☆ STAR DUST

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SHULMAN TO DEMONSTRATE OPTICAL PROCESSING

ARNOLD R. SHULMAN

Mr. Arnold R. Shulman of Recognition Equipment Inc, Dallas, Texas, will again speak to National Capital Astronomers at the March 7 meeting. He will review the concepts of coherent optical processing he presented in his April 1976 talk, highlighting with demonstrations and slides.

This will be an important presentation for both astronomers and photographers as well as others concerned with optical data processing.

After reviewing *coherent* processing techniques Mr. Shulman will introduce *incoherent* optical data processing techniques. Discussing the problems associated with recording images on photographic film, he will show unusual techniques for salvaging improperly exposed or processed film, for extending the dynamic range of conventional film, and for using black and white film for storing color images.

Mr. Shulman will conclude by showing how photographic images can be correlated or convolved using incoherent optics instead of the usual coherent techniques.

Mr. Shulman holds an M.S.E.E. degree from Newark College of Engineering and is the author of the book *Optical Data Processing*, published by John Wiley. Prior to coming to Recognition Equipment Inc., he taught coherent optics at a graduate level at George Washington University, and retired from NASA Goddard Space Flight Center in 1976.

MARCH CALENDAR — *The public is welcome.*

Tuesday, March 3, 10, 17, 24, 31, 7:30 PM — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

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

*Friday, March 6, 13, 27, 8:00 PM — Observing with the NCA 14-inch telescope 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 7, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, March 7, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Arnold Shulman speaks.

*Pending Mr. Schnall's recovery from recent surgery. Call to confirm.

FEBRUARY LECTURE

Dr. Mario Acuna, NASA Goddard Space Flight Center, summarized the Pioneer and Voyager Saturn data at the February 7 meeting of National Capital Astronomers.

Both missions used Jupiter as a gravitational catapult to provide the additional energy necessary to reach Saturn. Dr. Acuna calculated that this "gravitational refueling" (Ed.) cost Jupiter a reduction in orbital velocity of about 0.2Å per century!

Extensive data were obtained on atmospheres, compositions, structures, meteorology, heat balance, trapped radiation, magnetic fields, magnetospheres, energetic particles, satellite masses and sizes, interplanetary medium, solar wind, cosmic rays, and many images. Voyager 2 will continue beyond Saturn to Uranus (1986) and probably to Neptune (1990).

Pioneers 10 and 11, the first probes of the outer solar system, which served as pathfinders for the Voyager mission, themselves made substantial contributions and provided a basis for design of the Voyager experiments — measurements of plasma, magnetic fields, ultraviolet, infrared, and charged particles, photopolarimetry, and planetary radioastronomy.

Pioneer 11 approached to within 1.36 radii of Saturn in a trajectory plane within 6° of Saturn's equator. While Pioneer confirmed the existence of Saturn's magnetic field, it found it to be only 0.2 Gauss, not the 1 Gauss predicted by the planetary-dynamo theory from the angular momentum. it also found the field axis in apparent coincidence with the spin axis — an impossible condition for a self-sustaining field. The approximately 40° inclination of Voyager's approach to 3.3 Saturn radii allowed a quite accurate measurement of the field axis, found to be only 0.7° from the spin axis, which may account for the low flux density. The field is very symmetrical, having a near-dipole pattern. These measurements indicate that the field-generating convection is quite close to the center of the planet.

Voyager found Saturn's atmospheric pattern to be very different from that of Jupiter. A strong equatorial flow diminishes gradually toward the poles, with some small-scale convection features at about 40° to 60° north.

Voyager imaging resolved several hundred rings, and found the ring system to be eccentric. The period of rotation of the radial features observed in the B-ring seems to be that determined by the magnetic field for charged particles, which is very nearly but not quite Keplerian. It is speculated that electrostatic levitation of extremely small particles above the ring plane accounts for the changes in the reflective or scattering properties of the ring to produce the effect. Apparently some resonance exists between the magnetic and Keplerian periods.

Strong radio emissions with which the rotation period of Saturn was earlier determined seem to arise from discrete sources on the planet. The radiation pattern seems inconsistent with the symmetry of the magnetic field. It seems doubtful that the slight angle between the magnetic and rotational axes is sufficient to explain it.

Extending from 8 to about 16 Saturn radii is a current sheet of about one-tenth the intensity of that of Jupiter. It streches the magnetic field lines and adds to the effect of the solar wind in forming the magnetic tail. The magnetic tails of both Jupiter and Saturn are closer to the planets than was expected, perhaps because of the rapid rotation of both planets.

Acuna showed several short films including previous computer-generated expectations of the missions, and actual time-lapse films made on approach.

Several satellites were filmed and several unknown ones were discovered.

In orbiting Saturn, Titan transits the magnetopause. Its fortunate position within the magnetosphere at the time of Voyager's approach allowed close study of its interaction with the magnetosphere. Titan shows no evidence of an intrin-

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 Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
03-02-81	10:40	Columbia, MD	7.8	18	10S	5 cm
03-08-81	23:31	Atsion, NJ	7.7	9	9S	10 cm
03-09-81	23:10	Wstprt, NY, & ME	4.3	17	8S	5 cm
03-15-81	05:33	Hightstown, NJ	7.1	72	4N	10 cm
03-29-81	14:36	Havre de Grace, MD	3.0	44	-7N	5 cm

NEW MEMBERS WELCOMED

Francis R. Baffa, Jr.
2110 Pierce Street, Apt. 5
Arlington, VA 22209

Andrew D. Boatner
2343 S. Nash Street
Arlington, VA 22202

Stanley G. Cawelti
11621 Chapel Road
Clifton, VA 22024

Robert O. Groover
706 N. Highland Street
Arlington, VA 22201

Peter M. Holland
Box 1161
Leesburg, VA 22075

Harry Oliver
9944 Longford Court
Vienna, VA 22180

Paul Eugene Tangren
5821 Fisher Road, Apt 102
Temple Hills, MD 20031

Edward Uttridge
11835 Green Valley Road
Union Bridge, MD 21791

Blanch L. Windham
4400 East-West Hy, Apt 1003
Bethesda, MD 20014

Mr. & Mrs. Edw. A. Zentgraf
9100 Le Velle Drive
Chevy Chase, MD 20015

ASSISTANCE ASKED FOR FAIRFAX COUNTY PARKS PROGRAM

The Fairfax County Park Authority holds occasional public programs for which volunteers with telescopes will be appreciated. The next program will be held on Friday, 27 March at 7:30 PM, at Huntley Meadows Park. For further information call John Lohman at 820-4194

SCIENCE FAIR AWARDS SOON

Those who will be judging the metropolitan area science fairs for the annual NCA awards are asked to contact John Lohman, 820-4294.

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sic magnetic field; an upper limit of 30 gammas has been set. It has, however, a dense atmosphere from which ions are swept by Saturn's rapidly rotating field, moving across Titan at about 200 km per second. Titan thus shows an induced magnetic tail, but no bowshock. This may explain the ionized trail observed all around Titan's orbit, which otherwise may be caused by some phenomenon associated with the moving magnetopause. Very rapid changes in flux density were observed near Titan which were interpreted as current sheets delineating the boundaries of Titan's induced magnetotail. However, attempts to compute vectors normal to the current sheets by minimum variance analysis gave inconsistent results. The boundary dynamics introduce serious problems for interpretation of the observations, and for distinguishing between temporal and spatial effects.

Much has been learned and many new questions have been raised. Those which cannot be answered by further reductions and analyses of the data will provide valuable guides to the design of future probes. rhm

EXCERPTS FROM THE IAU CIRCULARS

1. January 12 — K. Matilla and M. Toriseva, University of Helsinki Observatory, found that the 2.22-GHz H_2O line emission of U Orionis has brightened by a factor of about 15 since 1978.

2. January 13 — Several observers reported that Comet Bradfield (1981t) underwent an outburst, brightening from about magnitude 5.5 to 4.5.

3. January 18 — David Branchett, Eastleigh, Hampshire, Great Britain, discovered a probable nova of 8th magnitude in Scutum. Although the Royal Greenwich Observatory confirmed the presence of an object not on the Palomar Sky Survey, other observations have failed to confirm the finding.

4. January 20 — O'Meara, Cambridge, Massachusetts, and Bortle, Stormville, New York, reported that the nucleus of Comet Bradfield had split. A secondary nucleus was seen 2".5 from the primary along the spine of the tail. Two other condensations were also seen northwest and southeast of the primary nucleus.

NAVAL OBSERVATORY COLLOQUIUM SCHEDULED

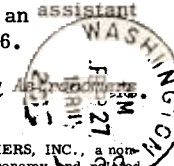
Dr. Kenneth J. Johnson of the Naval Research Laboratory will speak on Proper Motions of the Radio Jets of SS 433 at the 5 March Naval Observatory colloquium. These colloquia are held on alternate Thursdays at 3:00 PM in Building 52, Room 300. Coffee and tea are served in the foyer at 2:40. Enter at the 34th Street and Massachusetts Avenue gate, where the guard will require some form of identification and will provide directions. Call the Scientific Director's office, 254-4540 for further information.

SMITHSONIAN OFFERS SYMPOSIUM

The National Air and Space Museum will sponsor a free public symposium on Perspectives in the History of the Space Sciences on March 23 and 24th. The sessions will start at 9:00 AM and end at 4:30 PM, with lunch from 12:00 to 1:30. Speakers will include some of the most widely recognized scientists and historians. A collection of essays based on the lectures will be published.

HELP WANTED

An Arlington, Virginia telescope sales and service shop seeks an assistant Call Mr. Redlich at 527-5151 weekdays 10 to 6, Saturdays 10 to 6.



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