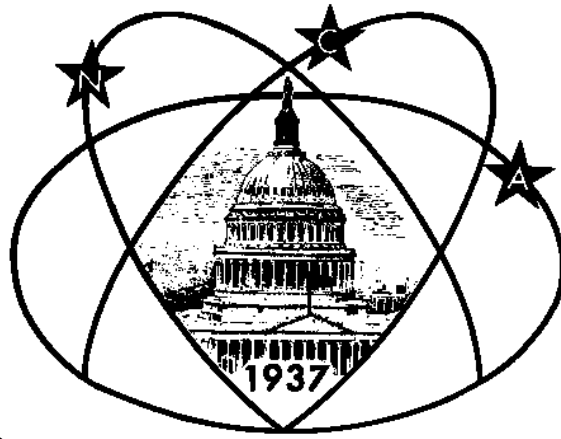


Star



Dust

National Capital Astronomers, Inc.

Volume 59, Number 6

February 2001

ISSN 0898-7548

David Rust to Speak about Solar Astronomy

submitted by Gary Joaquin

Dr. David Rust will present the featured talk for the February 3 meeting of National Capital Astronomers, "Solar Astronomy from 25 Miles above Antarctica." The meeting will be held in the Lipsett Amphitheater in Building 10 (Clinical Center) of the National Institutes of Health in Bethesda at 7:30 P.M. Both the synopsis and bio that follow are primarily excerpts from the Flare Genesis Experiment web site, a rich source of project information at <http://sd-www.jhuapl.edu/FlareGenesis>.

Synopsis

The principal objective of the Flare Genesis Experiment (FGE) is to understand the origins of solar activity. Flares, coronal mass ejections, and coronal heating are caused by dissipation of energy associated with current-carrying magnetic flux ropes. This assertion is based on the close association between magnetic fields and these phenomena and on the paucity of viable alternative explanations for solar activity. But

advancement beyond this level of insight has been extremely difficult. The consensus among solar physicists is that greatly improved magnetic field observations are needed. Higher resolution, greater stability during observations, and longer runs without interruptions are expected to reveal key features of magnetic energy buildup and release.

(Continued on page 2)

Review of Maurice Shapiro's Talk about Cosmic Rays

by Gary Joaquin

At the January NCA meeting Dr. Maurice Shapiro, astrophysicist and cosmic ray expert, summarized the results of cosmic rays research. His presentation was often colored by intimate recollections of the great minds of the twentieth century, many of whom Dr. Shapiro knew personally as colleagues and friends, an exemplary expression of his 60-year love affair with cosmic rays.

How Were Cosmic Rays Discovered?

Victor Hess discovered cosmic rays quite serendipitously in 1912. Hess was involved with testing the electrification of the air. He wanted to know whether or not atmospheric electrification was totally caused by radioactive terrestrial rocks or if there was another contributing cause coming from space. Testing up to that time taken from great heights atop the Eiffel Tower and mountain peaks had been ineffective. Hess, usually accompanied by a companion and equipped with an electrometer, went aloft in balloons up to altitudes of 9 miles. When he discovered that his electrometer discharged more rapidly as he ascended in a

balloon, he attributed this to a source of radiation entering the atmosphere from above. It took many years after he published his results to understand the vast implications of his discovery. In fact, it wasn't until 1936 that he received a Nobel Prize for his work, the same year that Carl Anderson was awarded the Nobel prize for his discovery of the positron.

What Are Cosmic Rays?

Cosmic rays are high-energy charged particles, originating from outer space, traveling at nearly the speed of light. Most cosmic rays are the nuclei of atoms, ranging from the lightest to the heaviest elements in the periodic table, typically 89% Hydrogen, 10% Helium, and about 1% heavier elements. Cosmic rays include high energy electrons, positrons, and other subatomic particles. These particles impact the Earth with energies that range from 1 million electron volts (eV) up to 10^{20} eV (where one electron volt or one eV is equal to the energy gained when one electron is accelerated through a potential difference of 1 volt). This is an amazing amount of energy

considering that it takes 10^{26} atoms to make up a pound of material. Cosmic rays bombard the Earth from all directions, with the exception of the lower energy cosmic rays that are influenced by the Earth's magnetic field, enough so that they are re-directed and strike the Earth at the geomagnetic poles with much greater frequency than they do at the geomagnetic equator.

The term "Cosmic Ray" is really a bit of a misnomer, because "ray" usually suggests light, e.g., X rays, gamma rays, the entire electromagnetic spectrum, however today it is known that cosmic rays are particles with well-identified masses. Initially, physicists Arthur Compton and Robert Millikan argued about the nature of cosmic rays. Millikan thought that the emissions had to be gamma rays because they were so penetrating. Compton argued that they were charged particles because they were influenced by the Earth's magnetic field. Despite the fact that Compton was right, the archaic name, "cosmic ray", stuck.

(Continued on page 2)

NCA Events This Month

The Public is Welcome!

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

Fridays, February 2, 9, 16, & 23
7:00 - 10:00 P.M. - Telescope-making and mirror-grinding classes at American University, McKinley Hall, Basement (Room 9), Nebraska and Massachusetts Avenues, NW. Instructor wants to know if there is interest in having Tuesday evening sessions at the Chevy Chase Community Center at McKinley Street and Connecticut Avenue, NW. Call or email Guy Brandenburg to confirm: 202-635-1860 or gbranden@earthlink.net.

Fridays, February 2, 16, & 23 8:30 p.m. Open night with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia; 6007 Ridge View Drive (off Franconia Road between Telegraph Road and Rose

Hill Drive). Call Bob Bolster, (703) 960-9126 before 6:00 p.m.

Saturday, February 3, 5:30 P.M.
Dinner with the speaker and NCA members at the Aangan Indian Restaurant 4920 St. Elmo Ave. Bethesda, MD
See the map and directions on Page 6.

Saturday, February 3, 7:30 P.M. - **NCA meeting**, at the Lipsett Auditorium in Building 10 at NIH, will feature Dr. David Rust talking to NCA about "Solar Astronomy from 25 Miles above Antarctica."

See Page 4 for more National Capital area astronomical doings. To join NCA, use the membership application on Page 7.

Maurice Shapiro

(Continued from page 1)

Other terms like "solar cosmic ray" are equally odd, because it suggests something beyond the heliosphere, whereas "solar energetic particle" may be more accurate. Meanwhile "galactic cosmic ray" describes highly energized particles that originate outside of our solar system. Dr. Shapiro concluded that particle physicists are indeed astronomers, because like astronomers they have chosen to adopt and retain some of the most peculiar names.

Where Do Cosmic Rays Originate and How Are They Energized?

Initially there was debate over whether or not the Sun was the primary source of cosmic rays, however the Sun's 11 year cycle of sunspot activity disproved this notion. When the Sun is least active, the greatest number of cosmic rays are detected. When it is most active, during the highest Sunspot periods, the least number of cosmic rays are detected. This is inconsistent with the idea of the Sun being a significant source of cosmic rays.

Contemporary theoreticians have identified supernova shock waves as the mechanism for cosmic ray acceleration, but Dr. Shapiro contends that this hypothesis alone is insufficient. Its underlying assumption is that a shock wave comes along, strikes a particle

at rest in the interstellar medium, and accelerates it to cosmic ray velocities. This is not possible because the composition of the interstellar medium is very well known and does not match the composition of incoming cosmic rays. There has to be an intermediate step prior to shock wave acceleration.

Dr. Shapiro argues that red dwarfs, otherwise known as flare stars, having masses of about 20 to 80 percent of the Sun, contribute to accelerating cosmic rays. While the Sun's maximum output is about 10^{31} ergs, a red dwarf's maximum output is between 10^{34} and 10^{35} ergs. Every few seconds there is a stellar burst that is one to ten thousand times more powerful than the most intense solar flare emitted from our Sun in a year. Red dwarf flare emissions are so frequent that they are often confused with viable stars.

Dr. Shapiro proposed the hypothesis, "The galactic cosmic rays, most of them by far, get their start in coronal mass ejections on red dwarf stars (mainly dMe, also dNe)" where "d" denotes "dwarf", "M" and "N" denote star type, and "e" denotes "emission". In support of his hypothesis he offered these arguments:

(Continued on page 3)

David Rust

(Continued from page 1)

The FGE is a unique and versatile solar observatory. It can measure the surface magnetic fields and motions with a unique balloon-borne 80-cm (aperture) telescope. By observing continuously from the Antarctic stratosphere, above 99.7% of the atmosphere, the FGE overcomes the principal problems that have hindered magnetic field observations from the ground.

Bio

Dr. David Rust is the Principle Investigator of the FGE team. He is a Senior Staff Physicist at the Johns Hopkins University Applied Physics Laboratory and the Head of the Solar Physics Section of its Space Department's Space Physics Group.

Dr. Rust's research interest is solar physics, especially solar flares and magnetic fields, instrumentation for astrophysical measurements, telescopes, spectral analyzers and sensors.

As a Senior Physicist at APL, Dr. Rust has initiated programs to analyze X-ray images and spectra from the Solar Maximum Mission satellite, to measure solar magnetic fields and flares, and to fly a large solar telescope above the atmosphere. Earlier, at American Science and Engineering, Inc., Dr. Rust analyzed X-ray images of the solar atmosphere obtained with a grazing incidence telescope aboard Skylab. He created a movie on the solar X-ray corona which has appeared on American, Japanese and British television and at the Air and Space Museum. Before that, at the High Altitude Observatory, the Mount Wilson Observatory, and the Sacramento Peak Observatory, Dr. Rust studied the magnetic fields in solar prominences and sunspot regions. At the Sacramento Peak Observatory, he initiated research programs on solar flares and participated in the development of a novel spectroheliograph/magnetograph. He has published over 120 refereed papers and has presented many invited reviews on solar flares, solar prominences, magnetic fields and astronomical instruments.

Dr. Rust has a Sc.B. in Physics from Brown University and a Ph.D. in Astro-Geophysics from the University of Colorado.

Maurice Shapiro

(Continued from page 2)

- Red dwarfs comprise about 90% of all known stars;
- 60% of the dwarf stars flare frequently and powerfully including radio, extreme ultra violet, and X-ray emissions;
- Unlike the composition of the interstellar medium, the composition of the red dwarf chromosphere matches that of incoming cosmic rays. The sources (the stellar chromosphere) satisfy the first ionization potential;
- The supply of seed particles is adequate, i.e., the required energy budget is modest; and
- The particles are very likely to meet in shock waves and be promoted to cosmic ray energies.

As soon as Dr. Shapiro completed stating his hypothesis he mentioned physicist and educator, Richard Feynman, who said that it is too easy to become too consumed with one's own ideas and theories. Doubt is at the heart of all good science. Self doubt is the most difficult to come by and the most essential of all.

Dr. Shapiro acknowledged that the study of cosmic ray collisions with atomic nuclei has been the "Rosetta Stone" of cosmic ray physics, providing much information about what happens when cosmic rays interact with intermediate particles that alter its structure. This makes it possible to analyze and determine the source composition of a cosmic ray, i.e., its composition prior to its interaction with the interstellar medium.

So What Are Cosmic Rays Good For?

Cosmic rays have:

- Led to the discoveries of subatomic particles like the positron;

- Improved our understanding of the nature of regions in the cosmos where ultra-high energy processes occur;
- Made the study of gamma ray and high-energy neutrino astronomy possible;
- Provided a means to "x-ray" the Giza pyramids to find a concealed burial chamber (although it didn't work too well);
- Provided a means to understand subatomic particle structure when it is not possible to simulate the highest energy conditions on Earth, even with the largest particle accelerators. Cosmic rays are the byproduct of nature's own gigantic particle accelerator;
- Cosmic rays have been a source of genetic variation and mutation. In essence, cosmic rays are partially responsible for the process of evolution.

Dr. Shapiro also noted that cosmic rays can be a nuisance by damaging the sensitive circuitry in computers which are often aboard orbiting satellites.

Neutrino Astrophysics

Dr. Shapiro summarized some of the significant events and gains that have occurred in the science of neutrino astrophysics:

- Neutrinos are "ghostly" subatomic particles, having no charge, consisting of little or no mass, and interacting so weakly with matter that they pass through ordinary matter, making them very difficult to detect. Vast numbers of neutrinos pass through us and through the entire Earth every second;
- The supernova SN1987A, the first supernova to have been observed in a

nearby galaxy in the last several hundred years, provided a fertile ground for the study of neutrino emissions. In fact, the neutrino emissions reached Earth long before the explosion became visible in optical wavelengths;

- Dr. Shapiro was involved with the Deep Underwater Muon and Neutrino Detector, DUMAND, in the 1970s. DUMAND was an observatory located on the bottom of the ocean where the collection array could be shielded from cosmic rays in the hopes of detecting the elusive neutrino, primarily via the detection of secondary particles that result from neutrino collisions with the array. Dr. Shapiro quipped that "DUMAND lived for 15 years and ultimately died because it needed more money than it could collect." Most of the funding required paid for a ship large and stable enough to hold its position above the array to service it; and
- Successor arrays like AMANDA, the Antarctic Muon and Neutrino Detector Array, continue DUMAND's work today. AMANDA is actually an array drilled into the Antarctic ice. An even larger array about the size of the state of Delaware has been proposed by Nobel Prize winner, James Cronin, who has had some success in acquiring funding for his array in the southern hemisphere.

Closing Words

The question and answer session after Dr. Shapiro's presentation was both enthusiastic and stimulating. Dr. Shapiro and several NCA members also shared fond memories about the late Robert W. McCracken, past NCA president and long time contributing NCA member. NCA is grateful to Dr. Shapiro for having taken the time to speak with us.

Star Dust Is Now Available Electronically



Any member wishing to receive *Star Dust*, the newsletter of the National Capital Astronomers, via e-mail as a PDF file attachment, instead of hardcopy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at ngroman@erols.com, or via telephone at 301-656-6092 (home)

Deadline for March *Star Dust*: February 15



Please send submissions to Elliott Fein at elliott.fein@erols.com.

Text must be in ASCII, MS Word, or Word-Perfect. Graphics in BMP are best.

Thanks.

Other National Capital Area Meetings, etc.

Department of Terrestrial Magnetism (DTM) Carnegie Institute of Washington Seminars are held on Wednesdays at 11:00 a.m. in the Main Building, 5241 Broad Branch Road, N.W., Washington, D.C.

January 31 Mark A. Richards, DTM Visiting Investigator, Department of Geology and Geophysics, University of California, Berkeley, "Why Earth has Plate Tectonics and Why Venus Does Not". DTM is located on 32nd Street one block south of its intersection with Military Road. Proceed south on 32nd Street one block to Jocelyn Street, turn left on Jocelyn, and right into the parking lot. Coffee and tea will be served at 10:45 a.m. Please call to confirm that there have been no cancellations. Tel. 202-478-8830. Source: <http://www.ciw.edu/DTM-seminars.html>

Goddard Scientific Colloquium — Construction in Building 3 has been postponed. The Scientific Colloquium will be held at 3:30 p.m. on Fridays in the Building 3 auditorium until the work is re-scheduled.

February 2 Bruno Coppi, Yale University, "Theoretical and Experimental Results in Fusion Research: Related Issues in Astrophysics"

February 9 Richard Mushotzky, NASA/GSFC, "The X-Ray Background - A Year of Discovery"

February 16 Andrew Westphal, University of California, Berkeley, "The Origin of Galactic Cosmic Rays: New Results from the Russian Space Station"

February 23 James Burch, Southwest Research Institute, "First Light' from the IMAGE Spacecraft"

If you plan to attend and do not have a NASA badge, please contact Carol Krueger, at (301) 286-6878, at least 24 hours beforehand. Source: heawww.gsfc.nasa.gov/users/djt/colloq/

Montgomery College's Planetarium Fenton St. in Takoma Park, MD.

February 17, Saturday, at 7:00 P.M. "African Skies" The planetarium show will explore the African Skies and African astronomical mythology. The diverse African peoples have a large body of cosmological legendary tales which are short, often humorous, and always educational. The sun, moon, and stars were used to keep calendars which were used to determine planting, fishing, hunting, and yearly festivals. The tradition of using songs to convey information about the sky that would be useful to people on earth saw further development in the "Follow the Drinking Gourd" song. African-American slaves used this navigation song to determine the direction of their flight to freedom from slavery.

Come to the planetarium and you too, will learn that the night sky still has useful information about life on earth. Source: <http://www.mc.cc.md.us/Departments/planet/>

Northern Virginia Astronomy Club (NOVAC) meets 6:00 p.m. at Lecture Hall 1 on the Fairfax campus of George Mason University. 703 803-3153.

February 11 Bob Gent: "Astronomy and the Astronomical League". Come hear NOVAC's own Bob Gent, who also happens to be the Newsletter Editor and Public Relations Officer of the International Dark Sky Association, and Vice President of the Astronomical League. Source: <http://novac.com>

University of Maryland Observatory on Metzerott Road. Open house on 5 and 20 of each month includes a 20- to 30-minute slide presentation in the lecture hall, followed by telescope viewing.

February 5 at 7:15 p.m. & 8:00 p.m. Dr. Dana Hurley Crider, Goddard Spaceflight Center, "What Happened to the Water on Mars".

Info: (301) 405-3001 Source: <http://www.astro.umd.edu/openhouse/>

NASA/GSFC LEP Seminar Laboratory for Extraterrestrial Physics

Brown Bag Seminar. The Laboratory for Extraterrestrial Physics (LEP) at NASA's Goddard Space Flight Center conducts weekly science seminars Fridays at noon in Room 8 in Building 2 at Goddard.

February 2 Tom Moore, NASA/GSFC, "Low Energy Neutral Atoms as Seen from IMAGE".

February 16 Lutz Rastaetter, NRC at NASA/GSFC, TBA

February 23 Shing F. Fung, NASA/GSFC "Observations of Magnetospheric Plasmas by the Radio Plasma Imager (RPI) on the IMAGE Satellite"

March 2 Akimasa Ieda, NRC at NASA/GSFC, "Auroral Breakups and Magnetotail Plasmoids: Polar/UVI and Geotail Observations"

Source: http://lepjas.gsfc.nasa.gov/~seminar/lep_seminar.html

Goddard Engineering Colloquia

All colloquia are held at 3:30 p.m. on Mondays in the Building 3 Auditorium, unless otherwise indicated below.

February 26, Ralph McNutt, TBA

March 5, Mario Livio, Space Telescope Science Institute, "Beauty in Physics and the Accelerating Universe"

Note: Individuals not badged for entry into Goddard should obtain the current procedure by contacting Main Gate security at 301-286-7211. Source: <http://ecolloq.gsfc.nasa.gov/sched.html>

Space Telescope Science Institute (STScI) Free public Lectures at the Space Telescope Science Institute. Lectures are at 8 p.m. the first Tuesday of every month in the STScI auditorium, on the campus of Johns Hopkins University. Free parking is available. For directions, call 410-338-4700.

February 6, Megan Donahue, "Chandra Observations of Clusters of Galaxies". The Johns Hopkins University's Bloomberg Telescope is open to the public every Friday evening, weather permitting. For more information, contact the observatory at (410)-516-6275 or via email at altan@pha.jhu.edu. Source: http://hubble.stsci.edu/about_us/open-night.shtml

Laboratory for Astronomy and Solar Physics (LASP) — Seminars are on Thursday at 3:30 P.M. in GSFC Bldg. 21, Room 183.

February 1 David Wilner, Harvard-Smithsonian CFA, "The Dark Side of Star Formation: Probing High Redshift Galaxies with the Sub-millimeter Array"

February 8 Ned Wright, UCLA, "The Cosmic Infrared Background"

February 15 Renyue Cen, Princeton University, "Simulations of Large-Scale Structure in the Universe"

February 22 No Speaker Washington Area Astronomers Meeting at GSFC

March 1 Bhuvnesh Jain, Johns Hopkins University, "Gravitational Lensing and Cosmology"

Coffee, Tea, and Cookies served before the seminar. For additional information, contact Eli Dwek at 301-286-6209 (edwek@stars.gsfc.nasa.gov) or Jon Gardner at 301-286-3938

(gardner@harmony.gsfc.nasa.gov). Source: http://stars.gsfc.nasa.gov/www/lasp_colloq

LASP Stellar & Extra-Galactic Astronomy Lunch — Talks are Wednesdays at 12:00 Noon in Room 242 of Building 21, except as noted.

Tuesday, February 6, Eli Dwek, GSFC, "On Chemical Evolution with Dust".

Source: <http://hires.gsfc.nasa.gov/~gardner/seal/>

Washington Area Astronomers Meeting The next Washington Area Astronomers Meeting will be held on **Thursday, February 22** at NASA's Goddard Space Flight Center, Greenbelt, MD. The meeting will be held in Building 26, room 205.

To get on the mailing list, contact George Kaplan at the U.S. Naval Observatory, gkaplan@usno.navy.mil, (202) 762-1562

Source: http://aa.usno.navy.mil/waa/mtg_info.htm

Mid-Atlantic Occultations and Expeditions

by David Dunham

Asteroidal Occultations

DATE	Day	EST	Star	Mag	Asteroid	dmag	Dur Ap.		Location
Feb 6	Tue	18:35	SAO 110692	7.7	Ino	4.9	6	1	Hudson Bay
Feb 13	Tue	1:08	SAO 100028	7.7	Pythia	4.7	6	1	Mississippi
Feb 15	Thu	23:25	SAO 080084	9.1	Beatrice	2.9	10	3	Florida
Feb 16	Fri	0:10	SAO 098586	8.9	Phaedra	3.8	5	3	MD - PA border
Feb 19	Mon	20:22	TYC08191063	10.8	Gunloed	3.2	4	7	Virginia
Feb 21	Wed	19:47	TYC28560064	9.9	Palma	2.2	8	6	Jamaica

Lunar Grazing Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Location
Feb 27	Tue	19:52	ZC 0306	6.8	19+	26	7S Emmitsburg & MD Line(I83), MD
Mar 3	Sat	18:05	zeta Tauri	3.0	59+	71	10S Back Bay, VA, Sun -2 & Cary, NC

Mar. 3: Back Bay is south of Virginia Beach. Unfortunately, this conflicts with the monthly NCA meeting, but will be worth the weekend trip if it is clear; it's the brightest star grazed in the region this year and should be spectacular even with the bright twilight.

Total Lunar Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Notes
Feb 1	Thu	20:52	D ZC 0464	6.1	55+	49	77N Sp. K0; maybe double
Feb 2	Fri	22:42	D ZC 0610	5.9	66+	41	26N dbl., mag. 9.3 4.4", PA 326
Feb 3	Sat	0:34	D ZC 0620	6.1	67+	21	83S Sp. K0
Feb 3	Sat	23:27	D 106 Tauri	5.3	77+	45	23N Sp. A5; maybe double
Feb 4	Sun	23:03	D ZC 0928	5.9	86+	61	24N Sp. K4
Feb 4	Sun	23:55	D TV Gem	6.9	86+	52	75S Sp. M1; ZC 0939, range 1.3 mag.
Feb 6	Tue	1:29	D delta Gem	3.5	94+	47	82S Sp. F0; ZC 1110
Feb 6	Tue	2:34	R delta Gem	3.5	94+	34	-87S WA 266; very hard to time
Feb 6	Tue	4:54	D 63 Gem	5.2	94+	9	29S Sp. F5; possible close double
Feb 6	Tue	22:35	D ZC 1250	5.8	98+	69	84S Sp. K1
Feb 16	Fri	2:39	R ZC 2401	5.6	38-	5	80S Sp. F3; Az. 120 deg.
Feb 17	Sat	4:42	R 52 Oph	6.5	28-	6	80N Sp. A; ZC 2529
Feb 18	Sun	5:39	R ZC 2682	7.0	20-	14	85N Sp. G8
Mar 3	Sat	17:44	D zeta Tauri	3.0	60+	66	43S Sp. B4; Sun alt. +3 deg.
Mar 3	Sat	18:28	R zeta Tauri	3.0	60+	71	-22S ZC 847; WA 201; Sun -6 deg.

Many 8th-mag. stars are occulted on March 3 after zeta Tauri disappears.

Phone the IOTA occultation line, 301-474-4945, for weather go/cancel decisions, and other updates, or check IOTA's Web site at <http://www.lunar-occultations.com/iota> for finder charts and path updates.

David Dunham Phone home 301-474-4722; office 240-228-5609; car 301-526-5590.

Meteor Showers

Full Moon: February 8

Major Activity: None

Minor Activity			Daylight Activity		
Radiant	Duration	Maximum	Radiant	Duration	Maximum
Aurigids	January 31-February 23	Feb. 5-10	Capricornids-Sagittariids	January 13-February 28	January 30-February 3
Alpha Centaurids (ACE)	February 2-25	Feb. 8/9	Chi Capricornids	January 29-February 28	February 13/14
Beta Centaurids	February 2-25	Feb. 8/9			
Delta Leonids (DLE)	February 5-March 19	Feb. 22/23			
Sigma Leonids	February 9-March 13	Feb. 25/26			

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

Getting to the NCA Monthly Meeting

Saturday, February 3

5:30 P.M. - Dinner with the speaker and NCA members at the

Aangan Indian Restaurant
4920 St. Elmo Ave.
Bethesda, MD
301-657-1262

7:30 P.M. - NCA Meeting at Lipsett Auditorium in Building 10 at NIH. Guest speaker: Dr. David Rust speaking about "Solar Astronomy from 25 Miles above Antarctica."

Directions to the Meeting Place

From Rockville Pike (Wisconsin Ave., Rt. 355)

To get to the parking lot at the South entrance (this will be the entrance for the next three years or so until they finish the new wing) from Rockville Pike, enter NIH at the Metro Entrance: South Drive (traffic light). Go straight ahead. At the third stop sign you will be at the parking lot, but you will have to make a left turn then a right to get to the entrance to the lot. Make a right turn into the lot. Building 10 is just north of the parking lot. Enter the building and follow the signs to the Lipsett Auditorium.

From Old Georgetown Rd., enter at Lincoln Drive (traffic light nearest to Suburban Hospital). Go straight ahead. The second stop sign is at a T. Bear left and the lot will be on the right.

Make a right turn into the lot.

Metrorail Riders - From Medical Center Metro Station: Walk down the hill, past the bus stops. Continue straight past the anchor. At the second stop sign after the anchor, bear right up the incline into the entrance of Building 10, the tallest building on campus (walking time less than 10 minutes).

Taking the J2 or J3 buses from Silver Spring, get off at the Metro stop and follow the directions given for motorists from that point. If coming from Montgomery Mall, get off at the first stop in NIH, before the Clinical Center. There are signs near the ramp for the garage directing you into the side entrance. Walk straight through the building to the Lipsett amphitheater.

Directions to the Restaurant

Dinner before the meeting will be at 5:30 P.M. at the

Aangan Indian Restaurant
4920 St. Elmo Ave.
Bethesda, MD

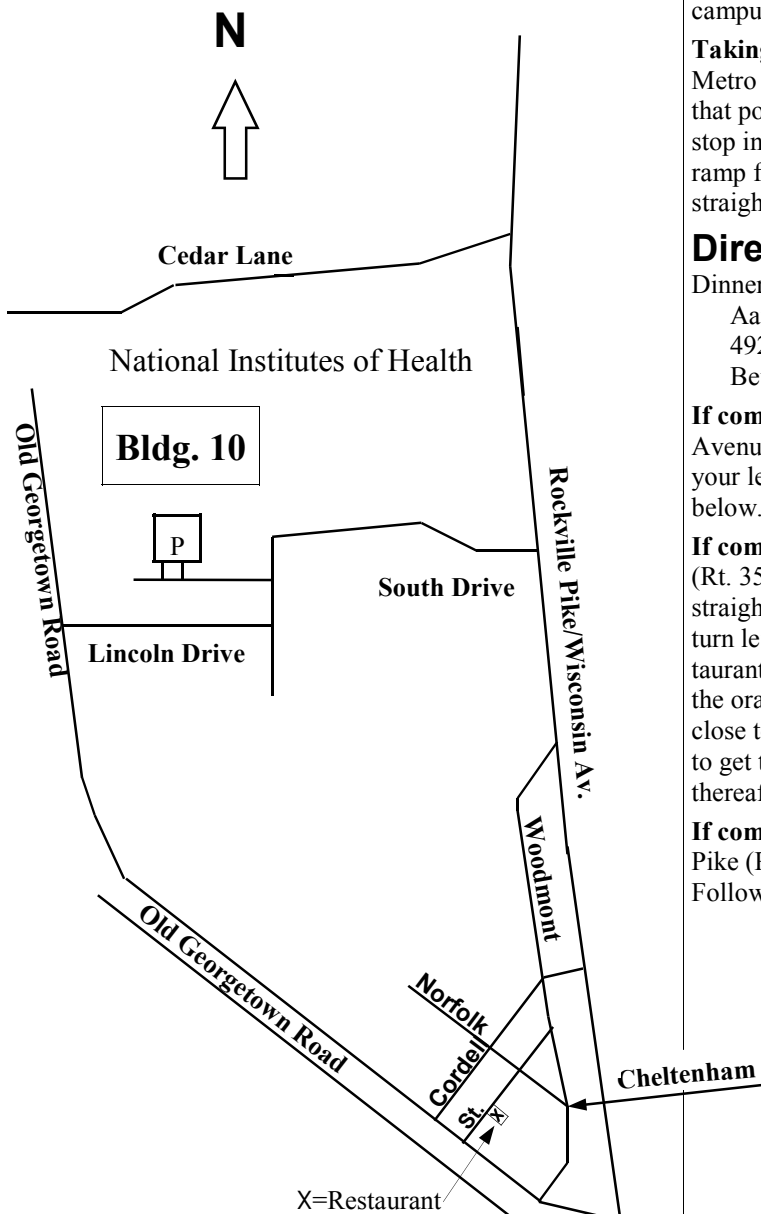
If coming from the District, when going north on Wisconsin Avenue, ignore all signs until you pass Old Georgetown Road on your left. Once past Old Georgetown Rd., follow the directions below.

If coming from south of Bethesda, go north on Wisconsin Ave. (Rt. 355), turn left onto Cheltenham Dr. (traffic light). (AA) Go straight (slight right) to go onto Norfolk Ave. Go two blocks and turn left at St. Elmo Ave. You will be going Southwest. The restaurant will be on your left, half-way down the block. Look for the orange awning. There is a free, public parking garage very close to Old Georgetown Rd. between Cordell and St. Elmo. Best to get to the parking garage by 5:30 because it becomes full soon thereafter if the weather is good.

If coming from north of Bethesda, go south on the Rockville Pike (Rt. 355). Turn right onto Cheltenham Dr. (traffic light). Follow directions at (AA) above.

After dinner,

Continue Southwest on St. Elmo Ave.
Turn right onto Old Georgetown Rd.
Go Northwest on Old Georgetown Rd.
Enter NIH (on the right) at Lincoln Drive (traffic light nearest to Suburban Hospital). Go straight ahead.
The second stop sign is at a T.
Bear left and the lot will be on the right.
Make a right turn into the lot.



Star Dust is published ten times yearly, September through June, by the National Capital Astronomers, Inc. (NCA).
Editor: Elliott Fein, Co-editor: Adele Fein, Editorial Advisor: Nancy Byrd.
Star Dust © 2000. *Star Dust* may be reproduced with credit to National Capital Astronomers, Inc.

National Capital Astronomers, Inc.

Nancy Byrd, NCA President, nancy@pangean.com, 703-978-3440 (home).
Gary Joaquin, NCA Vice-president, gljl@erols.com.
Nancy Grace Roman, NCA Secretary, ngroman@erols.com, 301-656-6092 (home).
Jeffrey Norman, NCA Treasurer, jeffrey.norman@ferc.fed.us, 5410 Connecticut Avenue, NW, Apt. #717,
Washington, DC 20015-2837.
Harold Williams, NCA Webmaster, hwilliam@mc.cc.md.us, 301-650-1463 planetarium, 301-565-3709 (home).
Leith Holloway, NCA contact for Junior members, jleithh@aol.com, 301-564-6061.
Elliott Fein, NCA *Star Dust* Editor, elliot.fein@erols.com, 301-762-6261 (home), 5 Carter Ct. Rockville, MD 20852-1005.
NCA Web Page: <http://capitlastronomers.org/>.

SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a nonprofit, membership-supported, volunteer-run, public-service corporation dedicated to advancing astronomy, space technology, and related sciences through information, participation, and inspiration, via research, lectures, presentations, publications, expeditions, tours, public interpretation, and education. NCA is the astronomy affiliate of the Washington Academy of Sciences. All are welcome to join NCA.

SERVICES & ACTIVITIES:

Monthly Meetings feature presentations of current work by researchers at the horizons of their fields. All are welcome; there is no charge. See monthly *Star Dust* for time and location.

NCA Volunteers serve in a number of capacities. Many members serve as teachers, clinicians, and science fair judges. Some members observe total or graze occultations of stars occulted by the Moon or asteroids. Most of these NCA members are also members of the International Occultation Timing Association (IOTA).

Publications received by members include the monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

Consumer Clinics: Some members serve as clinicians and provide advice for the selection, use, and care of binoculars and telescopes and their accessories. One such clinic is the semiannual event held at the Smithsonian Institution National Air and Space Museum.

Fighting Light Pollution: NCA is concerned about light pollution and is interested in the technology for reducing or eliminating it. To that purpose, NCA is an Organization Member of the International Dark Sky Association (IDA). Some NCA members are also individual members of IDA.

Classes: Some NCA members are available for educational programs for schools and other organizations. The instruction settings include star parties, classroom instruction, and schoolteacher training programs that provide techniques for teaching astronomy. NCA sponsors a telescope-making class, which is described

in the *Star Dust* "Calendar of Monthly Events".

Tours: On several occasions, NCA has sponsored tours of astronomical interest, mainly to observatories (such as the National Radio Astronomy Observatory) and to the solar eclipses of 1998 and 1999. Contact: Sue Bassett wb3enm@amsat.org

Discounts are available to members on many publications, products, and services, including *Sky & Telescope* magazine.

Public Sky Viewing Programs are offered jointly with the National Park Service, and others. Contact: Joe Morris. joemorris@erols.com or (703) 620-0996.

Members-Only Viewing Programs periodically, at a dark-sky site.

NCA Juniors Program fosters children's and young adults' interest in astronomy, space technology, and related sciences through discounted memberships, mentoring from dedicated members, and NCA's annual Science Fair Awards.

Fine Quality Telescope, 14-inch aperture, see "Calendar of Monthly Events".

Yes! I'd like to join the NATIONAL CAPITAL ASTRONOMERS

Date:

Name(s): _____

Address: _____

Telephone: _____ E-mail: _____

Other family members who should receive a membership card: _____

Dues:

___ \$57 With *Star Dust* and a discount subscription to *Sky & Telescope*.

___ \$27 With *Star Dust* ONLY.

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

___ \$15 Junior membership with *Star Dust* ONLY.

___ \$100 Contributing member (with *Sky & Telescope*) (\$43 tax-deductible).

___ \$150 Sustaining member (with *Sky & Telescope*) (\$93 tax-deductible).

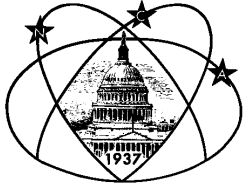
Junior members only: Date of Birth: _____ Only members under the age of 18 may join as juniors.

Tax deductible contribution: _____ Thank You.

_____ I prefer to receive *Star Dust* by e-mail.

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

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



National Capital Astronomers, Inc.

If undeliverable, return to
NCA c/o Nancy Roman
4620 N. Park Ave., #306W
Chevy Chase, MD 20815-4551

**FIRST CLASS
DATED MATERIAL**

Inside this issue:

February Speaker and his Talk	1
Review of January Speaker's Talk	1
NCA Events This Month	2
Other National Capital Area Meetings, etc.	4
Meteor Showers	5
Mid-Atlantic Occultations and Expeditions	5
Directions with Map to Restaurant and Meeting	6