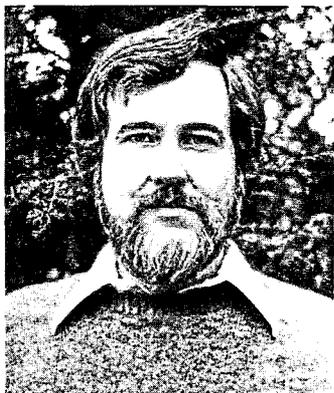




Bennett to Discuss Status of Ulysses Solar Polar Orbit Mission



DR. BENNETT

On December 6, Dr. Gary Bennett, Deputy Director, Division of Special Applications, U.S. Department of Energy, will speak to National Capital Astronomers on the out-of-ecliptic Ulysses mission to explore the heliosphere over the full range of solar latitudes.

Ulysses is a joint mission of the National Air and Space Administration (NASA) and the European Space Agency (ESA), to be launched by the Space Shuttle. A gravitational boost and redirection by Jupiter will provide the large energy required for a high-inclination solar orbit.

The mission will investigate, for the first time as a function of latitude, solar wind, heliospheric magnetic field, solar radio bursts, plasma waves, solar X-rays, solar and galactic cosmic rays, interstellar and interplanetary neutral gas and dust, and cosmic gamma-ray bursts, and will search for gravity waves. The status of the

mission and planned launch dates will be discussed.

Gary Bennett manages the Energy Department's radioisotope power source projects for space applications. He received a Ph.D. in physics and has worked for eleven years on space propulsion and power systems including those used on the Voyager spacecraft and to be used on the Ulysses and Galileo craft. Dr. Bennett has coauthored or contributed to over 40 papers on power systems and space exploration, and has authored a novel, *The Star Sailors*. He has been a member or advisor to the U.S. delegations to the Scientific and Technical Subcommittee and the Legal Subcommittee of the United Nations Committee on Peaceful Uses of Outer Space. He has received eight professional or governmental awards and citations, including an Energy Research and Development Administration Citation for his work on the Voyager power supplies.

DECEMBER CALENDAR — *The public is welcome.*

Monday, December 1, 8, 16, 22, 29, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, December 5, 12, 19, 26, 7:30 pm — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Friday, December 5, 12, 26, 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, December 6, 6:00 pm — Dinner with the speaker at the Smithsonian Restaurant, 6th and C streets, SW., inside the Holiday Inn. Reservations unnecessary. Use the 7th Street and Maryland Avenue exit of the L'Enfant Plaza Metro station.

Saturday, December 6, 8:15 pm — NCA monthly lecture in the Briefing Room of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. (Enter Independence Avenue side.) Dr. Bennett will speak.

There will be no discussion group in December.

NOVEMBER LECTURE

The November National Capital Astronomers lecture of the monthly series was given by Mark Trueblood in the Einstein Planetarium of the National Air and Space Museum. Mr. Trueblood is the Program Manager at Ford Aerospace Corporation for the contract to build the Hubble Space Telescope (HST) Operations Control Center at NASA's Goddard Spaceflight Center. He described the HST time-allocation policy which provides for others than astronomers to submit research proposals.

Mr. Trueblood began with an overview of the HST system. He described the telescope, its operation, its support systems, and the on-board instrumentation and capabilities that will be available.

The HST, which is planned to be orbited by the Space Shuttle *Atlantis* on 17 November 1988, will communicate with the Operations Control Center at Goddard through a Tracking Data Relay Satellite (TDRS) via a ground station at White Sands, New Mexico. The HST can be retrieved from orbit and returned to Earth for servicing; a plan is under consideration to refurbish the equipment periodically.

The system recently underwent tests in a thermal vacuum chamber at Lockheed, Sunnyvale, California, where it was accessed and operated satisfactorily from the Goddard ground system at Greenbelt.

The Director of the Space Telescope Science Institute has donated a small block of his discretionary time for the exclusive use of the telescope by non-professional observers. He invited a number of amateur societies to develop a plan for its use. An Amateur Astronomy Working Group (AAWG) was assembled to receive, evaluate, and select proposals from other than professional astronomers for this time.

The American Association of Variable Star Observers will provide an amateur proposal information packet for one dollar. A one-page essay on the proposed work is to be submitted to the appropriate society, depending upon the nature of the work. Upon notification of preliminary selection the applicant is to submit a detailed proposal. Three of these will be selected by each of the participating societies for review by the AAWG, which will make a final selection of a few.

Mr. Trueblood recounted some of the current problems in astronomy and discussed the ST's capability of addressing them: The size and age of the universe; whether it is open or closed; galactic dynamics; the missing-mass search; the search for extra-solar-system planets; how the solar system was formed; quasi-stellar objects.

The Space Telescope has four advantages over ground-based telescopes: 1. Diffraction limited spatial resolution will be about 0.2 arcsecond for the 2.4-m aperture in the absence of atmospheric turbulence. 2. The absence of atmospheric absorption will extend the limiting magnitude by about 5, perhaps to 29 or 30. 3. Spectral bandwidth will be extended from far ultraviolet to infrared. 4. Time resolution will be independent of atmospheric scintillation.

Science instruments on board are the Wide-Field Planetary Camera (WFPC), Faint-Object Camera (FOC), High-Resolution Spectrograph (HRS), Faint-Object Spectrograph (FOS), and High-Speed Photometer (HSP). The fine-guidance system (FGS) instruments can also be used for astrometric observations.

In the center of the focal plane, the WFPC, optimized for ultraviolet, uses only reflective optics. A pyramid splits the optical axis into 4 beams, each relayed into a cooled CCD. Eight CCD's are used, four in each mode, $f/13$ and $f/30$. The FOS has two slits, polarizers, spherical reflective gratings, and red- and blue-sensitive diode detectors. The HRS also uses reflective spherical gratings. The HSP has no moving parts; filters are mounted in separate apertures selected by aiming the telescope. Both image disectors and photomultipliers are used as detectors. The FOC also uses only reflective optics and selectable spectral filters. Two of the three FGS instruments are used at a time to track guide stars and signal the reaction wheels for pointing. FGS signals can also be used for astrometry to provide accurate separations.

The WFPC should reach about 23rd magnitude. It can be used for planets, nearby galaxies, other extended objects. With a photometric accuracy of about 1 percent, the WFPC can also help to address the age of the universe by indicating the approximate distances of galactic clusters by their relative brightnesses and distributions. The FOC can be used in three modes, $f/48$, $f/96$, $f/288$, for small solar system objects, distant galaxies, and to search for stars with companions about 7 magnitudes fainter, using its occulting disk. It will also be able to photograph objects much farther and fainter than any now known. It may be able to resolve QSO structure and any surrounding galactic matter. The FOS spectral resolution is limited by the available light. At a finesse of 100 it should reach about magnitude 26; at 1000, magnitude 22. It will be useful for examining the compositions and red shifts of distant galaxies and QSO's. The HRS, with its much higher spectral resolution of 2,000, 20,000, or 100,000, can examine the composition of brighter objects. Even at a finesse of 100,000 it can reach 11th magnitude. Its accurate red-shift measurements will help refine the distance scales. The HSP, with a time resolution of 16 microseconds, dynamic range of 100,000:1, and photometric accuracy of 0.2 percent, is useful for accurate measurements of any very fast variations, some of which indicate source sizes, to 24th magnitude. The FGS, in addition to its primary guidance function, can provide excellent astrometric data. Small proper motion perturbations thus detected may indicate orbiting bodies.

The present deadline for the essay is the end of March 1977, and for the proposal, the end of July 1977. To start, send \$1.00 to the AAVSO for the information packet: HST-AAWG, c/o AAVSO, 25 Birch Street, Cambridge, MA 02138.

R.H. McCracken

OCCULTATION EXPEDITIONS PLANNED

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

| UT Date | Time | Place | Vis Mag | Pcnt Sunlit | Cusp Angle | Min Aper |
|---|-------|------------------------|-----------|-------------|----------------|----------|
| Grazing Lunar: | | | | | | |
| 12-10-86 | 22:38 | Pittsvl, MD; C May, NJ | 6.2 | 76 | 17S* | 8 cm |
| 12-18-86 | 06:34 | Melwd, MD, Vienna, VA | 6.9 | 96 | 16S | 20 cm |
| 12-23-86 | 08:52 | Glen Dale, Bowie, MD | 8.0 | 60 | 16S* | 8 cm |
| 12-27-86 | 09:52 | Bryantwn, St. Chas MD | 8.5 | 19 | 17S | 13 cm |
| * Data at this angle especially valuable for support of solar-radius program. | | | | | | |
| Asteroidal: | | Star Mag | Delta Mag | Name | | |
| 12-12-86 | 06:26 | n. Brazil | 8.8 | 4.0 | (377) Campania | 8 cm |
| 12-12-86 | 22:50 | Miami FL | 7.8 | 6.0 | (379) Huenna | 5 cm |
| 12-22-86 | 07:42 | nw S. America | 5.7 | 8.0 | (877) Walkure | 3 cm |
| 12-28-86 | 06:06 | Labrador | 8.4 | 4.0 | (87) Sylvia | 5 cm |
| 12-30-86 | 10:39 | Colombia,SA (Mex?) | 8.7 | 6.0 | (946) Poesia | 5 cm |

NCA WELCOMES NEW MEMBERS

Roland and Bonnie Beaulieu
11221 Westport Drive
Bowie, MD 20715

Barry D. Brooks
8606 Imagination Court
Walkerville, MD 21743

Charles R. and Nancy M. Corigan
3335 Tennyson Street, NW
Washington, DC 20015

Brian R. Gifford
5809 Planters Court
Frederick, MD 21701

John A. Graham, #1414
4601 North Park Avenue,
Chevy Chase, MD 20815

Sam and Luann Mudrak
6302 Wayles Street
Springfield, VA 22150

TATAREWICZ APPOINTED TO HIGH NASM OFFICE

NCA's Joseph N. Tatarewicz has been appointed Acting Head of the Space Science and Exploration Division of the National Air and Space Museum. Congratulations, Joe! We wish you success and gratification in your new position.

COMPUTERS IN ASTRONOMY

This column will be strongly biased toward MS-DOS, not because of its superiority, but because of the abundance of public-domain software -- the best kind -- it may be copied without royalty payments! There is more public-domain MS-DOS-compatible software than all the rest combined, much of it excellent.

This month's example is the *Floppy Almanac* (FA) from the U.S. Naval Observatory. The FA gives much of the Astronomical Almanac information to full precision. The 1986 and 1987 versions include data on the Sun, Moon, planets, and stars. Four star catalogs are included; one with 200 bright stars, one of the FK4 stars, one of 233 compact extragalactic radio sources, and one of the Messier (Mes-yay) objects.

There are no fancy graphics, no flashy sounds -- just a solid program that does the job. It is available in three versions, 1.3P for standard DS/DD 5.25-inch MS-DOS diskettes, 1.3C for 5.25-inch MS-DOS for PC's with 8087 or 80287 coprocessor, and 1.3P 3.5-inch MS-DOS for portable PC's. It will be available in December for the DEC Microvax II, and on tape for IBM mainframes.

The price is \$20.00 for the software on diskette, and \$4.00 for additional copies of the User's Guide. It is in the public domain, and lawful to copy and share. Make checks payable to the U.S. Naval Observatory. The address is: Nautical Almanac Office, Code FA, U.S. Naval Observatory, Washington, DC 20390-5100.

(Ed. note: Plans are actively underway for an expanded NCA astronomical information service including both computer bulletin board and voice information. The ASTBBS line, (301) 495-9062, is now being used exclusively for voice occultation information; in the interim the bulletin board is temporarily suspended. If you are a computer type who would like to take an active part in planning, organizing, or operating this interesting, useful service, call NCA: 320-3621.)

EXCERPTS FROM THE IAU CIRCULARS

1. October 30 -- T. Urata and T. Nijima, Shimizu, Japan, discovered an asteroidal object of 16th magnitude in Aries photographically with a 31-cm reflector. Further observations on November 2 and 3 revealed a faint coma indicating that the object is a comet. The elements indicate that the comet, 1986o has a period of 6.42 years.

2. November 1 -- William Sorrells, Pleasanton, California, discovered a comet of 12th magnitude in Taurus on a photograph taken with a 40-cm reflector. Comet Sorrells (1986n) appeared to be in a parabolic orbit and will reach perihelion in March, 1.7 au from the Sun.

3. November -- European optical astronomers reported detecting spectroscopic and photometric changes with a 9-hour period in suspected X-ray source AC 211 in M 15. P. Hertz, Naval Research Laboratory, searched the HEAO A-1 data and found a matching periodicity in the X-ray emission.

Robert N. Bolster

WANTED

Six-inch Newtonian or other moderately priced telescope. Brian Faller, Home: 685-0809, work, 633-2308.

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★ S T A R D U S T

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