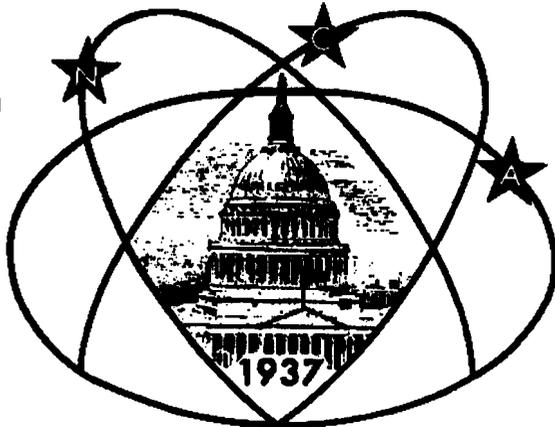


Star



Dust

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Extrasolar Planets

abstract and biography provided by Alan Boss

Abstract

Searches for extrasolar planets and brown dwarfs have a long and dismal history. However, recent discoveries have marked the advent of an era of discovery of extrasolar planetary systems. The newly discovered objects appear to be a mixture of gas giant planets, similar to Jupiter, and brown dwarf stars, elusive objects that have long been hypothesized to exist but never seen before. Brown dwarf stars are intermediate in mass between giant planets and the lowest mass stars that can burn hydrogen like the Sun; the atmospheres of cool brown dwarfs may very well resemble those of giant planets, but their

highly eccentric orbits are a clue to their origin as stars rather than as planets. Giant planets must form in the relatively cool, outer regions of protoplanetary disks, which is why the discovery of several giant planets with circular orbits very close to their central stars was a shock to theorists. These discoveries have forced theorists to accept the fact that some planets must migrate inwards from their place of birth toward their central star. This inward migration appears to have been negligible for our solar system, however. Undoubtedly other theoretical adjustments lie ahead, as we begin to learn at last what other planetary systems are like.

A biography

Alan P. Boss is a staff member at the Carnegie Institution of Washington's Department of Terrestrial Magnetism (DTM) in northwest Washington, D.C. Boss received his Ph.D. in physics from the University of California, Santa Barbara, in 1979. He spent two years as a postdoctoral fellow at NASA's Ames Research Center in California before joining the staff of DTM in 1981. Boss's research focuses on using three dimensional hydrodynamics codes to model the formation of stars and planetary systems. He has been helping NASA plan its search for extrasolar planets ever since 1988, and continues to be active in helping to guide NASA's efforts. Boss last spoke to the National Capital Astronomers in 1991 about the origin of the moon. ○

400 Years of Women in Science

Review by Andrew W. Seacord, II

For the 1997 June NCA meeting, Dr. SETHANNE HOWARD presented a fascinating talk entitled "4000 Years of Women in Science." Dr. Howard is a visiting senior scientist at NASA Headquarters Office of Space Science. In her presentation, Dr. Howard cited examples where accomplishments of women scientists have been omitted from history books. One example is Patrick Moore's book "Men of the Stars" which does not discuss any women astronomers.

Most of the talk, however, dealt with the accomplishments of women scientists. In mathematics, the algebraic curve known as the Witch of Agnesi was

discovered by Maria Gaetana. The theory of stress and strain, a subject of mechanics, was developed by Sophia Germain. In the realm of domestic mechanics, a black woman, Ellen Eglui, was granted a patent for her invention of the washing machine ring. Being black, however, she sold the patent.

Florence Nightingale is well known for her work as a nurse. However, how many of us are aware of the fact that she invented the pie chart and developed the basis of modern hospital management? And Lady Lovelace, aka Augusta Ada Byron, the daughter of Lord Byron, was Charles Babbage's com-

puter programmer when she wrote the first subroutine.

In the realm of astronomy, the predicted position of Neptune, derived from the perturbations on Uranus that John Couch Adams published prior to the actual discovery of Neptune were, apparently, calculated by Marie Lavoisier. The contributions of Maria Mitchell and Annie Jump Cannon, to name two of many women astronomers, are well known. In ending her talk, Dr. Howard told of how Vera Rubin (an NCA member), the first woman to use the Mt. Palomar 5-meter telescope, broke the toilet barrier. ○

Calendar of Monthly Events

The Public is Welcome!

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

Mondays, Sept 1, 8, 15, 22, and 29, 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, September 2, 9, 16, 23, and 30, 7:30 PM-Telescope making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

Fridays, September 5, 12, 19, and 26, 7:30 PM-Telescope making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 202/362-8872.

Fridays, September 5, 12, 19, and 26, 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, September 6, 5:30 PM-Dinner with the speaker and other NCA members at North China Restaurant, 7814 Old Georgetown Road. Bethesda, MD. See map and description on back page.

Saturday, September 6, 7:30 PM-NCA meeting, will feature Alan Boss speaking on "Extrasolar Planets." Science Fair winners may also be featured. The Science Fair Winners are also featured. For directions, see map and description on back page.

Saturday, September 20, beginning 6:00 PM-Open House at Hopewell Observatory. NCA members, families, and guests are invited to view the autumn sky. (See the article on page 3 for details and directions.)

Saturday, September 27, 9:00 PM-Exploring the Sky, Rock Creek Park, near the Nature Center. Information: 202/426-6829

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 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 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 7.

The Science Fair Winners

Two of NCA's science fair winners of the past Spring were unable to attend our June meeting; however, we hope to have them at our September meeting. They are Anne Gaumond of Oxen Hill whose project was "Chaos in the Astroid Belt" and Court Zabel of Washington D. C. whose project was "The Tenuous Hold of 16 Cygni B1". ○

Dues Incease

Due to rising costs, the Regular basic NCA membership dues will rise from \$24 to \$27 effective on October 1, 1997 for new members or current members renewing after that date. This is the first increase in NCA basic dues in several years during which time *Sky & Telescope* has raised subscription rates (over which we have no control) at least twice. The new rate for those who wish to subscribe to *Sky & Telescope* through NCA will be \$54. ○

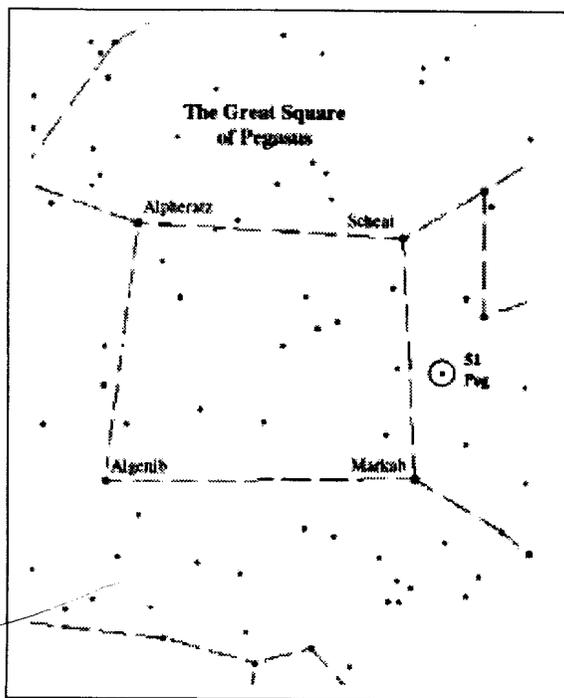
Volunteer Needed

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. ○

Encyclopedia Extrasolar

courtesy of Eric Mamajek

(Downloaded from the web by Alisa Joaquin, ed.)



Extrasolar Planets: The Discovery of a Planetary Orbit Around the Nearby Star 51 Pegasi. Initial discovery by Michel Mayor and Didier Queloz

The below extrasolar systems are listed in order of discovery.

Note:

Currently there is no clear definition of a planet. The systems listed below are of objects that have been confirmed by several sources and/or techniques and are believed to be planets because their mass is less than that necessary to ignite deuterium burning.

P1257+12

Wolszczan and Frail's discovery of the first planetary system outside of our own. Two terrestrial-mass planets were initially discovered in 1991 (A,B), a third moon-sized body (C) was later found (1994), and yet a possible 4th Saturn-mass planet (D) has been inferred in the data up until 1996 (Wolszczan (1996) & Joshi & Rasio

(1996)). The planets were discovered via the pulsar-timing method, and pose a mystery for astrophysicists. How can planets form in such an environment? Did they accrete and form after the supernova?

51 Pegasi

The first of the confirmed jovian planets discovered orbiting a nearby, solar-type star. 51 Peg b is also the first confirmed exoplanet found via doppler spectroscopy. This discovery broke astronomers' expectations of where jovians can exist. Some quick calculations show that the object should be able to retain an atmosphere, despite its sub-solar temperature of roughly 1200K.

Encyclopedia, Continued on page 4

Gene Shoemaker (1928-1997)

He will be missed by all.

The world has lost one of its most renowned scientist with the death of Eugene Shoemaker at age 69. On July 18th, Gene and his wife, Carolyn, were involved in a car accident in central Australia. He was fatally injured; Carolyn suffered broken ribs and is recovering. What I will remember most is when Gary Joaquin (NCA) called the Carnegie Institute to ask if he could record the lecture that Gene would be giving. Gary received a personal call back from Gene giving him permission. It had been a great surprise and honor to receive such a call. He will be missed.



Open House at Hopewell Observatory

NCA members, families, and guests are invited to view the autumn sky at Hopewell Observatory on Saturday evening September 20. All of the planets except Mercury will be in the sky, along with the summer Milky Way. Sunset will be at 7:11 pm, and astronomical twilight ends at 8:40. The Moon rises at 10:07. 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 orange 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.

The event will be canceled if it is raining or hopelessly cloudy. Another open house with more dark time is planned for November 22. For further information call (703) 960-9126.

NCA Treasurer's Report

July 1, 1996 to June 30, 1997

Income	
Dues	\$8,143.00
Gifts	321.00
Interest	293.00
Sale of <i>Observer's Hnadbook</i>	374.00
Sale of Telescope	100.00
Telescope-making Classes	287.00
Total Income	\$9,518.00
Expenses	
IDA	\$100.00
Miscellaneous	53.64
NCA Travel	600.00
Purchase of <i>Observer's Hnadbooks</i>	352.00
<i>Sky & Telescope</i> Subscriptions	3,672.00
Secretary	706.00
Speaker's Dinners	318.00
<i>Star Dust</i>	3,853.93
Telephone	453.33
Total Expenses	\$10,110.23
Balance — July 1, 1996	\$10,336.22
Excess Expenses over Income	591.90
Balance — June 30, 1997	\$9,744.32*
Total number of paying members joining or renewing from 7-1-95 to 6-30-96 179**	
Total number of paying members joining or renewing from 7-1-96 to 6-30-97 194**	
Increase in Memership (8.4%)	

*The balance includes \$1,833.76 from the NCA Travel account.

**This does not include members or science fair winners because they receive free memberships.

Encyclopedia, Continued from page 3

70 Virginis

The prototype of the "eccentric"-type planets (Marcy & Butler 1996). This behemoth of a world orbits a solar-type star in a very eccentric orbit ($e=.40$). It appears to be either a low-mass brown dwarf or a very massive jovian planet. The eccentricity of the planet's orbit and its large mass likely precluded the formation of planets within many AU of its star. This was the first announced detection of many from the San Francisco State Planet Search group using Lick Observatory. This object seems to be akin to HD 114762 in nature.

47 Ursae Majoris

This is the first extrasolar planet discovered that partially resembles our own Jupiter. This "classical" jovian is in a low-eccentricity orbit about 2 AU from its host G0-type star.

55 Cancri

The second discovery of a jovian-mass planet orbiting very close (0.11 AU) to its primary star. Geoff Marcy also announced at the Workshop on Planetary Formation in the Binary Environment at Stony Brook (June 16-18, 1996) that they believe a second jovian exists in

From the Secretary

by Leith Holloway

Good News! I recently bought a new computer with Windows95®, and I'm gradually converting my NCA work to it. Some of you may have already noticed that your NCA directory, bill, and renewal form were printed by a laser printer. There is now room for an E-mail address in the NCA database. If you would like one (and only one) E-mail address listed under your name in the NCA directory, please send me a short E-mail message saying so. My E-mail address is: leith@erols.com.

As you may know, the NCA is an organizational member of the International Dark-Sky Association (IDA). We pay \$100 per year to support their efforts to reduce light pollution. Many of our NCA members belong to IDA on their own. I, myself, am an individual member at the "Sustaining" level.

Last November, IDA launched a fund-raising campaign to expand their activities and office staff. They have asked each current IDA member to try to recruit five new members. Basic individual membership dues are \$30 per year. An application for membership appears on the insert sheet in this *Star Dust*. Increased membership helps IDA in two ways: It raises more money for the society, and secondly, the larger membership gives it more influence on politicians who decide on town/state expenditures for outdoor night lighting. Please join this worthy organization. ○

this system with a mass of ~5 Jupiters in a 15-20 year orbit. These planets orbit the G8V star 55 Cancri A. Orbiting farther out from A and its planets is an M5 dwarf (55 Cancri B) which lies ~1150 AU away.

Lalande 21185

From the Allegheny Observatory astrometric work done by George Gatewood et al, it appears that there are two "classical jovians" orbiting Lalande 21185. One has a period of about 30 years (1.6 jovian masses, $a = 10$ AU) and one with a period of 6 years (0.9 Jovian masses, $a = 2.5$ AU). These planets will hopefully hold up as the first confirmed astrometric detection of a planetary system. Other astrometry-based planet dis-

NCA Budget — Fiscal 1998

Welcome New Members

Income	
Dues	\$8,700
Interest	300
Gifts	300
Telescope-making Classes	300
Total Income	\$9,600

Expenses	
Int. Dark-Sky Assn. Dues	100
Miscellaneous	50
Secretary	700
Sky & Telescope subscriptions	3,700
Speakers Dinners	300
Star Dust	4,700
Total Expenses	\$9,550

Surplus	\$50
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coveries have come and gone (e.g. Van de Kamp's planets around Barnard's star in the 70's), will this one survive? There has been some debate over the authenticity of this discovery, primarily by researchers who have monitored Lal 21185 by Doppler spectroscopy. Lal 21185 is the 5th closest star to our Sun.

Tau (τ) Bootis

τ Boo b was suspected to be a spectroscopic binary companion by Duquennoy and Mayor in 1991. The orbit was confirmed by Marcy & Butler and Mayor, Udry, & Queloz in 1996. Both groups announced their recent data at the 188th AAS meeting in Madison, in June 1996. The new doppler velocity curves indicate that "c" is most likely planetary in nature, according to its minimum mass (about 4 jovian masses). The object appears to orbit only 8 stellar radii from the F7V primary: τ Boo A. The orbit has also been confirmed by a group using the AFOE with collaborators from the Harvard-Smithsonian Center for Astrophysics, the High Altitude Observatory, and Penn State University. τ Boo A's other stellar companion, τ Boo B, is an M2 dwarf that appears to be in an eccentric orbit around τ Boo A and its planetary companion C. According to Hale (1994), B's orbital period around A+C is ~2000 years, with $a = 245$ AU, and $e = 0.91$.

Upsilon (υ) Andromedae

The fourth "epistellar jovian" discovered, with mass (0.60 jovian masses), period (4.61 days), and orbital radius (0.054 AU), values that are nearly the same as 51 Peg b's. The primary is a F8V star about 16.5 pc away. The discovery was released as part of a poster paper authored by Hauser, Shirts, Williams, Butler, and Marcy at the ASP 1996 Conference "From Stardust to Planetesimals" in late June, 1996.

16 Cygni

A spectroscopic companion to the solar-like star 16 Cyg B has been discovered independently by Cochran & Hatzes (Univ. of Texas) and Marcy & Butler (SFSU). The discovery announcement came at the 28th DPS meeting on October 23, 1996. This planet is a very notable discovery because it has the highest eccentricity of any known planet. The object appears to be a lower mass cousin of the "eccentric planets" 70 Vir b and HD 114762. The object has a minimum mass of 1.55 jovian masses and orbits the G2.5V star 16 Cyg B with a period of 804 days (2.2 years). The other member of this system, 16 Cyg A, lies 900 AU away from B and C.

Rho (ρ) Coronae Borealis

As the first announced extrasolar planet discovered by the AFOE/Whipple Observatory group, ρ CrB b has proved

Leigh Bassett
250 Old Line Avenue
Laurel, MD 20724-2256

Allan H. Johnson
6207 60th Place
Riverdale, MD 20737

Meghan & Caitlin Pennington
(Junior Members)
2313 Henslowe Drive
Rockville, MD 20854

Thomas E. Perotti
1822 Park Road, NW
Washington, DC 20010

Vera & Robert Rubin
3308 McKinley Street, NW
Washington, DC 20015

Robert H. Stojinski
10161 Peanut Mill Drive
Gaithersburg, MD 20882

Kamran Taimouri
P.O. Box 17603
Washington, DC 20041

Andrea Young
(Junior Member)
4400 17th Street, NW
Washington, DC 20011

once again that Jupiter-mass planets may exist in close orbits to ordinary stars. The parent star, ρ CrB A is a ~10 billion year old analog of our sun (similar in mass and spectral type) lying roughly 55 light-years from our solar system. Its planetary companion has a minimum mass of 1.13 Jovian masses, and orbits the primary star once every 40 days at an orbital radius of about 0.25 AU; closer than Mercury to the Sun. Four years of precise photometry by G. Henry shows that ρ CrB A is photometrically stable to within 0.00017 magnitude, effectively ruling out radial pulsations as the perturbation mechanism. The AFOE team previously confirmed τ Boo Ab and 51 Peg b. \odot

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—"When the Sky Falls" Takoma Park, MD. September 23. (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.

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

FYI Women in Astronomy

CUNITZ, MARIE Astronomer (1610-1664) She translated and simplified the works of Johannes Kepler into the common tongue. Kepler was an astronomer who determined a way to predict how the planets revolve about the Sun. Kepler's Laws of Planetary Motion are still used today. She made his work accessible to the scholars of that time. For several centuries her translations were the only ones available to scholars. Her abilities in astronomy were so outstanding that she was called *Urania Propitia*, i.e., "she who is closest to the muse of astronomy". ○

The Age of Astronomy

This is not a song title, but this has been questioned many times. How old is astronomy? Would you be surprised to learn that it's older than you think. When we think of astronomy, we think of what our northern hemispherical ancestors contributed, but there is one source that is largely overlooked. Did you know that the Aborigines of Australia are considered to be the world's oldest astronomers? Check out The Sidney Morning Herald web site for Saturday, August 23, 1997. There you will learn the rest of the story. — ed. (Unable to get URL due to technical difficulties. Will publish next issue.)

Cosmos Revisited

A series of lectures will be presented in memory of Carl Sagan at the National Air and Space Museum this fall. On seven Tuesdays at 6 p.m. from October 14 to December 2, 1997 except for November 11, the following topics will be discussed by these speakers:

- Oct. 14: The Particle Cosmos by Christopher Quigg
- Oct. 21: The Big Bang and Beyond by Paul Steinhardt
- Oct. 28: Shadows of Creation: The Dark Matter in the Universe by David Schramm
- Nov. 4: Star Formation by Anneila Sargent
- Nov. 18: Extrasolar Planets by Geoff Marcy
- Nov. 25: Special viewing of IMAX film, "Cosmic Voyage"
- Dec. 2: Life as a Planetary Phenomenon by Andrew Knoll

The tuition for this series of lectures is \$84 for Smithsonian Resident Members and \$129 for the general public. For more information, call Missy Snelling at 202/357-4260. To order tickets, call 202/357-3030.

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

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

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.



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*. (\$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.

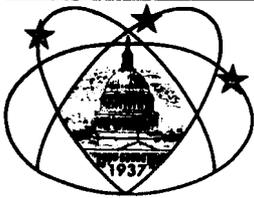
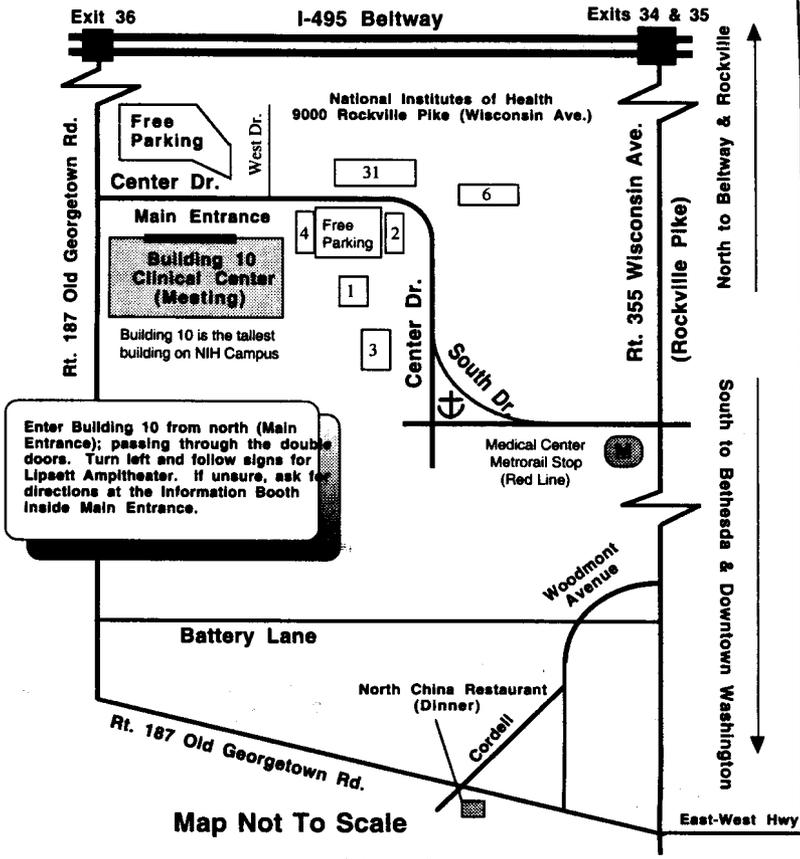
The following information is optional. Please indicate briefly any special interests, skills, education, experience, or other resources which you might contribute to NCA. **Thank you, and welcome to NCA!**

Getting to the NCA Monthly Meeting

Metrorail Riders - From Medical Center Metro 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).

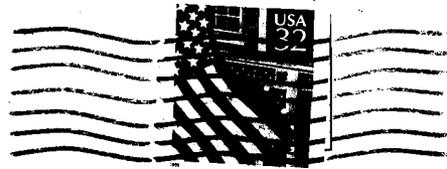
To North China Restaurant - Take Wisconsin Avenue toward Bethesda and head right onto Woodmont. Follow Woodmont to Old Georgetown Road and make a right. The restaurant is a few blocks on the left (7814 Old Georgetown Road). Alternatively, turn right on Cordell from Woodmont and proceed a few blocks to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

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: Wayne H. Warren, Jr. *Star Dust* © 1997 may be reproduced with credit to National Capital Astronomers, Inc.



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NCA c/o Leith Holloway, Apt. #M-10
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10500 ROCKVILLE PIKE APT M10
ROCKVILLE MD 20852-3331

September 1997



International Dark-Sky Association

3545 N. Stewart, Tucson, AZ 85716-1241 USA
 crawford@darksky.org http://www.darksky.org

Help Us Protect the Night Sky!

We are losing our heritage of starry night skies. Terrestrial lights shining inefficiently into the night sky threaten to destroy the spectacular views the heavens offer. Even worse, this "light pollution" wastes energy and provides no benefit to society.

City and suburban dwellers today (which is now most of us) have lost sight of most of the universe. The spectacular view of the sky offered our ancestors on dark clear nights no longer exists. The outdoor lighting accompanying urban population growth has overwhelmed the stars with its glow. The problem, however, is not the outdoor lighting, but rather the light wasted upward into the night sky. This light pollution provides no useful benefit, wastes significant amounts of energy, and threatens astronomical research and everyone's enjoyment of the night sky.

The International Dark-Sky Association (IDA), a membership-based non-profit organization, serves the public and astronomy community through information, education, and research on outdoor lighting and related issues. IDA is active in sharing knowledge and facilitating communication at the local, national, and international level. While the IDA was organized to preserve dark skies for astronomy and the general public, solutions to the problem of light pollution will promote the best outdoor lighting designs, thus reducing energy use and helping preserve the Earth's natural resources. Visibility-impairing glare will also be minimized, resulting in a safer, more secure, and more aesthetically pleasing nighttime environment. Please help us as we work to protect the night sky both for ourselves and for future generations. Join the IDA!

Please enter my membership in the International Dark-Sky Association.
 I want to help **protect the night sky** for current and future generations.

Name: _____

Organization: _____

Address: _____

City: _____ State: _____ ZIP: _____

Country: _____ Phone: _____

E-mail: _____ Fax: _____

Annual Membership:

	Member	Sponsor	Sustaining	Patron	Benefactor	Life
Individual:	\$ 30 *	\$ 50	\$ 100	\$ 200	\$ 500	\$1000
Organization:	\$100 **	\$ 200	\$ 500	\$1000	\$2000	\$3000

* Student or limited income is \$15 per year. ** Small astronomy club (less than 100 members) is \$50.

Select the appropriate category above, and mail this form and your check (in U.S. dollars), made payable to the International Dark-Sky Association (or IDA), to: **International Dark-Sky Association, 3545 N. Stewart, Tucson, AZ 85716-1241 USA**

We also accept Master Card or VISA: Card Type: MasterCard -or- VISA (circle one)

Card Number: _____

Expiration Date: _____ Signature: _____

IDA is a 501(c)3 non-profit organization. Donations may be tax deductible.