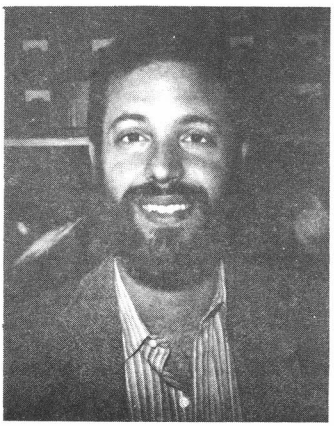
★ STAR DUST

Volume XLIV November 1987 Number 3

Rich to Present New Data from Galactic Center Study



DR. RICH

Dr. Michael Rich, of the Carnegie InstitutionI's Department of Terrestrial Magnetism, will address National Capital Astronomers November colloquium at the National Air and Space Museum. He will present some interesting new findings from studies of the central galactic bulge

The advent of large telescopes in the Southern Hemisphere has permitted study of the nuclear bulge of the Galaxty in unprecidented detail. We have learned that some of the stars in the bulge are the most metal-rich stars known, and for the first time, we may study a stellar population which resembles those in the distant elliptical galaxies. Dr. Rich will describe what this remarkable collection of new data tells about the formation of the Milky Way Galaxy, as well as the physics of stellar populations in other galaxies. He will also show close-up views of the southern hemisphere observatories.

Dr. Rich received the B.A. from Pomona College in Los Angeles, and his Ph.D. from the California Institute of Technology. He is a post-doctoral fellow at the Carnegie Institution of Washington, Department of Terrestrial Magnetism. He has observed for eight years at the southern hemisphere observatories.

NOVEMBER CALENDAR — *The public is welcome.*

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

Tuesday, November 3, 10, 17, 24, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, Novemer 6, 20, 27, 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, November 7, 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, November 7, 7:30 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. Rich will speak.

Saturday, November 21, 7:30 pm — Annual NCA Public Telescope-Selection Seminar for guidance of those seeking to purchase a first telescope. Room A06, Building 42, University of DC, Connecitcut Aenue NW Campus. See page 12. Information: 320-3621.

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

OCTOBER COLLOQUIUM

Dr. Rabindra N. Mohapatra, professor of physics at the University of Maryland, addressed National Capital Astronomers on superstring theory at the National Air and Space Museum on October 3. He asks, "Could this be (or lead to) the ultimate theory of nature?"

Because of after-the-fact discovery of technical difficulties, the reviewer is faced with a lack of either a usable tape or notes at the time of this writing. This account is as faithful to the content of the talk as memory permits.

Albert Einstein attempted to create a unified theory of all of physics, but without success. In particular, he could not reconcile quantum mechanics with gravitation. In recent decades, Grand Unified Theories (GUTs) are making more progress toward a complete theory. However, gravitation and quantum mechanics have remained stubbornly incompatible. (Ed. note: We should view Newton's and Maxwell's theories as pointing toward a unified theory of physics.)

Major twentieth-century progress was made withn the recognition of a strong and a weak force between sub-nuclear particles. Unlike gravitation and electromagnetic forces, these do not reach to great distances, but are confined within the nucleus. They are intermediate in strength between the very weak gravitational force and electromagnetism. Quantum mechanics shows that all fields or forces necessarily also appear as particles (photons, mesons, etc.) which convey the forces.

The notion of symmetry plays a large role in all modern theories. Symmetry is handled mathematically by group theory. It greatly simplifies GUTs by limiting the number of arbitrary parameters that have to be specified. (Ed. note: A modern viewpoint shows that much of even Newton's theory follows from considerations of symmetry.)

A decade or two ago, Klein and Kalusa developed models of space-time calling for more than the obvious four dimensions, typically ten. The additional dimensions were curled up in tiny spaces. Strings appeared in this context, and also as exotic fragments left over from the very earliest, very dense universe.

Klein-Kalusa theory was not highly regarded at first, but it has now become more acceptable. With it, string theory has led to the idea of superstrings which are curled up in spaces that are tiny (about 10^{-33} cm) compared to an atomic nucleus. Vibrational states of these superstrings are seen as ultimate particles. Quarks, etc. are then states (there should be an unlimited number of such) of superstrings. The idea of point particles has been shown to forbid unification of quantum theory and gravitation even in principle. Superstrings have extent, and make quantum gravity theory possible.

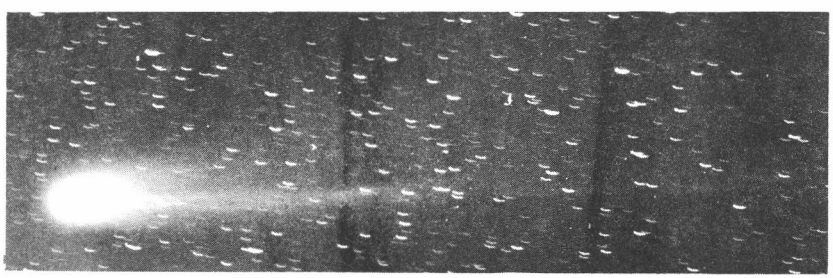
The topic is under lively development today; but its problems, including formidably difficult mathematical ones, are far from being solved. It appears to make far broader GUTs possible, but has not yet produced them. In any case, successful or not, superstring theory seems certain to affect physical theory in the future profoundly. John B. Lohman

COMET BRADFIELD (1987s) BRIGHTENING

At this writing Comet Bradfield is slightly brighter than earlier predictions; by mid November the comet may reach marginal, but not easy, unaided-eye visibility in very dark, clear sky. 7x50 binoculars should show it well.

This abbreviated ephemeris by Nissen indicates the most favorable period to be 8 to 24 November, during which the integrated magnitude is predicted to reach about 5.4. The Moon will be waning early in the period to new on 21 November. Note that times are UT (subtract 5 hours for EST); altitudes and azimuths are for Washington DC.

UT	RA	DEC	ALT	AZI
Date Time	H, M	Deg, M	Deg	Deg
11-08-87 23:30	18 00	+03 25	30	248
11-11-87 23:28	18 12	+04 56	32	248
11-14-87 23:26	18 26	+06 30	34	249
11-17-87 23:24	18 40	+08 17	35	249
11-20-87 23:23	18 55	+09 45	37	250
11-23-87 23:21	19 11	+11 25	39	251



This Hopewell Observatory photograph of Comet Bradfield was taken by Robert N. Bolster at UT 1987 October 9, 0h7.5m to 0h30m (22.5-minute exposure) on gas-hypered Eastman 2415 film, with the 31-cm, f/4.1 Wright. The original plate shows a 1.1-degree tail at position angle approximately 90 degrees. The scale as printed here is 93.3 mm per degree.

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following occultations. For further information call (301) 495-9062 (Silver Spring, MD).

UT Date	Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
Grazing Lunar:						
11-09-87	09:29	Fairland, MD,	7.0	86	11S	10 cm
11-24-87	23:01	Spenderville, MD	9.1	17	18S	10 cm
11-30-87	02:05	Silver Spring, MD	7.0	72	15S	5 cm

Asteroidal*:			Star Mag	Delta Mag	Name	Min Aper
11-05-87	10:25	Panama	10.3	3.0	(114) Kassandra	15 cm
11-08-87	10:07	Cuba, Bermuda	8.8	4.0	(127) Johanna	5 cm
11-13-87	08:16	Pittsburgh, PA†	10.0	2.0	(313) Chaldaea	10 cm
11-14-87	00:14	Midwest, se Canada	11.5	0.3¶	(7) Iris	30 cm
11-25-87	11:10	Antarctica	12.2	4.0	(2060) Chiron	25 cm
11-25-87	22:45	NW Territory	8.3	1.6	(621) Werdandi	5 cm
11-27-87	00:53	se Canada, cent U.S.	9.3	3.0	(336) Lacadiera	5 cm
11-30-87	08:05	Greenland	8.8	4.0	(114) Kassandra	5 cm

* Appulses escept as noted. To be observed for possible satellites or path changes.
† Occultation. ¶ Photometric.

NCA WELCOMES NEW MEMBERS

Robert G. Johnsson
7422 Ridge Road
Frederick, Maryland 21701

David G. Kaplan
2711 Arcola Avenue
Silver Spring, MD 20902

Kenneth Lum
160 Lion Head Court
Baltimore, MD 21237

Michael A. McCombs
2535 Chain Bridge Road
Vienna, VA 22180

George J. Mohn
19009 Capehart Drive
Gaithersburg, MD 20879

Ronald I. Personett
426 Ritchie Parkway
Riverdale, MD 20852

AIR AND SPACE MUSEUM OFFERS PROGRAMS, TELESCOPIC SKY VIEWING

The folowing free, public programs will be held in the Einstein Planetarium of the National Air and Space Museum:

Saturday, November 7, 9:30 am — "The Year the Moon Stood Still." Dr. LeRoy Dogget of the U.S. Naval Observatory. Following the lecture, weather permitting, NCA Trustee and NASM Docent Stanley Cawelti will offer safe telescopic viewing of the Sun.

The National Air and Space Museum in conjunction with the Harvard Smithsonian Center for Astrophysics is sponsoring three lectures in November. All will be held in the Einstein Planetarium at 8:00 pm:

November 3 — Dr. Jeffrey McClintock: "Do Black Holes Exist?"
November 10 — Dr. Costas Papaliolious: "Supernovae — Grand Finale or New Beginnings?"
November 17 — Dr. Lee Hartmann: "How Stars are Born." Following the lecture, permitting, NCA Trustee and NASM Docent Stanley Cawelti will offer a telescopic tour of the nighttime sky.
November 17 — Dr. Martin O. Harwit, Director of NASM, will present a lecture, "Cosmic Discoveries," to members of the Smithsonian Resident Associates Program in the Langley Theater of NASM at 7:30 pm. (Please note conflict with third lecture above.) Non-RAP members should contact the RA office for cost and details (202) 357-3030.

ASTRONOMY AND PERSONAL COMPUTERS

The U.S. Naval Observatory **Floppy Almanac** for 1988 and for 1989 is now ready for distribution. This program gives information from much of the **Astronomical Almanac** to full precision. Anyone familiar with using the AA will find this easy enough not to need the User's Guide for basic operations. The price is $20.00 for 5.25- or 3.5-inch MS-DOS diskette and User's Guide. The software is in the public domain, which means it is legal to share with friends. Copies from the USNO, however, come with the User's Guide, which explains how to create special catalogs for use with the FA, and details about how the computations are performed. (The Floppy Almanac is also available for the DEC MicroVAX II, on 5.25-inxh 400k RX50 disk ($20.00) and for IBM mainframes 370, 43xx, 30xx, on nine-track 1600 bpi computer tape, VM/CMS format, at $25.00.)

This is a new version of the Floppy Almanac. Changes include a new user interface and combination of the two MS-DOS versions (plain and coprocessor) into one. If a mathematic coprocessor is detected, it will be used, but the program will run on machines that do not have one. An external file that contains the default coordinates has been aded, allowing users to set specific default cordinates.

To purchase, send a check payable to "U.S. Naval Observatory" to: Nautical Almanac Office Code FA, U.S. Naval Observatory, Washington, DC 20390-5100.

The October 17 discussion group included demonstration of optical ray-tracing software written in BASIC for a Timex Sinclair computer. The software, a commercial product which has been somewhat modified, does the computations for various glass types, combinations of lenses, and surface curves. The demonstration included showing the difference in the result when the computations are approximate, considering small angles, from when no approximations are made.

Joan B. Dunham

EXCERPTS FROM THE IAU CIRCULARS

1. August 24 — Eleanor F. Helin, Jet Propulsion Laboratory, discovered a comet (1987w) of 16th magnitude in Pisces on Palomar Sky Survey II plates taken by J. Mueller with the 1.2-m Schmidt.

2. September — West German radio astronomers reported the first detectionn of extragalactic methanol, in galaxies NGC 253 and IC 342. The observation was made at 96.75 GHz with the IRAM 30-m radiotelescope.

3. Septyember 21 — Gordon Garrodd, Tamworth, N.S.W., Australia, discovered a nova of 10th magnitude in the Large Magellanic Cloud.

4. October 11 — David Levy, Tucson, Arizona, discovered a comet (1987y) of 9th magnitude in Bootes with a 20-cm f/7 reflector. Robert N. Bolster

ANNUAL NCA PUBLIC TELESCOPE SELECTION SEMINAR SET

The annual NCA free, public seminar, "How to Select, Use, and Care for a Telescope," will be held on Saturday, November 21, at 7:30 pm;in Room A06, Building 42, on the Van Ness Campus of the University of DC. Guidance will be provided, myths will be dispelled, and the uninitiated will be equipped to select and purchase wisely. After a basic presentation and discussion, hands-on experience with representative types will be offered.

By Metrorail, exit the UDC station (Red Line), turn legt, go between the columns under the "4250," up steps at the left, three flights to the elevated walkway to Building 42. By Auto, park in garage under building 44, on north side of Van Ness Street a short distance from Connecticut Avenue. Continue to far (north) end of garage and building 42. Building 42 is immediately north of Building 44.

U.S. NAVAL OBSERVATORY COLLOQUIUM SCHEDULED.

On Monday, 9 November, at 3:00 pm, Dr. Yuri L. Kokurin, Lebedev Institute of Physics, Academy of Sciences, Moskow, will present "The Status of Lunar and Satellite Laser-Ranging Programs in the USSR." Coffee will be served at 2:40. The colloquia are held in Building 52, Room 300. Parking is available behind the building.

NCA members are welcome. Enter the main gate at Massachusetts Avenue and 34th Street, NW, where the guard will require some identification and provide directions. For further information call 653-1513.

FOR SALE

Fifteen-year-old Dynamax 8 with wedge and sturdy pier mount on casters, finder scope, 3 eyepieces, RA motor drive. Delivered to your door anywhere in the Washington metropolitan area for best offer over $250.00. Call NCA member Ted Woolsey at 320-2339 (Bethesda) to arrange a visit to see the equipment.

☆ STAR DUST
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 affiliate of the Washington Academy of Sciences. President, Walter I. Nissen. *Star Dust* deadline 15th of preceding month. Information: (301) 320-3621. Material for publication: Robert H. McCracken, Editor, 5120 Newport Avenue, Bethesda, MD 20816.

FIRST CLASS