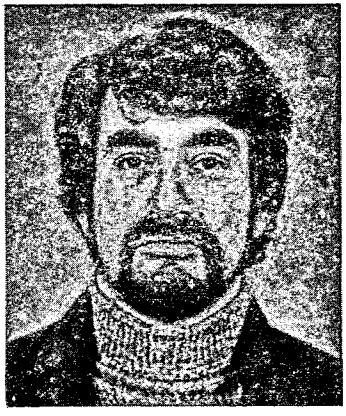
★ STAR DUST

Volume XXXVI December 1979 Number 4

# HOLT TO PRESENT RECENT HEAO-2 RESULTS



DR. HOLT

Dr. Stephen S. Holt, NASA astrophysicist, will address the December 1 meeting of National Capital Astronomers on results from the High-Energy Astronomical Observatory-2 (HEAO-2), the Einstein Observatory.

Dr. Holt will present data from the imaging and spectroscopy experiments on the Einstein Observatory, the first satellite-borne imaging X-ray telescope devoted to extra-solar astronomy. The unique capabilities of the observatory will be illustrated with data from a wide variety of astrophysical contexts: stars, supernova remnants, nearby galaxies, clusters of galaxies, and active galactic nuclei at cosmological distances.

Stephen S. Holt received his B.S. in 1961 and his Ph.D. in physics in 1966 from New York University. Before coming to Goddard Space Flight Center he was a researcher, instructor, and lecturer at NYU and the University of Maryland. Dr. Holt has been associated with numerous NASA satellite and rocket programs as project scientist, investigator, and study scientist, and as a member of numerous committees and working groups.

Dr. Holt was the recipient of the NASA Medal for Exceptional Scientific Achievement in 1977. He is a member of the American Astronomical Society.

DECEMBER CALENDAR — *The public is welcome.*

Saturday, December 1, 6:15 PM — Dinner with the speaker at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, December 1, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E streets, NW. Dr. Holt will speak.

Tuesday, December 4, 11, 18, 7:30 PM — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, December 7, 14, 21, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Friday, December 7, 14, 21, 28, 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, 960-9126.

## NOVEMBER LECTURE

Dr. Ronald P. Lepping of Goddard Space Flight Center presented recent data comparing planetary magnetospheres at the November 3 meeting of National Capital Astronomers.

Dr. Lepping began with a brief explanation of the magnetosphere concept and related terminology, showing the three inner planets, Mercury, Venus, and Earth, for illustration purposes.

The region where the plasma pressure of the solar wind is balanced by the magnetic pressure of the planetary magnetic field is the *magnetopause*. In the case of the planet Mercury a weak magnetic field was discovered by the Mariner 10 spacecraft. Because of the weakness of the field and the high intensity of the solar wind at Mercury's orbital distance, the magnetopause may at times be driven all the way to the planet's surface. Venus, in comparison, does not have a magnetic field and therefore cannot have a true magnetosphere. There is, however, evidence of dynamic interaction of the solar wind with the ionosphere of Venus, which creates a *pseudo*magnetosphere with a *pseudo*magnetopause at the level of Venus' extreme upper atmosphere. The Earth's magnetosphere is noteworthy for its well-defined magnetopause and the Van Allen radiation belts within the magnetospheric cavity. The belts are composed of energetic charged particles captured from the solar wind and contained by closed field lines of the Earth's magnetic dipole.

Recent spacecraft data and related studies of Jupiter's magnetosphere reveal it to be the largest astrophysical entity in the solar system, extending some 5-million km in radius. In contrast to the Earth's magnetosphere, that of Jupiter contains a very hot trapped plasma which appears to play a key role in counterbalancing the solar wind pressure. Jupiter's magnetopause can apparently adapt very quickly over large distances to changes in solar wind intensity.

The near-surface magnetic fields of Jupiter have been found to be intense and highly distorted. As a result, the auroral zones at the planet's polar regions are calculated to be relatively small and asymmetrical. The calculated northern auroral zone contains neither the magnetic nor the rotational axis.

The relative motion between the rotating trapped plasma and Jupiter's inner Galilean satellite, Io, causes the induction of currents approaching 5-million Amperes within the Io *flux tube*. This current strength corresponds to an energy dissipation of about 10 Watts at the surface of Io. Dr. Lepping indicated that this mechanism may cause or at least contribute to Io's high internal heat and associated volcanic activity. The magnitude of energy involved is comparable to that generated by the Io-Europa-Jupiter tidal friction hypothesis advanced by other investigators.

Knowledge of the Saturnian magnetic environment was advanced greatly by the recent Pioneer-Saturn spacecraft flyby. Saturn has a somewhat weaker magnetic field than had been anticipated with a magnetosphere of only about one-fifth the diameter of Jupiter's. Notable was the nearly complete absorption of energetic particles by Saturn's rings where they intersect the magnetic field lines. A faint new ring has been inferred from a measured drop in particle intensity at approximately 10 radii from the planet. Saturn's magnetopause lies very close to the orbit of its large satellite, Titan, and may interfere somewhat with magnetometer studies of Titan by the two Voyager spacecraft scheduled to arrive in 1980 and 1981.

Dr. Lepping concluded by showing some Voyager spacecraft imagery of Jupiter, its five inner satellites, and ring. jkc

## OCCULTATION EXPEDITIONS PLANNED

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

| UT Date | UT Time | Place | Vis Mag | Pcnt Sunlit | Cusp Angle | Min Aper |
|---|---|---|---|---|---|---|
| 12-07-79 | 04:36 | Silver Spring, MD | 8.4 | 87 | 12N | 20 cm |
| 12-10-79 | 08:10 | Hightstown, NJ | 5.9 | 61 | .2N | 10 cm |
| 12-11-79 | 08:10 | Venezuela, SA | 6.8 | Asteroidal occultation* | | 5 cm |
| 12-23-79 | 23:36 | Richmond, VA | 7.2 | 25 | 5S | 5 cm |
| 12-30-79 | 21:23 | Chicago, IL | 1.1 | 93 | 3N | 5 cm |

* Occultation by the asteroid 9 Metis. Local observations are desired for the detection of possible satellites. For details, contact Dr. Dunham before December 7 at 585-0989, or Wayne Warren at 474-0814.

## NCA WELCOMES NEW MEMBERS

Andy Ivers, Box 214
Leonard Hall, American Univ.
Washington, DC 20016

John D. Schwartz
801 Fairlawn, Apt #4
Laurel, MD 20810

Thomas Gronsky
9833 Meadowcroft Lane
Gaithersburg, MD 20760

Stephen Yeandle
11321 Kenilworth Avenue
Garrett Park, MD 20766

Joseph P. O'Dea
305 Aragona Drive
Oxon Hill, MD 20022

## MEMBERSHIP INFORMATION

NCA membership applications, dues, address changes, and related questions should be addressed to Ms. Frances Trexler, Secretary, National Capital Astronomers, 5609 Ottawa Street, Oxon Hill, MD 20021, 839-3490.

Matters related to *Sky and Telescope* should be addressed to Dr. Robert M. Lynn, Treasurer, National Capital Astronomers, 7320 Baylor Avenue, College Park, MD 20740, 474-6715.

Matters related to *Star Dust* should be addressed to Robert H. McCracken, 5120 Newport Avenue, Bethesda, MD 20016, 229-8321.

## WANTED TO BUY OR BORROW

Questar for total solar eclipse trip to India, February 1980. Walter Nissen, 466-5000.

## EXCERPTS FROM THE IAU CIRCULARS

1. October 15 — Abraham, Opher, and Raffaelli, CRAAM-Observatorio Nacional, Rio de Janeiro, observed a giant outburst of Orion A in the 22-gHz water line.

2. October 25 — Gehrels, Van Allen, and the other Pioneer experimenters reported the discovery with Pioneer 11 of a Saturnian ring designated the F ring, with a width of 2,000 km and a radius 2.35 times that of Saturn. Several new gaps in the rings were observed, as was a satellite 2.53 radii from Saturn.

3. October 30 — C. E. Worley, U.S. Naval Observatory, reported resolving and measuring the binary star which is the brighter component of -Cygni with the 66-cm refractor. This confirmed spectral evidence and resolution by speckle interferometry by McAlister. rnb

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Published eleven times yearly for NATIONAL CAPITAL ASTRONOMERS, INCORPORATED, a non-profit, public-service organization promoting interest and education in astronomy and related sciences. President, Mary Ellen Simon. *STAR DUST*: Robert H. McCracken, 5120 Newport Avenue, Washington, DC 20016. Deadline: 15th of preceding month.