



Harrington to Discuss Search for Unknown Outer Planets



DR. HARRINGTON

Dr. Robert S. Harrington, Chief of the Equatorial Branch of the U.S. Naval Observatory, will present the National Capital Astronomers opening lecture of the 1986-87 series, on September 6, at 8:15 pm in the Einstein Planetarium of the National Air and Space Museum. Note the new location. He will discuss the search for unknown outer-solar-system objects, suspected sources of orbital perturbations of the outer planets.

Depending upon your interpretation, either three or four planets have been discovered by modern man. Two of these resulted from searches for the causes of unexplained perturbations of outer-planet orbits. Such perturbations remain, suggesting a further search. Some efforts have already been made, and a variety of factors may dictate the next steps in this search. There are also several indirect arguments for the existence of such

a planet, relating to things like the odd behavior of Pluto and the hypothesized periodic mass extinctions of life on Earth. Dr. Harrington will discuss the relevant discovery history, recent efforts, and some of the indirect arguments and their implications.

Robert S. Harrington received his B.A. in physics from Swarthmore College, where he studied astrometry under Peter van de Kamp, and his Ph.D. in 1968 from the University of Texas, where he worked on multiple-star dynamics under Bill Jefferys. In 1967 he joined the staff of the U.S. Naval Observatory, where he has worked on various programs in photographic astrometry and dynamical astronomy. As Chief of the Equatorial Branch he is responsible for the Observatory's parallax and astrographic catalog programs.

SEPTEMBER CALENDAR — *The public is welcome.*

Tuesday, September 2, 9, 16, 23, 30, 7:30 pm -- Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

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

Saturday, September 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, September 6, 8:15 pm -- Note new location of the NCA monthly lecture: the Albert Einstein Planetarium of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. (Enter Independence Avenue side.) Dr. Harrington will speak.

Friday, September 5, 12, 26, 8:30pm -- 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, September 13, 9:00 pm -- *Exploring the Sky*, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: John B. Lohman, 820-4194.

Saturday, September 20, 8:00 pm -- Discussion group: To be announced.

JUNE LECTURE

Dr. Henning Leidecker, NASA Goddard Space Flight Center and a former President of National Capital Astronomers, addressed the June NCA meeting, following presentation of the annual NCA Science Fair awards. He described his current work on a problem of the Geosynchronous Orbiting Environmental Satellite (GOES) and its solution.

The National Oceanic and Atmospheric Administration's series of GOES, first launched in 1970 and managed by NASA Goddard, have saved thousands of lives and many millions of dollars in property losses that formerly were lost to hurricanes. GOES' high-resolution (1700-line) images of terrestrial cloud systems are provided day and night using both visual and infrared light. These are the images seen regularly on the television weather reports. Analysis of the weather patterns revealed by these satellites now allows prediction of dangerous storms in time to prepare for them, including evacuation of affected areas when indicated.

Another important function of the GOES is distribution of the time standard from the National Bureau of Standards, corrected to within several microseconds by special techniques, for the transit time of the signals to any location within range of the satellite.

To monitor weather conditions over both the Atlantic and Pacific oceans, a GOES was positioned over each coast.

Because the satellites are gravitationally perturbed by both the Sun and the Moon, occasional orbit corrections are necessary, each of which requires a small amount of fuel. Sufficient fuel is carried for corrections predicted for seven years, during which each satellite is expected to be productive.

Unfortunately, a small flaw has required much more frequent replacement of the satellites. Analysis of the problem by Leidecker's group has indicated a solution.

The satellite rotates once per second; its sensors are protected from direct sunlight. Pointing direction is continuously monitored by optical encoding disks which use small incandescent lamps. Although these special lamps had satisfactorily passed accelerated life tests, and were operated at conservative temperatures, a number of them burned out in about a year and a half.

Crystallization of a spot in the filament and attendant increased resistance led to a hot spot, increased local evaporation of tungsten, and eventual burnout.

Much work led to development of an apparent solution: new, smoother filaments of tungsten-rhenium alloy operated at lower temperature, backup encoders, and two lamps for each encoder.

One GOES was lost in the Delta rocket failure this spring on its way to replace the eastern GOES. The western GOES-6 is the only one now operational. It is moved between the east and west positions as needed, according to the greater storm threat. There is one remaining unlaunched GOES; it is expected to be launched by the end of summer. The new series will be ready in about two and a half years.

The use of filaments instead of gas discharges or light-emitting diodes was questioned. Leidecker responded that gas discharges are not good line-image sources, and that LED's, although attractive, and now actually the primary illuminant, are still unproven in this service; they are not useful over 200 degrees.

John B. Lohman

REMINDER: NEW LOCATION FOR NCA LECTURES

Remember that the monthly NCA lectures will be held at the National Air and Space Museum, in the Albert Einstein Planetarium, beginning on September 6. This was announced in the summer edition.

The National Air and Space Museum is located at Seventh Street and Independence Avenue, SW, and is a short walk from the Seventh Street and Maryland Avenue exit of the L'Enfant Plaza Metro station. Street parking is available on Saturday Evenings at the Museum.

The 6:00 pm pre-meeting dinner with the speaker will be at the Smithsonian Restaurant, in the Holiday Inn at Sixth and C Streets, SW. Individual checks, reservations unnecessary.

OCCULTATION EXPEDITIONS PLANNED

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

UT	Place	Vis	Pent	Cusp	Min	
Date	Time	Mag	Sunlit	Angle	Aper	
Grazing Lunar:						
09-23-86	09:19	Germantown, MD	5.5	75	10N	5 cm
09-25-86	05:21	Clarksburg, MD	7.8	58	13N	10 cm
Asteroidal:						
09-29-86	10:46	Fort Worth, TX	9.5	1.4	(148) Gallia	10 cm
10-01-86	01:22	Central S. Amer.	6.5	6.0	(598) Octavia	5 cm

NCA WELCOMES NEW MEMBERS

Ron and Helen Schwartz and Family 2703 Parker Avenue Wheaton, MD 20902	Alan and Maureen Williams 13006 Trailside Way Germantown, MD 20904
Mike A. Stein 3530 Porter Street Washington, DC 20016	

ACADEMY SCHEDULE FOR 1986-87

National Capital Astronomers is an active affiliate of the Washington Academy of Sciences; the 1986-87 Academy lecture schedule is given here. In arranging the program we have attempted to present in each lecture those aspects of the subject that are of general interest to an audience that includes others than the specialists. The Academy lecture series may encompass any of the sciences represented by the more than 50 professional societies that are affiliates.

The lectures are held on the third Thursday of each month, September through May, except December, at the Mary Graydon Center of American University, Massachusetts and Nebraska Avenues, NW. A reception at 6:45 pm is followed by dinner at 7:30, and the lecture at 8:30. For more information and for dinner reservations, call Bob McCracken at 320-3621 (NCA). It is not necessary to attend the dinner to hear the lecture, and there is no charge for the lecture only. Dinner reservations must be received one week prior to the meeting.

- September 18 -- *Medical Ethics*, Dr. Edmund Howe, Associate Professor of Psychiatry, the Uniformed Services University of the Health Services, Bethesda, Maryland. Cosponsored by the Society for Experimental Biology and Medicine.
- October 16 -- *How Many Kinds of Time?* Dr. Gernot Winkler, Director of the Time Service Division, U.S. Naval Observatory. Cosponsored by National Capital Astronomers, Inc.
- November 20 -- *A New View of Marine Biology through Marine Biotechnology*, Dr. Rita Colwell, Vice President for Academic Affairs and Professor of Microbiology, University of Maryland. Cosponsored by the Society for Experimental Biology and Medicine.
- January 1987 -- *Mind-Body Interactions*, Dr. David S. Kranz, Associate Professor of Medical Psychology, the Uniformed Services University of the Health Services. Cosponsored by the District of Columbia Psychology Association.
- February 19 -- *Einstein's Attitude toward the Universe*, Dr. Raymond J. Seeger, National Science Foundation, Retired.
- March 19 -- *Global Climate Variability: Recent Trends and Future Outlook*, Dr. Eugene S. Rasmusson, Former Chief, Diagnostics Branch, Climate Analysis Center, National Weather Service. Cosponsored by the American Meteorological Society.
- April 16 -- *Washington Academy of Sciences Annual Awards for Scientific Achievement*, Dr. Frank Yekovich, Chairman, W.A.S. Awards Committee.
- May 21 -- *Advanced Composites: An Historical Perspective*, Dr. Simon W. Strauss, President, Washington Academy of Sciences. Annual business meeting.

EXCERPTS FROM THE IAU CIRCULARS

1. July 14 -- K.I. Churyumov and V.V. Solodovnikov, Coronal Station, Kazakh Academy of Sciences, U.S.S.R., discovered a comet (1986i) of 13th magnitude in Capricornus.

2. July -- Kresak, Slovak Academy of Sciences, reported that the comet observed by Pons in 1808 February was P/Grigg-Skjellerup. A backward integration of the orbit fitted the position and direction of motion noted by Pons.

3. August 4 -- M. Wakuda, Tokyo, discovered a probable nova of 9th magnitude near CI in Cygnus.

4. August 4 -- Christine Wilson, Palomar Observatory, discovered a comet (1986l) of 11th magnitude in Pegasus on plates taken with the 1.2-m Schmidt telescope. Preliminary parabolic elements by Marsden indicate that Comet Wilson will be at perihelion in 1987 April 22. It will pass 0.6 AU from the Earth in early May, and could be of naked-eye brightness, but too far south to observe from mid-northern latitudes.

NASM TO SAVE AIR FORCE TWO MILLION DOLLARS

A satellite which has been in the National Air and Space Museum for 15 years will be returned to the Air Force and launched on October 8.

The refurbished and renamed Polar Beacon Experiment and Auroral Research (Polar BEAR) satellite will serve the current need to assist other communication and meteorological satellites to overcome auroral radio interference. Use of the old satellite will save about two million dollars.

AIR AND SPACE MUSEUM OFFERS TALKS, SAFE SOLAR VIEWING

On Saturday, September 6, at 9:30 am, in the Einstein Planetarium of the Air and Space Museum, Jan K. Herman, Historian of the U.S. Naval Medical Command, will speak on observations of the December 8, 1874 solar transit of Venus.

Following the talk, weather permitting, Stanley Cawelti will offer safe telescopic solar viewing in hydrogen alpha on the east deck.

FOR SALE

Telescope: Celestron Super C-8, tripod, wedge, clock drive. Negotiable. Kirk Kinsey, 16 Long Green Court, Silver Spring, MD 20906. (301) 460-8033.

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