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Dr. Judith Lean to Speak on Variations in Solar Radiation



Judith Lean is currently a Research Physicist with the Hulburt Center for Space Research at the Naval Research Laboratory. Dr. Lean's is a member of the Solar Ultraviolet Spectral Irradiance Monitor (SUSIM) team studying variations in the ultraviolet portion of the spectrum that is absorbed in the Earth's ozone layer. She received her B.Sc. in Physics from Australian National University and a Ph.D. from the University of Adelaide. Dr. Lean spent several years at the Cooperative Institute for Research in Environmental Sciences at the University of Colorado/NOAA in Boulder as a Research Associate, then two years with Applied Research Corporation before coming to the Naval Research Laboratory.

Dr. Lean will discuss correlations between the data from two independent, satellite-borne solar radiometers deployed during 1980-1990, and observed solar phenomena. Is the radiation that heats the earth, or the radiation that maintains the ozone layer, affected by the sun's activity cycle? This question, when posed of the sun's total (i.e., spectrally integrated) irradiance (also called the "solar constant") has been debated for over a century. Because total solar irradiance is dominated by visible radiation that reaches the earth's surface, its variability has long been suspected as a driver of climate change. Measurements of the solar constant made from the ground during an entire century were unable to clarify whether or not variations in the data were the consequence of true solar variability, atmospheric "seeing" effects or measurement inaccuracies.

Measurements of solar radiation, both spectrally integrated, and at ultraviolet wavelengths, will be used to demonstrate how the sun's radiation varies. These variations will be related to active region features of the sun's disc, and the relevance of their variability for the earth will be identified.

—Last month, because of a power outage at the University of the District of Columbia, we were unable to hold our monthly colloquium. The speaker graciously agreed to postpone her presentation until this month. We have reprinted her abstract and vitae for those who wish to review the topic before the lecture.—Ed.

February Calendar *The Public is Welcome*

Saturday, February 2, 7:30 pm - NCA Monthly Colloquium will be held in room A-06 of Building #42 on the Van Ness Campus of the University of the District of Columbia (UDC), at 4200 Connecticut Ave NW. Dinner with the speaker at 5:45 PM at Charlie Chaing's Restaurant at 4250 Conn Ave. NW (dinner will be in upper level of restaurant).

DIRECTIONS: From the Van Ness Metro station exit, walk west through entrance of UDC, crossing bus lane into garage. Exit garage on North side, climbing to level A of the campus. Building 42 is

to the west as you emerge. (Alternatively, there is an elevator in Building 42.) The parking garage may be entered by car from Van Ness street. Charlie Chaing's restaurant is to the west of the entrance to UDC, and may be accessed from Connecticut Avenue or from the rear.

Tuesday, February 4, 11, 18, 25, 7:30 pm - Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnell, (202) 362-8872.

Friday, February 1, 8, 15, 22, 7:30 pm - Telescope-making classes at American University, McKinley Hall Basement. Information: Jerry Schnell, (202) 362-8872.

Friday, February 8, 22, 8:30 pm - NCA 14-inch telescope open nights with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at (703) 960-9126.

NCA Welcomes New Members

Brady & Therese Byrd
2138 Haycock Rd.
Falls Church, VA 22043

Gary W. Dehne
13234 Query Mill Rd.
Darnestown, MD 20878

Charles C. Brewer
1220 East West Highway
Silver Spring, MD 20910

Occultation Expeditions Planned

Dr. David Dunham is organizing observers for the following occultations. For further information call the NCA-IOTA information line (301) 474-4945 (Greenbelt, MD).

Date	Time	Locality	Visible Magnitude	Percent Sunlight	Cusp Angle	Minimum Aperture
Grazing Lunar:						
2-08	4:24	Belize	1.2	33	12S	1cm

A total occultation of Antares will be visible from the D.C. area. The disappearance will occur at 4:06.3 at position angle 90, cusp angle -83N (on the bright limb), and reappearance at 5:24.7 at position angle 301, cusp angle 66N. See the February issue of Sky and Telescope, page 180 for details.

Asteroidal:	Time	Locality	Star Mag.	Delta Mag.	Name	
2-01	22:14	Canada*	11.7	1.6	(46) Hestia	20 cm
2-02	22:50	N. Canada*	12.1	1.1	(121) Hermione	20 cm

*Appulse to be observed for possible satellites or path shift.
#EST

Excerpts from the IAU Circulars

R.N. Bolster

I • December 17 - K.J. Meech, University of Hawaii, observed a brighter and extended coma around Chiron with a CCD detector on the 2.2-m telescope on Mauna Kea, indicating an outburst since September.

2. January 5 - Masaru Arai, Yorii, Japan, discovered a comet (1991b) of 10th magnitude in Cancer with a 16-cm reflector. The orbital elements by Nakano indicate that the comet passed perihelion on December 12.

3. January 7 - H.J. Brewington of New Mexico discovered a comet (1991a) of 10th magnitude near the border between Pisces and Cetus with a 41-cm reflector. The orbital elements by Marsden indicate the comet is periodic, and it appears to be identical to comet Metcalf (1906 VI).

Astronomy and Personal Computers

Joan Bixby Dunham

Using Your Computer Outdoors

Computer control of a telescope, computerized data collection, digitization of CCD camera images, all have a feature in common -- You probably will want your computer out there next to the telescope. Out there in the same atmosphere that has you use a dew cap, that puts waves in the covers of your Astronomical Ephemeris and wrinkles in your sky charts. Out of the protection of the home heating and cooling systems and of insulated, and (usually) leak-proof walls and ceilings. Would you leave your television or VCR there all night? A computer usually costs much more and is, if anything, more sensitive to moisture than a VCR.

Professional observatories may have several computers in a dome. Those computers may be considerably more rugged than a personal computer, and designed to operate in damp, cold environments. The observatory domes are better built than most personal observatories, and give better protection from the elements. Also, many installations do not even try to house the computer "outside", but have a separate room that is heated in winter and dry at all times for the computer. The data collection devices or telescope controls are in the dome, connected to the computer by a wire through the wall to the computer room or by a telephone link. Nothing feels more luxurious, by the way, than to sit in a warm computer room on a cold clear night collecting data while an assistant in a bulky observing suits can be seen through a window working at the telescope.

What should be considered when designing a system to computerize data collection or processing? Ideally, protecting the computer system should not be the limiting factor on using the telescope. If a system is supposed to be portable, for example, it should be usable anywhere, not just within 30 feet of an electrical outlet, or within a printer-cable length of an open window. Compromises are often necessary to hold down the costs. A portable system could operate in a "reduced" mode when out in the field (not using a printer, or only collecting data, saving the processing for later), and a "full" mode otherwise.

The strategies for protecting the computer are: Do it later, do it somewhere else, or do it there, where "it" is the computer processing. These strategies are not all equally available. After all, if the computer is being used to control the telescope, the processing cannot be done later. Even doing it somewhere else than beside the telescope may not be practical. Also, the great advantage of the new observing techniques and the computer processing is the immediate information on whether or not the observation has been successful, which also means that at least some processing is done as the data are taken or soon after, and that the processing is most convenient done at or near the telescope.

Processing the data later may be the least expensive option if the data collection can be done on some auxiliary unit and stored for later processing. The optimum would be an arrangement where the data collection uses equipment that is easier to protect from the elements than the whole computer. If, however, the data collection basically requires a second computer (or the same computer used twice, this may be more of a nuisance than a help.

Communications between the computer and the telescope can be over a wire, so that the computer is well protected, perhaps never needing to be moved, while it controls the telescope and/or collects and processes data. Unless you are very very certain of your program and observing environment, it is probably best to arrange to be able to see the telescope from the computer, or to have two observers, one at the computer and the other at the telescope. The computer can be inside the house, or, if you want more portability, set up inside a car. A van or station wagon with a flat floor would be more convenient than the back seat of a passenger car.

Putting the computer beside the telescope is the easiest design, as long as the computer does not need much protection. Some personal computers are designed to be rugged, to be used in adverse environments. Most personal computers, and certainly the less expensive ones, are not rugged. Advertising campaigns

may show portable computers being used on beaches or at pool-side, but they may come with statements from the manufacturer on their being used indoors only, or with operating temperature and humidity limits that do not include the ranges we find when observing. The computer can also be protected by being placed in a heated, dry box or other observing shelter. The smaller the computer, the easier this will be. A notebook-sized portable would fit nicely within a Styrofoam ice chest, with a light bulb used to provide warmth and control the humidity. Computer travel cases, which typically close one to several hundred dollars, also can be used to protect the computer the same way.

A different design would be to communicate to the computer via modem. This requires two

computers, one at each end of the communication link. This does not necessarily mean the observer must actually have two computers, only use them. The second computer can be a service like CompuServe or a bulletin board. Also, the phone link at the telescope can be via cellular phone, and give complete portability anywhere in the USA where cellular service is offered. While I have yet to try this to see how well it really works, portable cellular phones can be used with an accessory that plugs into a modem, and the presumption is that, once the second modem is contacted, communication should be possible.

P.S. William David Dunham was born January 9, 5:14PM... our congratulations to the parents!

Astro Provides New Findings in Cosmology

In December, the space shuttle Columbia carried into orbit the Astro observatory complex. Although the nine-day mission was plagued by problems, some interesting data was obtained from several instruments important to cosmologists.

The Wisconsin Ultraviolet Polarimeter Experiment (WUPPE) provided new details regarding the composition of matter in interstellar space. The experiment found three major components in this dust: graphite particles; elongated silicate particles made ferromagnetic with iron impurities; and other small non-magnetic particles. The results indicate that iron is much more widely distributed in interstellar space than had been previously thought; and indicates that much of interstellar dust may be aligned with the galactic magnetic field. These magnetically aligned particles in space may polarize radiation as it passes through this dust.

The Hopkins Ultraviolet Telescope (HUT) was used in an experiment to detect tau neutrinos,

Dick Byrd

believed by some to be so pervasive a particle in interstellar and intergalactic space that they could provide the "missing mass" or "dark matter" which would be required to close the universe. If the mass of the universe is above a critical value, then the expansion of space since the big bang will eventually reverse and begin a contracting phase ending in the big crunch. However, direct observations of the mass of the universe so far have not detected sufficient mass to reverse the present expansion.

It was theorized that the tau neutrinos left over from the big bang eventually decay, giving off a tracer in the form of a photon with energy in the ultraviolet range. The HUT searched the Abell 665 cluster of galaxies for the characteristic UV energy indicating tau neutrino decay. However, the results of the experiment did not find the expected photons. This does not establish that tau neutrinos could not be present in large numbers, but it does seem to exclude the theorized decay rate of this particle.

Air and Space Museum - February Programs

Daily - The new IMAX film, *Blue Planet* joins *The Dream is Alive* in the Langley Theater. The new film is a dynamic portrait of the earth and its environs taken from space. Admission is \$2.75 for adults and \$1.25 for children and senior citizens.

Naval Observatory and NASA Goddard Programs

The international crisis has created the need for increased security at these facilities and possibly restricted access. For information call:

NASA Goddard Tracy Clegin at 301-286-4403 for clearance and details.

Naval Observatory Lt. Barbara Swerdowski at 202-653-1555 concerning access to the 5" scope.

National Capital Astronomers, Inc.

is a non-profit, public-service corporation for advancement of the astronomical sciences and is the astronomy affiliate of the Washington Academy of Sciences. For information, call NCA: (301) 320-3621.

SERVICES AND ACTIVITIES:

A Forum for dissemination of the status and results of current work by scientists at the horizons of their fields is provided through the monthly NCA colloquia. (See monthly *Stardust* for time and location.) All interested persons are welcome; there is no charge.

Expeditions frequently go to many parts of the world to acquire observational data from occultations and eclipses which contribute significantly to refinement of orbital parameters, the coordinate system, navigation tables and timekeeping. Other results of this work under continuing study include the discovery of apparent satellites of some asteroids, discovery of apparent small variations in the solar radius, and profiles of asteroids.

Discussion Groups provide opportunities for participants to exchange information, ideas, and questions on preselected topics, moderated by a member or guest expert.

Publications received by members include *Sky & Telescope* magazine and the monthly publication of NCA, *Stardust*.

The NCA Public Information Service answers many astronomy-related questions, provides predictions of the paths and times of eclipses and occultations, schedules of expeditions and resulting data, assistance in developing programs, and locating references.

The Telescope Selection, Use, and Care Seminar, held annually in November, offers the public guidance for those contemplating the acquisition of a first telescope, and dispels the many common misconceptions which often leads to disappointment.

Working Groups support areas such as computer science and software, photographic materials and techniques, instrumentation, and others.

Telescope-Making Classes teach the student to grind and polish, by hand, the precise optical surface that becomes the heart of a fine astronomical telescope.

NCA Travel offers occasional tours, local and world-wide, to observatories, laboratories, and other points of interest. NCA sponsored tours for comet Halley to many parts of the southern hemisphere.

Discounts are available to members on many publications and other astronomical items.

Public Programs are offered jointly with the National Park Service, the Smithsonian Institution, the U.S. Naval Observatory, and others.

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Note: If you already subscribe to *Sky & Telescope*, please attach a recent mail label, or indicate the expiration date: _____. A prorated adjustment will be made. Make check payable to

National Capital Astronomers, Inc., and send with this form to:
Nancy Byrd, Secretary, 4215 Holborn Ave., Annandale, VA. 22003.

The following information is optional. Please indicate briefly any special interests, skills, vocation, education, experience, or other qualifications which you might contribute to NCA

Thank you, and welcome!

Classified Announcements

A class will be taught on Celestial Navigation by George Lear at West Land School in Bethesda Md. The class will meet 12 times over the ten week period beginning February 11, 1991 between 7:30 and 9:30 Cost \$239.

Back issues of Astronomy (1/77-10/79), Popular Astronomy ('75-76), Star and Sky (1/79-7/79) and some Sky and Telescope can be obtained from Kathy Mathias 703-931-8241.

Stardust is published eleven times yearly by National Capital Astronomers, Inc. (NCA), a non-profit, public-service corporation for advancement of astronomy and related sciences through lectures, expeditions, discussion groups, conferences, tours, classes, public programs, and publications. NCA is an affiliate of the Washington Academy of Sciences. President Kenneth R. Short. Deadline for *Stardust* is the 15th of the preceding month. Information: Nancy Byrd, 4215 Holborn Ave. Annandale, VA 22003. Editors, Therese & Brady Byrd (703)237-0369

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FIRST CLASS

