to either temporal or spatial effects. By combining SERTS observations with radio data obtained with the VLA, the strength of the coronal magnetic field has been estimated in a quiet Sun region. Observations of He II 304 have provided insight into the excitation mechanism for this important transition region line. Finally, measurements of the line widths and Doppler shifts of coronal

emission lines have provided a picture of the velocity fields in the corona.

Joseph Michael Davila is currently an Astrophysicist in the Solar Physics Branch at Goddard Space Flight Center in Greenbelt, Maryland. Born December 30, 1948, Dr. Davila earned a B.S. in Mechanical Engineering from Lamar University, Beaumont, TX in 1972, a B.S. in Physics from the University of California, Irvine in 1978 and a Ph.D. in Astronomy from the University Arizona in 1982. He is a member of the American Astronomical Society, the American Geophysical Union, the American Association for the Advancement of Science, and the International Astronomical Union. His research interests have included the linear and non-linear theory of hydromagnetic waves, hydromagnetic instabilities due to energetic particle beams, resonance absorption in inhomogeneous plasmas, the acceleration of high speed wind streams in solar and stellar coronal holes, and plasma heating in closed magnetic structures. Dr. Davila has also published research on the acceleration of cosmic rays, the transport of energetic particles within the Galaxy, the modulation of Galactic cosmic rays by the solar wind and the propagation of Solar cosmic rays in the interplanetary medium.

Dr. Davila has been Principal "Investigator for the Solar Extreme-ultraviolet Rocket Telescope and Spectrograph (SERTS) program since 1991,

and has conducted extensive research on the structure of the solar corona. (See SERTS Home page: <<http://orpheus.nascom.-nasa.gov/serts>>. They have some interesting test and launch photos. — A.J., ed.) ○



The Solar Extreme-ultraviolet Rocket Telescope and Spectrograph (SERTS) is launched from the rail at White Sands Missile Range on a Terrier-Black Brant rocket. The instrument attains an altitude of 200 miles and returns to Earth on a parachute approximately 50 miles downrange. The total duration of the flight is about 15-20 minutes and the usable observation time is 6 minutes.

Calendar of Monthly Events

The Public is Welcome!

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

Saturday, March 1, 5:30 PM-Dinner with the speaker and other NCA members at North China Restaurant at 7814 Old Georgetown Road (near Cordell), Bethesda, MD. *See map and description on back page.*

Saturday, March 1, 7:30 PM-NCA meeting, will feature Joseph M. Davila. His talk will be "The Structure of the Solar Corona." More information on Comet Hale-Bopp will also be provided. For directions, *see map and description on back page.*

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.

Mondays, March 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>.

Tuesdays, March 4, 11, 18, and 25, 7:30 PM-Telescope making classes at Chevy Chase Community

Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

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

Fridays, March 7 and 14, 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.

Saturday, March 29, begining at 6:00 PM-Observation of Comet Hale-Bopp at Hopewell Observatory. *See article on page 4 for directions.*

*See page 5 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 1996*, the *Observer's Handbook 1996*, 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 7.*

Mars, Meteorites, Comet Satellites, and Multiple Exploding Planets

by Harold Alden Williams

At our February first meeting, in the Lipsett Auditorium in the Clinical Building of the National Institutes of Health, dr. Tom Van Flandern spoke to us on "Mars, Meteorites, Comet Satellites, and Multiple Exploding Planets." Tom is a long time NCA member and a well known celestial mechanic. Tom's talk was very thought provoking, and the audience asked many questions. Tom is willing to question and examine fundamental assumptions much more than most scientists In his book, *Dark Matter, Missing Planets, and New Com-*

ets, Tom quotes Charles Sander Pierca's statement, "The first and primary obligation of any philosopher or scientist is to do nothing that would block inquiry." Tom more than anyone I know actually practices this.

The so called Mars meteorites are identified as Martian mainly because they show signs of water erosion and the most common assumption is that only Mars and Earth had water. The isotopic match between the Mars meteorites and the Viking lander analyses is not perfect. The best case, isotopic analysis of

the ratios $^{40}\text{Ar}/^{36}\text{Ar}$ and $^{129}\text{Xe}/^{132}\text{Xe}$ in gas bubble inclusion in the rocks were only intermediate between Mars and Earth values. Other isotopic ratio analyses of the meteorites are even further away from Mars and Earth unless a log scale is used. Furthermore, asked Tom, why are supposed Martian meteorites more common than Lunar meteorites with the earth's moon so much closer?

Most studies also seem to indicate that small meteorites thrown off by collision would be shock melted, but whole unmelted rock pieces are seen. He as-

serted that the reason for forcing a match between these meteorites and Mars is the assumption that no large planets have ever exploded. Two hundred years ago the hypothesis that some of the debris in the solar system was from exploded planets was more popular. Today, the solar nebulae hypothesis of Laplace for the explanation of all debris in the solar system has become preeminent by argument, but not necessarily by observational evidence. In this Laplacian view all material not currently in major planets is largely debris that never was in a major planet, just left over planetesimals.

In the 1970s, Tom examined the exploding comet hypothesis with the hope of eliminating it dynamically. Much to his surprise he found out that he could not eliminate it, and in fact found facts which supported an explosion of a moon size body around 3.2 million years ago. Because the body would be beyond the orbit of Mars it would be loosely held by the Sun's gravity, therefore, any explosion which disrupted it would cause most of the fragments to escape from the solar system.

Using celestial mechanics, Tom argues that if exploding planets and

moons have occurred in the Solar System, then the resulting minor planets, asteroids, would be debris clouds from explosions, and therefore the largest local fragment would have several satellites, unlike what would happen if they were planetesimals left over from the formation of the solar system. Tom Suggests that if (253) Mathilde—which the Near Earth Asteroid Rendezvous (NEAR) missions should fly by on June 27, 1997—or (433) Eros—which NEAR should orbit around January 1999—is found to have several moons then the exploding planet hypothesis could become the new paradigm. So far we have only a hint of an answer, in that the very incomplete survey of the damaged Galileo mission, when it flew by Ida discovered to the shock of most, that it has a moon now called Dactyl. Galileo could have easily missed other moons around Ida, because of the very few pictures that were taken of the surrounding field.

The biases of scientists often interfere with significant discovery. In 1973 a third magnitude star was occulted by Eros. Many short occultations were seen outside of the Eros eclipse path on the Earth. Many professional astro-

mers denigrated these amateur observations of extremely reliable observers, because the conclusion departed from the generally accepted planetesimal paradigm. We will know whether Eros has moons.

Many other exciting explanations of weird, currently unexplained phenomena, were offered as being consistent with the exploding planet hypothesis. One of the more interesting ones was the blackness of half of Iapetus, a moon of Saturn. It looks like something blasted black on the side facing the explosion. The orbital dynamics of Iapetus rotation and revolution are such that during the entire two week period that the shock wave would have passed caused by the explosion, Iapetus would not have turned much.

Since Tom is willing to speak and reason with anyone, and is an expert in avoiding flame wars, he has been exposed to more information on the Cydonian face on Mars than most astronomers would be willing to consider. He was generous in sharing with us some of the possibilities with the proper skeptical caveats about this possibly strange area on Mars. ○

From The Secretary

by Leith Holloway

About this time of year, I start to ponder whether to run again for the office of NCA secretary. I enjoy many of the duties of this job, such as talking with people interested in joining the NCA. On the other hand, a lot of the clerical work involved in this job is not fun, namely, updating the NCA database, printing directories and *Star Dust* mailing labels and many other chores.

Most members read the seven steps listed on the NCA dues bill and fill out the renewal form properly, but others, unfortunately, leave out important information or fail to follow instructions. I'm grateful to the members who send neatly written, completely filled-out renewal forms. This information is important to me for keeping the NCA database up to date and accurate.

Many of our problems stem from misunderstandings by members, especially new ones, about the NCA membership renewal process. Therefore,

please carefully read the paragraphs below.

Four months before the date of your membership's expiration, I mail you a bill and a renewal form. This is the ONLY bill that you will receive from me so please put it in a safe place until you pay your dues. Your membership expires at the end of the month printed on your mailing label or membership card.

Members who subscribe to *Sky & Telescope* magazine through the NCA, receive their first subscription expiration notice long before they get my bill. No matter what *S&T* implies, it is NOT necessary for you to pay your NCA dues then! Please wait until you receive my bill, but save the *S&T* expiration notice. *S&T* may continue to send you reminders even after you pay your dues because of time lags in the process. If you pay your NCA dues within three weeks after receiving my bill, there is virtually no

risk that any issue of your *S&T* magazine will be late.

If you do not order an *S&T* discount subscription through the NCA, you have lots of time to pay your dues. Anytime before the month of your membership's expiration is soon enough, but don't forget to pay the bill just because it came early. I mail all monthly bills at the same time, regardless of who subscribes to *S&T*.

When you pay your dues, please use the renewal form sent with your bill, NOT a membership application form cut out of *Star Dust*. The latter is only for new members. Please follow the steps for renewal listed in my bill. Failure to follow these instructions may cause me or Treasurer Jeff Norman extra work. When processing these renewal forms, I compare the information on your new form with that in the current database and make corrections where necessary. All forms are filed and kept indefinitely. Please cooperate with me. I want to continue being your secretary. ○

Grazing Occultations and Astroidal Appulses, 1997 March

by David Dunham

Lunar Grazing Occultations

| DATE | Day | EST | Star | Mag | % | alt | CA | Approximate Location |
|-------|-----|-------|--------|-----|-----|-----|----|--|
| Mar02 | Sun | 2:22 | 2396 | 6.6 | 51- | 12 | 6S | Stamford, CT |
| Mar06 | Thu | 5:48 | 163851 | 8.0 | 10- | 11* | 2S | La Plata, MD & Woodbridge, VA |
| Mar14 | Fri | 21:22 | 0729 | 7.2 | 40+ | 35 | 5N | Manassas & Mt Vernon, VA; Brandywine, MD |
| Mar16 | Sun | 23:53 | 095985 | 7.9 | 61+ | 26 | 8N | Catlett and Stafford, VA |

*Sun alt. -10 deg.; Nokesville, VA is also in the path

Asteroidal Appulses and Occultations

| DATE | Day | EST | Star | Mag | Asteroid | dmag | dur sec. | ap. in. | Location |
|-------|-----|------|-------------|------|-----------|------|----------|---------|-----------|
| Mar06 | Thu | 5:25 | GSC55181025 | 11.7 | Comet SW1 | 5.2 | 4 | 8 | Caribbean |

David Dunham, Telephones: 301-474-4722 (home) and 301-953-5609 (work) e-mail dunham@erols.com

Comet Observing at Hopewell Observatory

by Bob Bolster

NCA members, families, and guests are invited to view Comet Hale-Bopp at Hopewell Observatory on Saturday evening March 29 at near maximum brightness. Sunset will be at 6:32 pm, nautical twilight is at 7:30 with the comet 23 degrees above the horizon, and astronomical twilight is at 8:02 with the comet 18 degrees up. The comet sets at 11:10. The Moon rises at 11:56. If you wish, come any time after 6:00 pm and bring your prepared picnic dinner. Coffee, tea, and cocoa will be provided by the Hopewell Corporation.

Directions:

(1) From the Beltway (I-495) go west on I-66 25 miles to Exit 40 at Haymarket onto U.S. 15. (2) Turn left on U.S. 15 at the end of the exit ramp. (3) Go 0.3 mile to traffic light, turn right onto Va. 55. (4) Go 0.8 mile to Antioch Road (Rt. 681) and turn right. (5) Go 3.2 miles to the end of Antioch Rd. and turn left onto Waterfall Road (601). (6) Go one mile and bear right onto Bull Run Mountain Rd. (Rt. 629). (7) Go 0.9 mile on 629 to narrow paved road at right with an or-

ange pipe gate (Directly across from an entrance gate with stone facing). (8) Turn right through pipe gates, go 0.3 mile to top of ridge, and around the microwave station. (9) Continue on dirt road through the white gate and woods a few hundred feet to the observatory. Park along the road short of the buildings.

If it is cloudy the event will be postponed until Sunday, the 30th. For further information call (703) 960-9126.

Volunteers Needed for Hale-Bopp Observing

by Jim Cook

As an astronomy volunteer with the Montgomery County (M-NCPPC) Park System, I know there are a number of public star gazing programs coming up and with Hale-Bopp's evening "prime-time" display not far off, volunteers and telescopes will be needed at local parks for their public star programs during March and April. If the comet lives up

to expectations and winds up getting a lot of press and media attention, the crowds at these programs may get unusually large.

I personally help out at the programs up in Black Hill Regional Park (the Boyds/Germantown area) and we have 4 programs set up from March 18 through April 7 (and I think one more later in April) and I am sure we can use

a hand if anyone in that area would be willing to bring their scopes over to share with the public. Anyone interested can either contact me or Glen Cumins, the park naturalist at the park. Contract: Glen Cumins, Staff Naturalist, Black Hill Park, 301/916-0220. Jim Cook, M-NCPPC volunteer, 301/540-6964.

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

March 2, and 16, 1:00 PM- "Launch Site Goddard" launching model rockets at Goddard Space Flight Center (GSFC—Greenbelt, MD). Details: 301/286-8981.

March 5, 8:00 PM- "The Formation of Stars and Planets" by Dr. Lee Mundy, University of Maryland, Department of Astronomy, College Park.

March 14, 6:30-8:00 PM- "Spring Stars" at Historic Bladensburg Waterfront Visitors Center. Details: 301/927-2163. (Se Habla Espanol.) Note: Due to construction activities, meetings may be moved to an alternate site. Call Geof Lane for more information.

March 20, 8:00 PM- "Comet Hale-Bopp: What's the Big Deal?" by Dr. Lucy McFadden, University if Maryland, Department of Astronomy, College Park.

March 21, 7:00 PM- "The Rites of Spring, the Vernal Equinox" Montgomery College's Planetarium, Takoma Park, MD. Information: 301/650-1463.

Mondays Through Saturdays, 11:30 AM & 2:30 PM; 1st & 3rd Sundays of Month, 11:00 AM- GSFC (Greenbelt, MD) guided walking tours of Hubble Space Telescope Control Center and NASA Communications Center. Start at Visitors Center.

Mondays Through Fridays, 10:00 Saturdays and Sundays, 10:00 AM and 1:00 PM- Paul E. Garber Preservation, Restoration, and Storage Facility, NASM. Take a tour of this facility where they preserve and restore aircraft as well as spacecraft, engines, propellers, models, and other flight-related objects. Guide conducted tours including the workshops. Individuals and groups are welcome. Reservations must be made two weeks in advance. No heating or air conditioning so dress accordingly. Details: 202/357-1400, or write to ATTN: Reservation Office, Education Services Division, MRC-305, NASM, Washington, DC 20560.

Web Page Sites

For more detailed events and information check out these web sites

Guide to Star Gazing and Planetarium Programs: http://128.183.127.48/pl_guide.html (This is a complete guide for the Baltimore/Washington area.)

Goddard Space Flight Center: <http://pao.gsfc.nasa.gov/vc/events/JAN-JUN97.htm>

Montgomery College's Planetarium: <http://myhouse.com/mc/planet.htm>

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

University of Maryland Department of Astronomy: <http://www.astro.umd.edu/openhouse/speakers.html>

We Are Moving!!!

Gary and I will be moving to a new home from March 26-28. We need ALL submissions in by the 15th because we will be dismantling our studio and packing up our computers for moving. We need to get the newsletter completed and mailed BEFORE March 25th, even though we have an extra week because this is a long month. We will need everyone's cooperation on this. If you would like to help us in the moving, give us a call and we will give you directions. 703/750-1636 — Alisa Joaquin, ed.

For Sale

Celestron C5+ 2 years old, excellent condition. Tiffin tripod, carrying case, piggyback camera mount 25 mm Killner, TeleVue 1.8x barlow, SkyGlow broadband light pollution filter. Package price: \$1,000. Call Marge Weissberg, 301/565-2303.

FREE To a Good Home

30+ years of *Sky & Telescope*, May 1964 through December 1996 in File Boxes. Will deliver in Washington, DC Metropolitan Area. Call Chuck Baker at (301) 762-8413 days or evenings. (Would be a good addition to any school library; High School or University—Ed.)

Newsletter Deadline for *April Star Dust* March 15, 1997

*****DO NOT BE LATE!!!!*****

Send Submissions to Alisa & Gary Joaquin, at 7821 Winona Ct., Annandale, VA, 22003, 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.

NATIONAL CAPITAL ASTRONOMERS, INC.

YOUR Ticket To The Cosmic Voyage!

NCA's Continuing Mission

NCA is a non-profit, membership supported, volunteer run, public-service corporation dedicated to advancing S*T*A*R*S — Space Technology, Astronomy & Related Sciences+ — through information, participation, and inspiration, via research, lectures, publications, expeditions, tours, education, and outreach. Since 1937 NCA has honorably served science and society in the National Capital region and beyond. NCA is the astronomy affiliate of the Washington Academy of Sciences, an organizational member of the International Dark-Sky Association (IDA), and the National Capital region's IDA representative. NCA members directly support S*T*A*R*S through a wide variety of vital services and activities. All are welcome to join NCA.

NCA's Cosmic Vision

We are ALL "Astronomers." We can all look up at the sky with wonder. And we don't need a Ph.D. to share equally in this grand voyage of Cosmic Discovery, especially since our tax dollars fund practically all of it. So S*T*A*R*S is far, far more than mere "constellations" of telescopes, spacecraft, and computers. In short, it is people; it is us. It connects us to the Universe, and ultimately to all that is positive and wonderful in our lives.

We are ALL "Astronauts." We can all look out through the window of Starship Earth to see the original specimen of Creation. And we all have "The Right Stuff" to marvel at this awesome Universe around us. For we all share equally in this continuing voyage of Cosmic Discovery, from our ancestors first looking toward the stars, to our descendants someday reaching those stars, and far, far beyond.

This is the Cosmic Vision to which NCA dedicates its Continuing Mission of public service. We gladly welcome you, as both Astronomers and Astronauts, to join NCA as your ticket to the Cosmic Voyage.

NCA's Inclusive Membership

NCA is a diverse group of people from all walks of life. Our only membership requirements are that you have an inquiring mind, a fascination with S*T*A*R*S, and a sense of wonder. NCA's regular, junior, and family memberships allow you to enrich your life, and the lives of those around you, by joining us in the continuing voyage of Cosmic Discovery. For NCA firmly believes that together, all can learn from each other and from this vast and wonder-filled Universe we all share.

To learn more about NCA, call NCA's General Number at 301/320- 3621, or call Daniel Costanzo (NCA Public Relations Officer) at 703/841-4765, or write to: NCA, c/o Jeffrey B. Norman, Suite #717, The Garfield Building, 5410 Connecticut Ave., N.W., Washington, D.C. 20015-2837.

S*T*A*R*S connects you to the Universe

NCA connects you to S*T*A*R*S

Join Us For The Adventure Of A Lifetime!

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

+ S*T*A*R*S — Space Technology, Astronomy & Related Sciences — is an original and unique acronym created by Daniel J. Costanzo of NCA. It may be used by others so long as they always give credit to both him and to NCA.



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: 301/320-3621 or 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*. (\$51 per year)

[] Star Dust only (\$24 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 \$22 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.

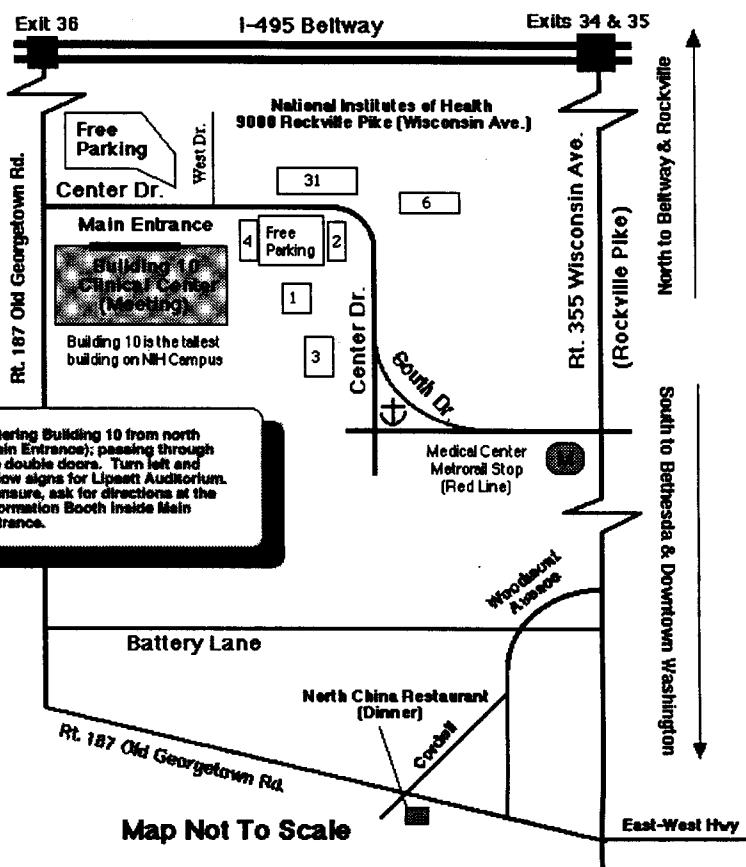
The following information is optional. Please indicate briefly any special interests, skills, education, experience, or other resources which you might contribute to NCA. Thank you, and welcome to NCA!

Getting to the NCA Monthly Meeting

Metrorail Riders - From Medical Center Metro Stop: 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).

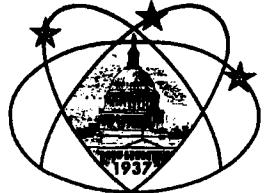
To North China Restaurant - Take Wisconsin Avenue toward Bethesda and bear right onto Woodmont. Follow Woodmont to Old Georgetown Road and make a right. The restaurant is a few blocks on the left (7814 Old Georgetown Road). Alternatively, turn right on Cordell from Woodmont and proceed a few blocks to Old Georgetown, where you will come out right near the restaurant. There is parking around the corner on a side street.

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 Numbers: 301/320-3621 or 703/841-4765. President: Harold Williams, 301/565-3709. Deadline for *Star Dust* is the 15th of the preceding month. Editors: Alisa & Gary Joquin, 7821 Winona Ct., Annandale, VA 22003, 703/750-1636, E-mail: ajglj@erols.com. Editorial Advisor: Nancy Byrd. *Star Dust* © 1996 may be reproduced with credit to National Capital Astronomers, Inc.



National Capital Astronomers, Inc.

If Undeliverable, Return to
NCA c/o Leith Holloway, Apt. #M-10
10500 Rockville Pike
Rockville, MD 20852-3331



FIRST CLASS

March 1997