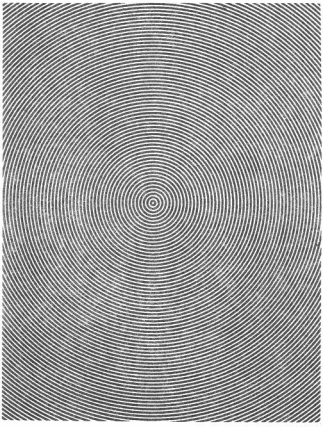
★ STAR DUST

Volume XLIII February 1987 Number 6

Brunweiler Suggests Explanation of Sirius' Spectrum Change



Dr. Frederick Bruhweiler, Professor of Physics at Catholic University, will address the February meeting of National Capital Astronomers. He will speak on the historical evidence for a change in the spectrum of Sirius, and offer a plausible explanation.

Ancient Babalonian, Greek, and Roman writings often described Sirius, the brightest star in the sky, as red, rather than its present blue-white. Until recently there has been no scientifically acceptable explanation for this dramatic change. However, advances in understanding of stellar evolution now suggest a solution to the dilemma posed by the historical references, and show that Sirius may have once been red and much brighter than it is now.

Frederick Bruhweiler received his degree in physics from Coe College in 1968 and worked in geophysics at Woods Hole Oceanographic Institute. He received his Ph.D. from the University of Texas in 1977. He was awarded a National Academy of Sciences-National Research Council Fellowship to support post-doctoral research at NASA's Johnson and Goddard Space Centers. In 1979 Dr. Bruhweiler joined Computer Sciences Corporation as a resident astronomer for the IUE satellite. In 1982 he became an associate research professor in the Department of Physics at Catholic University. He has published numerous papers from five space experiments. His research interests include white dwarfs, the interstellar medium, and and extragalactic astronomy.

FEBRUARY CALENDAR -- ***The public is welcome.***

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

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

Friday, February 6, 20, 8:00 pm -- NCA 14-inch open ights 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, February 7, 6:00 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 Metro station.

Saturday, February 7, 8:15 pm -- NCA monthly lecture in the Einstein Planetarium of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. (Enter Independence Avenue side.) Dr. Bruhweiler will speak.

Saturday, February 21, 8:00 pm -- Discussion group with Dr. Victor Slabinsky: Telescope axis alignment methods. 4250 Connecticut Avenue, NW, Suite 510, alongside the Red Line Metrorail UDC exit. **Use the plaza entrance.**

JANUARY LECTURE

Dr. Malcom Niedner, Jr., NASA Goddard, Deputy Discipline Specialist for Large-Scale Phenoma and Chairman of the Astro Halley Science Team, delivered the January 1987 lecture of the National Capital Astronomers monthly series. He discussed later results from comets Giacobini-Zinner and Halley.

The Heidelberg Conference in October 1986 was called to discuss results of the Halley observations. Faced with a plethora of data, however, it served mainly to identify many areas of disagreement. Even now, said Niedner, what we have learned can only be regarded as initial results; reduction of the data will continue for years to come.

Niedner discussed results from the virtual armada of spacecraft that went to Halley. and the substantial contributions of the United States to the international Halley program, even with the severely reduced NASA budget. There were two spacecraft from Japan, Suisei and Sakigaki, Vegas 1 and 2 from the USSR with France as junior partner, Giatto from the European Space Agency (ESA), and the International Cometary Explorer (ICE), sent by the United States on its unique two-comet mission through the tail of Comet Giacobini-Zinner (GZ) in October 1985 on its way to monitor the solar wind upstream of Halley.

Niedner reviewed the ICE project. At NASA's Goddard Space Flight Center, Dr. Robert Farquier saw the possibility of sending a spacecraft through the tail of the fortuitously placed Comet Giacobini Zinner on the craft's way to Halley. The International Sun-Earth Explorer (ISEE), which had monitored the solar wind between the Sun and the Earth, and still in its halo orbit, was ideally instrumented for the mission. NASA removed it from its halo orbit, renamed it the International Cometary Explorer (ICE). brought it through and around the Earth-Moon system for about a year and a half in a series of complicated reorientation maneuvers designed by NCA's Dr. David Dunham. On 22 December 1983 a final close lunar swingby provided the necessary gravitational boost ("gravitational refueling!" - ed.) to send it through GZ on 11 September 1985 on its way to measure the solar wind upstream of Halley before its interaction with the comet.

Niedner described the criteria whereby he decided on 10,000 km as the optimum distance downstream from the nucleus to penetrate Comet Giacobini-Zinner. There the unshielded craft woulld be relatively safe from impacts but close enough not to miss the tail. The mission was a complete success, and contributed an unprecidented advance in cometary physics. During the following six months many results thus became available to provide a new perspective for the Halley encounters in March 1986.

ICE's magnetometer, radio-science, and plasma-wave instruments were well suited for comet exploration. ICE confirmed and extended the theory and made several discoveries. The magnetic sheath, the plasma tail, the neutral sheet, the current sheet, the particle environment, and plasma waves were detected and measured. The only spacecraft ever to fly through the tail of any comet, ICE provided the cleanest plasma and magnetic-field data obtained from any of the comet missions, GZ or Halley.

The International Halley Watch was extremely active on the ground. The worldwide network of thousands of astronomers from more than 40 countries provided continuous coverage in each of eight different disciplines. Niedner and Brandt are concerned with large-scale phenomena, tail structure. Comets change rapidly and unexpectedly; never before were the necessary continuous observations available.

Nidner showed a photo of Halley's hydrogen corona taken on 13 March 1986 by a sounding rocket from White Sands, New Mexico, just before and supportive of the Giatto encounter. Pioneer-Venus orbiter (USA) observed Halley with an ultraviolet spectrograph when the comet was on the other side of the Sun, hence unobservable from Earth. It measured gas-production rate at and near perihelion - an important parameter indicating maximum activity. From August 1985 to June 1986 IUE provided detailed data on Halley's evolution as a function of its distance from the Sun. The United States thus provided worldwide ground-based, space-based, and in-situ observations of Halley.

The Soviet Vegas and the ESA Giatto showed a surprising result by ionized dust spectra: A preponderance of carbon, hydrogen oxygen, and nitrogen, and vely little of the heavier elements, was present in some particles, while others contained mostly the heavier elements with very little of the lighter ones.

Japan's Suisei penetrated the outer sunward atmosphere of Halley on 8 March 1986. For weeks and months before the encounter, its UV camera found the gas production to be oscillatory. Gas production peaked on each rotation of the nucleus, indicating active regions and a 2.2-day rotation period. It saw the bowshock strongly, and measured deflection and deceleration of the solar wind.

ESA's Giatto observed parent molecules from nucleus (before photodissociation), dust impacts and masses. It found and measured unexpectedly smallparticles of 10^{-20} kg. Giatto did multicolor imaging, ion-mass spectrometry, and analysis of ion energies as a function of position within the comet. It found the nucleus to be peanut-shaped, showed jets of dust toward the sunward direction, found discrete sources of dust and gas on the nucleus, showed a mountain in the middle waist of the nucleus, and craters of several hundred meters. Giatto found the reflectivity of nucleus to be about half that of darkest charcoal black.. Because it is dark, the nucleus' temperature is higher than expected -- about 300 to 400 Kelvin. It would be in the low 200s if it were white.

The Interagency Consultative Group of all space agencies Facilitated a coordinated effort. For example, the Vegas located the nucleus for the later Giatto encounter.

Dr. Niedner recounted some of the breakthroughs: In the fall of 1985 neutral water was detected in the comet by infrared spectrometry from the Kuiper Airborne Observatory in the stratosphere. Dr. Michael A'Hearn, University of Maryland and NCA member, using a CCD camera with narrowband interference filters for emission lines of different ion species. He found cyanogen organized into jets and spirals. These cannot be evolved from the nucleus as gas; they would not retain the observed patterns, but evaporate from dust grains.

Niedner Sought - and found - many tail-disconnection events through continuous observations by the ground-based Large-Scale-Phenomena Network of the International Halley Watch. Comparison of these with solar-wind reversals and magnetic sector boundaries recorded by the spacecraft confirmed Niedner's model of the phenomenon.

Robert 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:					
02-18-87 13:01	Gage, NM	1.2	79	13S	5 cm
03-02-87 24:00	Largo,MD; Arl. VA	8.7	10	7S	15 cm
03-06-87 03:50	Pueblo, CO	4.2	37	3N	5 cm
03-06-87 04:25	Cranford, NJ	6.8	37	6N	5 cm
03-06-87 04:43	San Onofre, CA	3.0	37	3N	1 cm
03-06-87 05:19	Pueblo, CO	3.8	37	6N	5 cm
Asteroidal and Lunar:		Star Mag	Delta Mag	Name	
02-22-87 08:22	Maine	9.5	3.0	(103) Hera	8 cm

NCA WELCOMES NEW MEMBERS

Jay Foster, Churchill H.S.
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Roy and Olga Waxler
3527 Yuma Street, NW
Washington, DC 20008

DISCUSSION GROUP ON TELESCOPE ALIGNMENT

Do you have trouble aligning your telescope axes for accurate tracking? To learn methods of easy, accurate alignment of portable instruments in the field, or to share your tips and tricks with others, come to the 8:00 pm 21 February discussion group to be led by Dr. Victor Slabinski at 4250 Connecticut Avenue, NW, Suite 510. **Use the plaza entrance,** alongside the UDC Metrorail exit.

AIR AND SPACE MUSEUM OFFERS TALK, SAFE SOLAR VIEWING

On Saturday, February 7, at 9:30 am, in the Albert Einstein Planetarium of the National Air and Space Museum, NCA's Geoffrey Chester, NASM Planetarium Coordinator, will discuss astrophotography for beginners who are interested in photographing the sky. Come learn the fundamentals, pick up plans for building a simple camera drive platform to follow the stars as the earth rotates, then attend the 21 February NCA discussion (listed above and in the Calendar) to get a good start!

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

ASTRONOMY AND PERSONAL COMPUTERS

Exchanging astronomical data or programs between two personal computers can be a frustrating experience. Computers using the same disk format can communicate via diskettes, but what if they use very different formats? Then the computers are connected electronically via the telephone lines. Each computer contains or is attached to a **modem,** a device that **mod**ulates computer data into tones or **dem**odulates tone signals into computer data. Communications software is used on each computer to manage the exchange.

We collected four such programs for MS-DOS computers to try at the January 17 NCA workshop: PC-Talk, PIB-Term, Procom, and Qmodem. These are all in the public domain. Each has a number of features and fairly long manuals. We will evaluate them and report our conclusions in a future column.

Don Oliver, Houston, Texas, sent us Procom, so we called his computer and sent him a list of the computer projects we were discussing. He sent us updated versions of ARC, a program for compressing files so they take less long-distance telephone time to send.

We will provide these five programs in exchange for five diskettes, or help anyone who would like to do this evluation.

Walter Nissen used Procom to show us the astronomy conference he runs on the MIX, the Capital CP User Group bulletin board. With one of these, he enters data from the IAU cards and computes local circumstances for observation. Bob Bolster told us about his work on an optical design program in Apple II code.

We also discussed 10 projects David and I proposed to assist in occultation observation and data reduction. One of them of more general interest will be the subject of a future column. If you want descriptions of these projects, send a SASE to Joan Dunham, PO Box 7488, Silver Spring, MD 20907. I will bring some copies to the February NCA meeting.

Joan B. Dunham

EXCERPTS FROM THE IAU CIRCULARS

1. December 24 -- A University of California team discovered a supernova of magnitude 14 in NGC 2227 at Leuchner Observatory.

2. January -- R.M. West, European Southern Observatory, remeasured Heidelberg plates taken in 1901 of the lost asteroid (473) Nolli. Correction to the orbit enabled Marsden to identify it with 1981QR and 1986PP, leaving only three numbered asteroids lost.

3. January 5 -- David Levy, Lunar and Planetary Laboratory, Tucson, discovered a comet (1987a) of 11th magnitude in Ophiuchus with a 40-cm refractor. The parabolic elements by Marsden indicate that Comet Levy reached perihelion on December 18. Robert N. Bolster

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WASHINGTON, D. C.

Published eleven times yearly by **NATIONAL CAPITAL ASTRONOMERS, INC.**, a non-profit, public-service corporation for promotion of astronomy and related sciences through lectures, expeditions, discussion groups, tours, classes, public programs, and publications. NCA is an affilliate of the Washington Academy of Sciences. President, Stanley G. Cawelti. *Star Dust* deadline 15th of preceding month. Information: (301) 320-3621. Material for publication: Robert H. McCracken, Editor, 5120 Newport Avenue, Bethesda, MD 20816.

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