STAR DUST

National Capital Astronomers, Inc.

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Hanel to Report Early Voyager—Neptune Results

DR. HANEL

Dr. Rudolph A. Hanel, Laboratory for Extraterrestrial Physics, NASA Goddard Space Flight Center, will speak at the September 9 meeting of National Capital Astronomers in the National Air and Space Museum. Note that it will be the second Saturday becaus of the holiday weekend.

Dr. Hanel will present the early results of the Voyager 2 flyby of Neptune and Triton. While we eagerly await reduction of the volume of measurement data taken in other wavelengths, the remarkable pictures have already disclosed both Neptune and Triton to be unexpectedly fascinating, complicated worlds.

Rudolph Hanel is a senior scientist at Goddard working on remote sensing for planetary probes and satellites. He has been principal investigator for infrared systems experiments on Voyager, Mariner, and several satellite programs, including those of the Tiros and Nimbus series.

Dr. Hanel received his Ph.D. in 1953 from the Technical University in Austria. On a number of his NCA lectures in the past, he has discussed the instrumentation involved and the results of his infrared studies in the encounters of Voyager with Jupiter, Saturn, and Uranus, and of Mariner 9 with Mars. With this lecture on the farthest known planet, he will have been our tour guide on the entire Grand Tour of the Solar System.

SEPTEMBER CALENDAR — ***The public is welcome.***

Friday, September 1, 8, 15, 22, 29, 7:30 pm — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Tuesday, September 5, 12, 19, 26, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Saturday, September 9, 5:45 pm — Dinner with the speaker at the Smithson 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 Metrorail station.

Saturday, September 9 7:30 pm — NCA monthly colloquium in the Einstein Planetarium of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. Enter Independence Avenue side. Dr. Hanel will speak.

Friday, September 8, 15, 22, 8:30 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, September 23, 7:30 pm — *Exploring the Sky*, presented jointly for the public by NCA and the National Park Service, on Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy. Information: John Lohman, 820,4194, or NCA, 320-3621.

For other organizations' events of interest see elsewhere in this issue.

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following occultations. For further information call the NCA-IOTA Information Line: (301) 474-4945 (Greenbelt, MD).

UT Date	Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
Grazing Lunar:						
09-22-89	05:27	MD City, MD; NW DC	8.2	48	6N	10 cm
09-23-89	06:23	Burtonsville, MD	7.0	37	6N	5 cm
09-23-89	06:27	Poplr Hl, MD; Dvr, DE	7.7	37	6N	8 cm
09-23-89	07:49	Oregon Inlt; Fayetvl, NC	6.9	36	5N	5 cm
09-24-89	06:53	Barco; Fayetvl, NC	6.2	27	5N	5 cm
Asteroidal Appulse*:						
09-28-89	01:17	Florida	4.6	8.0	(346) Hermentaria	0.6 cm

*Appulse to be observed for possible satellites or path shifts.

EXCERPTS FROM THE IAU CIRCULARS Robert N. Bolster

1. July - Anderson, Kulkarni, and Price, California Institute of Technology, and Wolszczan, Arecibo Observatory, reported the detection of a 10-ms pulsar in globular cluster M13. Their discovery resulted from analysis of observations made on May 20 with the 300-m Arecibo radio telescope at 430 MHz.

2. July 16 - Torrell, Echaniz, Lopez, and Pratginestos, Barcelona, Spain, noted a major fading of Jupiter's South Equatorial Belt. On the 21st it was reported to have disappeared at all longitudes, but on the 29th O'Meara saw it faded but still present as a "thin dusky band."

3. August 2 - The Voyager Imaging Team reported the discovery of three more satellites of Neptune. All move prograde in nearly circular and equatorial orbits.

4. August 6 - One photoelectric and 4 visual timings of the occultation of SAO 190531 by the asteroid (9) Metis were reported from New Zealand. The durations ranged from 8 to 15 s.

AIR AND SPACE MUSEUM OFFERS PROGRAMS IN SEPTEMBER

The following public program will be held during September in the Albert Einstein Planetarium of the National Air and Space Museum:

Saturday, September 2, 9:30 am — Free **Monthly Sky Lecture:** "The Grand Finale — Voyager 2 at Neptune." Stanley G. Cawelti, Chairman of the Docent Council and Past President of NCA, will present a slide-illustrated lecture on what has been learned so far. Safe telescopic viewing of Sunspots will follow, weather permitting.

The current daily Einstein Planetarium program, "Calling All Stars," tours the solar system and the universe, and discusses the scientific search for extraterrestrial intelligence. Call (202) 357-2700 for schedules and prices.

Wednesday, September 6, 7:30 pm — **Exploring Space Lecture Series:** "Voyager 2 Encounters Neptune," Edward C. Stone, Jet Propulsion Laboratory, Pasadena, California, Project Scientist for Voyager.

Wednesday, September 27, 730 pm — **Future in Space Symposium,** a panel discussion including Philip Morrison, Physics Department, MIT, Jill Tarter, NASA Ames Research Center, and others.

The Samuel P. Langley Theater features spectacularly realistic IMAX projection on a five-story screen. "The Dream is Alive" shows the solar system and the unoiverse as seen from the Space Shuttle. Other current programs are, "On the Wing," and "To Fly." All are absolutely spectacular. Call (202) 357-1686 for schedules and prices.

U.S. NAVAL OBSERVATORY TOURS IN JUNE

The Monday night public tours of the Naval Observatory begin at 8:30 pm EDT. The next tours are scheduled for September 11, 18, and 25. Passes will be issued to the first 100 persons in line at the gate across from the British Embassy, at Massachusetts Avenue and the southeast side of Observatory Circle, at the end of the circular road Some form of photoidentification will be required.

Parking is not allowed on the grounds For the tours except for the handicapped; ample parking is available near the gate.

Visitors will see various observatory facilities and, weather permitting, appropriately selected celestial objects, with the historic 26-inch Clark refractor with which the satellites of Mars were discovered more than a century ago.

For details, call the taped Observatory message: (202) 653-1543. Have a pad and pencil ready; there is much information.

ASTRONOMY AND PERSONAL COMPUTERS Joan B. Dunham

Communications – with a computer using a MODEM is a subject that confuses many. There are so many ways of configuring MODEMs and communications software, and so many different communications "standards" that are followed that many people do not even try. To add to the problems, just being able to send and receive intelligible information is only the first step in establishing good communications. Most of us use standard telephone lines, intended for voice transmission, when we send or receive data via MODEMs. The noise we can hear on the line can play havoc with data communications.

Communications Checking – Cyclic redundancy checking (CRC) is a popular method of checking the integrity of transmitted data, and is used in the PC protocols XMODEM, YMODEM, and others like them. Basically, a CRC test involves dividing the data sent from point A to point B into blocks of set length (128 or 1024 bytes are frequently used), dividing each block by a prime number, generating the remainder (throwing away the quotient), and sending the remainder as well from point A to point B. Once received, the remainder is recomputed. if it finds the remainder to be the same as at A, the data are judged to have been communicated correctly. If they are not the same, the process has detected a communications error.

The CRC checking proce.s is based on the fact that the result of dividing an integer of M digits by a prime number is unique. A prime number is a number that cannot be evenly divided except by itself or by 1. Each integer of M digits divided by, for example, the prime number 7, has a unique remainder. If we know the prime number that is the divisor, the number of digits in the integer, and the remainder, we can determine what the integer was. The remainder will be smaller (have fewer digits) than the original number. If we keep only remainders, we then have a way of passing information about numbers with fewer digits than are in the numbers.

Every piece of information stored in a computer can be manipulated as a binary number. Rather than do the CRC computation in base 10 arithmetic, which could be time consuming, the computation is done in binary. Instead of a prime number, the divisor is a primitive polynomial, a polynomial which cannot be factored into two smaller polynomials. As it happens, since only the remainder, and not the quotient is kept, the binary manipulation is fairly simple. Most PC communication software performs the computations for one or more protocols that use CRC's.

Communications Checking Protocols – Having the ability to check that data sent or received have been correctly transmitted is only one third of the battle. The rest, and sometimes the most difficult, is determining just exactly how the other end of the communications line is doing its checking. It is not at all uncommon to agree with a sender (or recipient) thet a specific protocol will be used, and then discover that the recipient's computer insists that every transmission attempt fails. I frequently find that, even though the particular variant of XMODEM we have agreed to use has the same name on both ends of the communications links, they really are not the same. Most communications packages and most BBS's have several protocols, and some experimentation may be necessary to find one that is the same on both ends.

The procedures that might be used in communications checking, that are referred to as the protocol, include how many times a message is sent before quitting, how long to wait between sends, how big the data blocks are, who tells the receiver what the file name is, What happens if the program detects problems. The PROCOM PLUS User's Guide lists 12 protocols it has, plus two extras they supply as external programs, and the option to send data with no checking at all.

Further information about CRC's can be found in some of the user's guides on communications software, textbooks on data communications, and occasional articles on data communications in magazines like **Byte** and **Computers in Physics**. Two articles I found are on page 88 of the July/August 89 **Computers in Physics**, and page 115 of the September 86 **Byte**. There is also a discussion on pages 147-150 in the textbook **Data Communications** by Kenneth Sherman, Reston Publishing, 1985.

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