



KUNDU TO PRESENT VLA OBSERVATIONS OF THE SUN



DR. KUNDU

Dr. Mukul R. Kundu, Director of the Astronomy Program, University of Maryland, will address the March meeting of National Capital Astronomers on recent advances in solar radio physics made through the use of the Very Large Array (VLA). The spatial location of microwave-burst-emitting sources in a flaring loop will be discussed. The magnetic field topology in flaring regions from the VLA intensity and polarization maps, and their use in testing of flare models will be presented. The ring structures in sunspot-associated microwave-active regions and their interpretations from combined radio and X-ray data will be presented. Finally, time permitting, Kundu will give an account of the present status of the Clark Lake Radio Observatory of the University of Maryland, with particular reference to solar research.

Born in Calcutta, India, Mukul R. Kundu received the B.Sc. in Physics with First Class Honors from the University of Calcutta, the M.Sc. in Radiophysics, First Class, from Calcutta, and in 1957 the D.Sc. in Radioastronomy from the University of Paris.

Dr. Kundu has extensive experience in higher education and research at the universities of Calcutta, Paris, Michigan, Cornell, and Maryland, the Observatoire de Paris, the National Physics Laboratory at New Delhi, the Tata Institute of Fundamental Research at Bombay, NASA Goddard Space Flight Center, the Max Planck Institute für Radioastronomie, and is currently Director of the Astronomy Program at the University of Maryland. He has contributed substantially to the science through hundreds of papers in refereed journals and scientific meetings, books, and active work in the major astronomical societies.

MARCH CALENDAR — *The public is welcome.*

- Friday, March 2, 9, 16, 23, 7:30 pm — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.
- Saturday, March 3, 6:15 pm — Dinner with the speaker at Blossom's Restaurant in The Pavillion at the Old Post Office Building, Pennsylvania Avenue and 12th Street, NW. Reservations unnecessary.
- Saturday, March 3, 8:15 pm — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Dr. Kundu will speak.
- Tuesday, March 6, 13, 20, 27, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.
- Friday, March 9, 23, 30, 8:00 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 960-9126.
- Saturday, March 17, 8:00 pm — Discussion group at the Department of Commerce, Conference Room D: Techniques and materials for solar eclipse photography, with Joe Macrie and the Working Group on Photographic Techniques and Materials. See page 27.

FEBRUARY LECTURE

Dr. Gart Westerhout, Scientific Director, U. S. Naval Observatory, addressed the joint meeting of National Capital Astronomers and the Washington Academy of Sciences on February 4. He spoke on new techniques for measurement of star and planet positions (astrometry), and on the implications of the expected further improvements in accuracy.

The new techniques appear to make possible a tenfold improvement in accuracy, reducing errors to approximately 1 milliarcsecond (mas). This is the angular size of a quarter in San Francisco viewed from Washington, DC. Large stars having a diameter of about 100 million miles subtend an angle of 1 mas at a distance of 3,000 light years (ly).

The parallax of a star is the angle subtended by the radius of the Earth's orbit at the star's distance. At 3.26 ly distance the radius of the Earth's orbit subtends 1.00 arcsecond (as). Since the angle is inversely proportional to the distance of the star, the parallaxes of stars 293 and 359 ly away are 0.11 and .009 as. Thus, when parallaxes can be measured with an accuracy of 1 mas, the distance to a star 326 ly away can be determined to within 10 percent.

The mass of Jupiter is .001 that of the Sun, and the radius of Jupiter's orbit is 5 times that of the Earth's. The center of mass (barycenter) of the solar system is therefore shifted .005 times the radius of the Earth's orbit by Jupiter. Due to the gravitational attractions of all the planets, an observer 3 ly away from the solar system would see the Sun follow a complicated path, deviating about 5 mas from a uniform straight-line motion. In the same way, the ability to measure star positions to 1 mas accuracy should make possible the detection of other planetary systems.

The lunar laser-ranging technique, discussed in the January lecture, measures the distance from a point on the Earth to a point on the Moon with an accuracy of 10 cm. This allows the right ascension of the Moon to be determined to an accuracy of approximately 1 mas. Accuracies of 100 m in measurements of the distance of spacecraft orbiting other planets make it possible to determine planetary positions to within a few mas along their orbits.

Current technology used with the Naval Observatory's 61-inch astrometric reflector at the Flagstaff Station yields accuracies of 1 or 2 mas for the positions of 100,000 stars with respect to each other. Proper motions (motion perpendicular to the line of sight) of 2 mas per year are measured. These accuracies represent substantial recent progress. Charge-coupled devices (CCD), used in lieu of photographic plates, offer several advantages. A CCD is an integrated circuit containing a square array of thousands of semiconductor photodetectors and electronics to allow measurement of the light on each detector, thus, the light in each part of an image.) Photographic emulsion creep is eliminated. The CCD's sensitivity to the longer, infrared wavelengths means larger turbulence cells -- improved seeing. A 1-cm square CCD having an 800 x 800-element array has about a 10 x 10-element area within a star image. By measuring the light on each element, the computer can find the center of the star image with great precision. A typical exposure of 4 minutes corresponds to a photographic exposure of about 1.5 hours, with no need to process and measure plates.

The Wide-Field Camera and the Planetary Camera of the Space Telescope should measure star positions over small regions of the sky to within 1 mas. These observations will be made by CCDs in the focal planes of the cameras.

A satellite for precise measurement of star positions, HIPPARCOS (High Precision PARallax Collecting Satellite), is being constructed by the European Space Agency. This satellite has an optical system which simultaneously images two star fields in a plane perpendicular to the satellite's spin axis. For a set

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following grazing lunar occultations in March. For further information call Dave at 585-0989.

UT		Place	Vis	Pcnt	Cusp	Min
Date	Time		Mag	Sunlit	Angle	Aper
03-11-84	02:16	Falmouth, VA	5.3	53	0S	5 cm
03-11-84	04:40	Red Lion, PA	7.1	54	3N	5 cm
03-12-84	05:24	Centreville, VA	8.8	65	4N	20 cm
03-23-84	06:47	Claxton, GA	3.4	60	16S	5 cm
03-25-84	06:07	N. America	8.6		Saturn	20 cm
03-25-84	10:25	Burtonsville, MD	8.5	39	9S	10 cm

NCA WELCOMES NEW MEMBERS

Deborah Beck
5420 Rumsey Place
Fairfax, VA 22032

Donald C.R. Pepe
8130 Berwick Road
Upper Marlboro, MD 20772

Martin C. Cohen
12002 Dove Circle
Laurel, MD 20708

MARCH DISCUSSION GROUP ON ECLIPSE PHOTOGRAPHY

Nearly 30 persons attended the February discussion group on planning for the 30 May solar eclipse. In response to the great interest expressed in photographing the eclipse, the March discussion group will concentrate on techniques and materials for solar-eclipse photography. Joe Macrie, Chairman of the Working Group on Photographic Techniques and Materials, will moderate.

The discussion groups are intended for all levels. Bring your questions, answers, problems, solutions, or suggestions, or just listen and learn.

NASA GSFC COLLOQUIA SET

In March, the NASA Goddard Space Flight Center Scientific Colloquium series includes the following talks:

March 2, "Quasars and Colliding Galaxies," John B. Hutchings, Victoria, Canada; March 9, "Which Came First -- the Universe or the Laws of Physics?," Kenneth Brechner, Boston U. and GSFC; March 16, "Life, Milankovitch, and Climate," Michael McElroy, Harvard; March 23, "Cosmic Rays and Magnetic Shells," Leonard E. Burlaga, GSFC; March 30, "Environmental Chemistry," F. Sherwood Rowland, U. California, Irvine.

The colloquia are held at 3:30 pm in the Building 3 Auditorium. Follow the signs from the Beltway to the main gate (not the Visitor's Center) and check in with the guard.

of stars in the two fields, HIPPARCOS measures the angles between planes containing the spin axis and a star. By a computer analysis of these observations during the 3-year life of HIPPARCOS, it is expected that star positions and parallaxes can be measured over the entire sky with an accuracy of 1 mas.

Looking to the future, Westerhout cited plans for development of new satellite instruments. One of these comprises two crossed optical interferometers which will measure two stars in two directions simultaneously, with an expected accuracy of 10 microarcseconds! With this accuracy, he pointed out, planets the size of the Earth around 10th-magnitude stars could be detected with a 20-minute exposure.

"A vision on the horizon for the year 2010." It will then be possible to study fundamentally different quantities of the Universe.

Peter Kammeyer

EXCERPTS FROM THE IAU CIRCULARS

1. January -- Minor planet 1984 AB, recently discovered by E. Helin at Palomar, appears to have an orbit similar to that of Mars. The orbit's mean distance from the Sun is 1.53 AU, its eccentricity is 0.086, and its inclination is 12 degrees. (The corresponding data for Mars are, 1.525, 0.093, and 1.8.) The elements are somewhat uncertain, having been based on an arc of only 4 days.

2. January 24 -- Michael Clark, Mount John Observatory, discovered a comet of 12th magnitude on Harvard Patrol plates taken on January 8 and 24. He reported comet 1984b to be moving southeastward in Fornax, diffuse and with a short tail. However, he failed to confirm the comet on a January 27 plate taken at Mount John.

3. February -- S. J. O'Meara reported determining rotation periods for Uranus of 16.0 to 16.4 hours from observations of cloud features. The observations were made in 1981 with the 23-cm refractor at Harvard College Observatory. A cloud marking the north pole of Uranus was also observed.

R.N. Bolster

FOR SALE -- Swift binoculars with Velban tripod. Alan Boldt, H: (703) 860-0913 (Fauquier County), O: (202) 756-1240 (DC).

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