



## SOLAR RADIO ASTRONOMY — A SURVEY



DR. M. R. KUNDU

Dr. M. R. Kundu, professor of astronomy at the University of Maryland, will assess the current state of solar radio astronomy at the April 7 meeting of National Capital Astronomers.

The radio emission from the sun has three distinct components, originating from the quiet sun, from bright regions, and from solar flares. These different kinds of emission will be discussed in terms of the contribution made by radio astronomy toward understanding the physics of the sun's atmosphere and interplanetary space.

M. R. Kundu holds degrees from the University of Calcutta, and received the Doctor ès Sciences degree from the University of Paris in 1957. Before coming to the University of Maryland, he was affiliated with the National Physical Laboratory, New Delhi; Paris

Observatory; the University of Michigan Radio Astronomy Observatory; and the Cornell University Department of Astronomy. Our speaker authored *Solar Radio Astronomy* (1965), probably the leading textbook in this field, and publishes frequently in the *Astrophysical Journal* and other journals.

### APRIL CALENDAR

Monday, April 2, 9, 16, 23, 30, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, April 6, 13, 20, 27, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, April 7 — Prince Georges County Science Fair, Cole Field House, University of Maryland, College Park.

Saturday, April 7 — District of Columbia Science Fair, Woodrow Wilson High School Armory.

Saturday, April 7, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. No reservations necessary.

Saturday, April 7, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th Street and Constitution Avenue, NW. Dr. M. R. Kundu will speak. The nominating committee will present a slate of officers for the May election.

Goddard Space Flight Center Scientific Colloquia — Fridays at 4:00 PM in the auditorium of Building 3.

April 6 — Urban Redevelopment

April 13 — Barium Release in the Magnetosphere

April 27 — The Birth of Stars (Bart J. Bok)

**MARCH LECTURE**

Dr. Frank Kerr, professor of astronomy at the University of Maryland, spoke about the Magellanic Clouds at the March 3 meeting of NCA. Our speaker noted that the revolution in modern astronomy, begun by the discovery of quasars and pulsars and the developments in radio astronomy and image-tube electronics is actually a continuation of the astronomical revolution begun by Copernicus, whose 500th birthday we celebrate this year.

The Magellanic Clouds, the two galaxies nearest to our own, were named for Ferdinand Magellan, the first Northern Hemisphere resident to record them. It is believed that, if seen edge-on, the larger cloud would resemble NGC 55. It covers 139 minutes of arc as seen by the Parkes Observatory 210-foot radio telescope in Australia. The Magellanic Clouds are considerably smaller than the Milky Way, respective masses being  $1 \times 10^9$ ,  $5 \times 10^9$ , and  $1 \times 10^{11}$  solar masses. The clouds are classified as class I irregular galaxies. The larger one has a radial velocity of 270 km/sec, the smaller, 150 km/sec, both away from the earth. The clouds are so far away that it would require 1,000 years of observations to determine proper motions using current techniques.

Since the days of William Herschel, optical, and later, radio searches have sought a bridge of material between the Milky Way and the large cloud. None has been found. Because young and old globular clusters are found in the Magellanic Clouds, we believe these galaxies are not young, but that evolution has been very slow. Five percent of the Milky Way mass is composed of gas and dust, compared to 30 percent of the clouds. Large numbers of Cepheid variables there make them valuable for distance calibrations.

In the long question period following Dr. Kerr's talk, he noted that the distributions of  $H_\alpha$  and neutral hydrogen emissions in the clouds are similar. This is due to the circumstance that neutral hydrogen concentrations are favored for star formation, which then produces the ionized  $H_\alpha$ .

**NCA CONSTITUTION AMENDED**

During February, members voted by mail to reduce the quorum required for a business meeting to 15 percent of the membership. The ballots were counted at the March 3 meeting by Estelle Finkle and Robert Bolster acting as tellers.

The vote was 86 to 3 in favor of reducing the quorum, with 44 percent of the membership voting. The constitution was so amended.

**NEW MEMBERS WELCOMED**

Bruce D. Boyce  
13602 Kerrydale Road  
Woodbridge, Virginia 22191

Dana A. Browne, 131 Watson  
Sta. #2, Univ. of Virginia  
Charlottesville, Virginia 22905

Judy Cooper  
9921 Sorrel Avenue  
Potomac, Maryland 20854

Pauline Le Marie  
1515 - 32nd Street, NW  
Washington, D. C. 20007

Robert J. Veenstra, Jr.  
141 Park Avenue  
Herndon, Virginia 22070

Laura Walton  
6853 Strata Street  
McLean, Virginia 22101

John Whalan  
6203 Lakeview Drive  
Bailey's Crossroads, Va. 22041

Jack E. & Ida Worden  
2428 L'Enfant Square, SE  
Washington, D. C. 20020

## A NEW SOLAR PROMINENCE TELESCOPE

There are three techniques for observing the bright condensations (prominences) in the solar corona in the isolated light of a solar spectral line: direct spectroscopy, the use of birefringence, and the use of interference. The development during the 1960's of low-cost methods of making narrow band, multilayer thin-film interference filters has rapidly increased the number of telescopes designed to observe the sun in  $H_{\alpha}$ , the most intense visible spectral line.

At Springfield, Virginia, Wolfgang Schubert demonstrated an attachment he has built for reflectors or refractors, using a  $3.5\text{\AA}$  halfband-width interference filter that permits clear  $H_{\alpha}$  views of prominences at the limb of the occulted sun. It is the first known  $H_{\alpha}$  telescope built by an NCA member.



*Schubert observes solar prominences.*

A number of companies produce suitable filters for less than \$100.00. Schubert's came from Spectro-Film, Inc., 261 Swanton Street, Winchester, Massachusetts 01890.

Schubert's instrument is about 15 inches long and made of balsa wood. It clamps to his  $4\frac{1}{2}$ -inch folded-optics refractor such that a plaster cone at the primary focus occults the solar disc. Other lenses relay the image through the  $H_{\alpha}$  filter into the eyepiece drawtube.

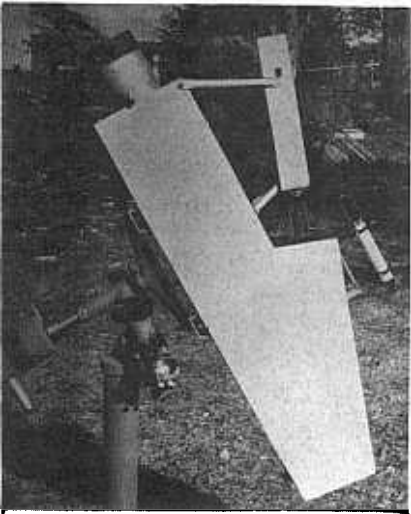
When the sun was observed on February 24 by Schubert, Winkler, Gant, and McCracken, four prominences were visible, including a large hedgerow similar to that seen at the March 1970 total solar eclipse.

*Wolfgang Schubert's hydrogen-alpha solar prominence telescope*

We were particularly interested to note that 1. This instrument can be attached to an existing astronomical telescope and easily removed. 2. The sun can be moved out from behind the occulting disc for a considerable portion of its radius before the prominence image disappears in scattered light. 3. The optical configuration used with the  $H_{\alpha}$  filter is not extremely critical to satisfactory image quality for viewing.

## NOTE ON CURRENT RESEARCH

Saturn's rings may consist of rough chunks, rather than gas, ice, or dust, as is widely believed, according to the first successful radar probing of the planet. Richard M. Goldstein and George A. Morris, Jr., of Caltech's Jet Propulsion Laboratory say that no radar echoes were detected from the planet itself, which therefore may be gaseous. But Saturn's rings, which turned out to be good radar reflectors, are apparently made of rough solids 1 meter in diameter or larger. *Chemical and Engineering News*, March 12, 1973.



### ABSTRACTS FROM THE IAU CIRCULARS

1. February 13 - 26 — Five new pulsars, all close to the galactic plane, were detected with the Parkes Observatory 64-m telescope.
2. February 28 — The elements of Comet Gehrels (1973d), derived by Brian G. Marsden, indicate that it is identical with P/Swift 1 (1889 VI). See this column in March *Star Dust*.
3. February 28 — Dr. L. Kohoutek, Hamburg Observatory, Bergendorf, Germany, discovered Comet Kohoutek (1973e). About 14th magnitude, it was near Delta Leonis moving northwestward.
4. March 6 — C. T. Kowal, Palomar Mountain Observatory, discovered a fast-moving asteroidal object in Ursa Major with the 48-inch Schmidt.

This listing courtesy Bob Bolster.

### FOR SALE

Schmidt-Cassegrain telescope, 5.75-inch aperture,  $f/11$ , with optics figured professionally, Edmund heavy-duty equatorial mount, drive, Jaeger three-toed pier, Astrola finder, Edmund inverter, camera adapter, three eyepieces and turret. \$375.00 plus freight takes all. Alan Gottlieb, PO Box 1030, Stetson University, Deland, Florida 32720. Telephone 904-734-6773.

### PROGRESS

Long photographic exposures on faint objects are reduced many hours for the modern astronomer by chilled film. In the past, long exposures have been reduced probably even more effectively by chilled observers, Bolster notes.

**S T A R D U S T**



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