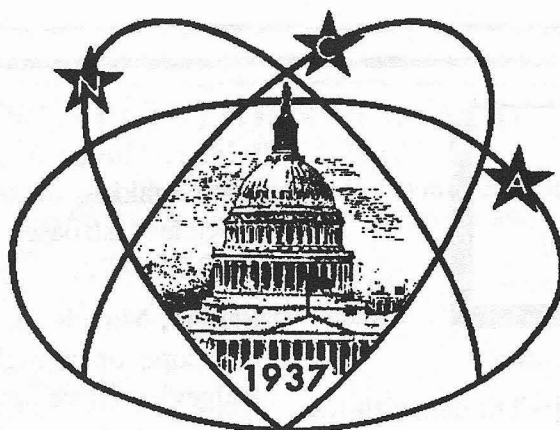


Star



Dust

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Harold Williams to talk About The Formation of Stars

by *John Graham*

The next meeting of National Capital Astronomers will be held on Saturday March 7, 7:30 PM at the National Institutes of Health in the Bunim Room at the Clinical Center (Floor 9, Building 10). On this occasion, we shall be addressed by Dr. Harold A. Williams, the Director of the Montgomery College Planetarium on the subject "The Formation of Stars". Although our own Sun is about 5 billion years old, others, similar in size and mass are being formed at the present time from dense, dusty clouds which primarily consist of molecular hydrogen. Dr. Williams will discuss the several processes involved in the collapse of the cloud core which finally result in the birth of a star shining by its own light.

Dr. Harold Williams is no stranger to us, as he is an active member of National Capital Astronomers. He was born in Gainesville, Florida and grew up in Jacksonville, Florida. He studied at Florida State University in Tallahassee before obtaining his PhD at Louisiana State University at Baton Rouge under the supervision of Dr. Joel Tohline. Subsequently, he came as a post-doctoral fellow to the Department of Terrestrial Magnetism of the Carnegie Institution, where he continued his studies of star formation, making use of some of the most powerful computers in the United States. He is now at Montgomery

College where he teaches mathematics and physics, as well as directing the Planetarium. He has a special concern for communicating the excitement of astronomy both through planetarium activities and visits to local schools. He is currently organizing a workshop for the coming summer aimed at grade-school teachers under the general theme "Astronomy across the Curriculum". Dr. Williams is widely known and appreciated for the tremendous enthusiasm which he brings to each of his many interests, and we look forward to a stimulating talk from him at the meeting.

The Galaxy, Spring Sky, and Nocturnal Nature

Smithsonian Institution Resident Associate
Program Tour for Earth Night, 1992

by *Daniel Costanzo*

On a dark, clear night far from city lights, Earth can be appreciated for what she truly is: a precious ark of life borne upon the currents of a grand, Galactic ocean. Seeking an experience of truly "deep" ecology on a cosmic scale, this tour to Virginia's Shenandoah National Park observes the natural envi-

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March Calendar

The Public is Welcome!

Saturday, March 7, 5:30 PM - Dinner with the speaker at Frascati's Restaurant in Bethesda before the monthly meeting. Reservations are for 5:30 Sharp!

Saturday, March 7, 7:30PM - Harold Williams (Montgomery College) "The Formation of Stars." Meeting will be held in the Bunim Room at the National Institutes of Health. For directions refer to map and description on inside back page.

Tuesday, March 3, 10, 17, 24, 31, 7:30 PM - Telescope making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

Friday, March 6, 13, 20, 27, 7:30 PM - Telescope making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 202/362-8872.

Friday, March 13, 27, 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 (703) 960-9126.

Friday, March 20, 7:00 PM - "The Rites of Spring, the Vernal Equinox," public planetarium program at Montgomery College Planetarium at 7600 Takoma Avenue (Takoma and Fenton Street). Information: Dr. Harold Williams, 301/650-1463 (office), 301/942-1014 (home).

Next Month:

April 4, 7:30 PM - James Zimbleman, (National Air and Space Museum) "Geology of Mars"

April 10-11 - Earth Night in Shenandoah National Park. (See article, page 1)

A Clever Use of Rings Around Galaxies

(February Colloquium Report)

by Nancy Byrd

We know that there is abundant dark matter in the universe, for we can often see it silouetted against illuminated matter. But what about the matter that we cannot see? How much dark matter is present? What is its distribution, and its nature? These questions have remained largely unanswered by astronomy. However, at the February 1 meeting of National Capital Astronomers, Dr. Penny Sackett described for NCA an intriguing way of determining the distribution of dark matter in at least some galaxies, that is by studying galaxies which are surrounded by highly inclined rings.

Dr. Sackett, currently on leave from the University of Pittsburgh, and serving as Program Director for Education, Human Resources, and Special Programs

in the Division of Astronomical Sciences at the National Science Foundation, began her talk by pointing out that there are three main types of galaxies: the elliptical galaxies, such as M87, the spiral galaxies of which there are two types: spiral and barred spiral galaxies, and the irregular galaxies, such as the Magellanic clouds. In the classification scheme developed by Edwin Hubble, the elliptical galaxies are designated E0 for the most spherical, and up to E7 with increasing eccentricity. The spirals have centers proportionately more flattened in the plane of the arms, and are designated Sa, Sb or Sc with increasing looseness of the spiral arms; similarly the barred spirals are designated SBa, SBb or SBc with loosening of the arm structure. The S0

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OCCULTATION EXPEDITIONS PLANNED

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

Date	Time (EST)	Place	Visible Magnitude	Percent Sunlight	Cusp Angle	Minimum Aperture
<i>Grazing Lunar:</i>						
Mar. 8	20:36	Richmond, VA	8.0	19	12N	6 cm
Mar. 9	22:10	Stafford, VA	28 6.9	28	13N	6 cm
Mar. 12	18:57	Ladysmith, VA	6.6	60	8N	6 cm

Date	Time	Place	Star Mag.	Delta Mag.	Name	Aperture
<i>Asteroidal:</i>						
Mar. 9	23:03	Cuba*	11.5	0.6	(451) Patientia	20 cm
Mar. 17	1:32	Florida*	8.8	4.5	(34) Circe	10 cm

*Appulse to be observed for possible satellites or path shift. Observers should obtain a finder chart from Dunham or IOTA.

Astronomy and Personal Computers

by Joan Bixby Dunham

Astronomical Computing

Jean Meeus has written a new book on computing in astronomy, called *Astronomical Algorithms*. This is a very useful book and I recommend it highly. It is a considerable expansion over his previous book on the same subject, *Astronomical Formulae for Calculators*. The book may be obtained from the publisher, Willmann-Bell, who sells by mail, or from Sky Publishing Corporation. I also recommend that anyone who wants to try some of the more difficult and lengthy computations of Meeus' book, such as the planetary motions computations, purchase one of the companion diskettes that includes the software. Entering the pages and pages of numbers for the some of the series could be tedious: the diskettes are well worth the extra expense.

Software for Physics Courses

A group called the Consortium for Upper-Level Physics Software (CUPS) has a project to develop simulations software for physics courses, to increase the usage of computers in physics classes. They are developing 27 programs for nine courses, which

includes astrophysics and optics. One of the benefits of this will be a consistency in the software among the courses, so that students who become familiar with the software in one course will be able to use that knowledge in another. The software is being developed in Pascal on PC's with 80386 processors and color VGA graphics. Later they will convert the software to the Macintosh.

George Mason University is providing financial support for this project along with the National Science Foundation and IBM. Anyone interested in this should first read the article in the Jan./Feb. 1992 issue of *Computers in Physics*, Vol. 6, No. 1, pp. 90-96.

One point made in the article that interested me was the comment on why the software is to be simulations and not tutorial. They say, "This

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EARTH NIGHT From Page 1

ronments of mountain and sky on a night when the brightest parts of our Milky Way Galaxy rise into view. It offers a perfect way to compliment celebrating Earth Day 1992, by making your Earth Day an Earth NIGHT!

This tour, offered as the Smithsonian Institution Resident Associate Program Tour for Earth Night 1992 — April: “The Galaxy, Spring Sky, and Nocturnal Nature,” is the fourth in a scheduled series of “Earth Night” programs stemming from an idea originated by the author for celebrating “Earth Night” in association with the more famous Earth Day. He has subsequently developed and improved it, with the assistance of NCA’s Walter Nissen, Karen Gray of the Smithsonian Institution Resident Associate Program, and Rob Gibbs of Brookside Nature Center. This program has been very favorably received, with informal endorsements by the International Dark-Sky Association and the Sierra Club. This “Earth Night” program, like the “Exploring The Sky” program, is a major NCA contribution towards instilling an appreciation for the natural world by increasing public awareness about Earth in her own environment.

Daniel Costanzo, Walter Nissen, and Rob Gibbs will lead this April’s “Earth Night” program. Participants journey to Big Meadows on Skyline Drive high up in Virginia’s Blue Ridge Mountains, remaining until dawn. There, a vast open area provides excellent observing possibilities. This tour coincides with the rising of our Milky Way Galaxy, with astronomy activities covering observing using the unaided eye, binoculars, and small telescopes. As the sky and scheduling permits, trip leaders will aid participants in identifying numerous objects, including artificial satellites, the Moon, several planets, stars of particular interest, star clusters, nebulae, and other galaxies. Emphasis here will be on how the wealth of new knowledge about even our Universe’s remotest regions aids in saving our global environment. Discussion of astronomical equipment, nocturnal nature, and Earth’s place in the Cosmos will occur even if weather restricts observation.

Naturalist activities include nature walks to watch and listen for nocturnal animals and observe how animals and plants become active in spring. The trip leaders will attempt to attract owls by calling, and to detect bats with special sensing equipment, and to point out deer, foxes, skunks, rodents, frogs, and insects if possible. The group leaders will initiate a, hopefully lively discussion of the influence of night on plants and animals and the environmental consequences of “light pollution.”

The tour lasts from Friday, April 10, 10:30 p.m. to Saturday, April 11, 10:30 a.m. It is by bus from the Smithsonian with an additional stop at the Vienna Metrorail station, south side Kiss and Ride area. Light snacks will be available during the night, and the tour bus will stop in Warrenton, Virginia for purchasing breakfast on the return trip in the morning.

In the event of forecasted general overcast or rain, the Earth Night program will be rescheduled to Friday, April 24, 9:00 p.m. to Saturday, April 25, 9:00 a.m. (note that these hours are different from primary date’s). Advice on what to wear and bring, with details on weather cancellation procedures will be mailed prior to the tour.

Additional details, costs for Smithsonian Institution Resident Associate members and non members, and registration can be obtained by calling the Smithsonian Institution Resident Associate Program at 202/357-3030 (Fax: 202/786-2034). This tour will be listed as “The Galaxy, Spring Sky, and Nocturnal Nature.” Minimum age is 14.

Warning: the site will be purposefully kept unlighted. Participants must assume their own personal responsibility for safely moving about in the dark.

Note that these “Earth Night” tours have sometimes been completely sold out, resulting in a long waiting list of standbys. So please sign up early!

COMPUTERS, From Page 3

galaxies, postulated but not seen by Hubble, are flattened, but do not show spiral arms. In addition, she said, there are a number of unusual galaxies: for instance, NGC 5128, Centaurus A, shows an intense band of dark matter, that appears to encircle a central elliptical galaxy. Another, NGC 3718, appears to be S0 at the center, with filaments of dust rotating about the center, in a different orbit from the central mass.

If you know the velocity of rotation at various distances along an arm or disk, you can estimate a galaxy's gravitational attraction and hence its mass. By measuring differences in red shift from one side to another of an edge-on galaxy, you can infer the speed of rotation, but to do so, says Dr. Sackett, you need a high dispersion prism, a large telescope, a small field of view, good seeing, and you must be lucky. Then, from the velocity of rotation, you can infer the mass.

If a galaxy were to rotate like a solid body, then the angular velocity would be constant and the radial velocity would be linear and increasing with increasing distance from the center of the galaxy. But if all but a negligible amount of the mass of a galaxy resides at its center, then the observed velocity of a particle outside of the center would vary according to the relation,

$$v^2 = G M_{gal} / r,$$

where v is the radial velocity, G is the gravitational constant, M_{gal} is the mass of the galaxy and r is the distance of the particle from the center of the galaxy. What astronomers expected to see, however, was a somewhat bell shaped curve for the velocity with respect to the distance from galactic center. That velocity distribution would correspond to the fraction of mass that appeared to be concentrated in the center from optical observations. Surprisingly, measurements taken in 21 cm radiation did not show this to be the case. The velocity, where we can measure it, flattens out but does not diminish with increasing distance from the center. Thus there must be much more dark matter than visible. Dr. Sackett estimates that typically the mass of dark matter is four to ten times the mass of stars. She pointed out that we know

nothing about this matter. Attempts have been made to study the distribution of dark matter in our own galaxy, she added, but we are too close to get rid of multiple signals. Moreover, in studying single rotation curves from other galaxies alone, we do not have enough data to infer the shape of the dark matter. Is it a spherical halo, a disk, solid or gaseous matter?

A promising avenue of research is the study of galaxies with polar rings. These rings, seen in a small percentage of galaxies, rotate independently from the equatorial disk or spiral arms. Thus the presence of a polar ring around a galaxy permits astronomers to measure velocity with respect to radius in two dimensions. Because they have two rotational directions, they have two different rotation curves. With this extra information one can learn about the shape of the dark matter. Dr. Sackett and her colleagues made use of both the VLA and the ESO 3.6 meter telescope for this purpose. From her studies, she was able to determine that the dark matter constitutes 75 to 90% of the total mass of the galaxies studied and that it extends at least as far as the radio size of radio galaxies.

COMPUTERS, From Page 3

decision was based on a desire to stay away from anything that resembled the Computer-Assisted Instruction (CAI) software-style now in disrepute." I am not quite sure what they mean by "software-style," unless it is the format in which some material is presented and then a quiz is given over that material. There are a number of companies selling CAI systems that might disagree with the judgment that the software is in "disrepute."

The software is expected to be published in 1995, and the source code will be provided.

From the Local Group

Member to Member Communications

Junior Division News

by Leith Holloway

The mentor program for NCA junior members is still in operation. Any junior desiring help with an astronomy project may call me for referral to an adult member who has expertise in the junior's particular interests. Don't be timid about calling me (at 301/564-6061). We are eager to help you. All juniors, including youngsters in homes with NCA family memberships, qualify for this assistance.

Science Fairs are Coming Up

During the months of March and April, local area schools will be featuring science fair competitions. Use your scientific education to contribute to the community by judging at these fairs. If you can help, contact Jay Miller at 301/530-7942

New Affordable Observatory Marketed by NCA Member

Good News! You can now purchase a ten-foot dome that is affordable, weather-tight, and easy to assemble. HOME-DOME is a new product of Technical Innovations, a family business operated by NCA members John and Meg Menke of Barnesville, Maryland.

NCA's March meeting agenda will feature a short presentation by John and Meg, including photographs of their HOME-DOME and an invitation to take advantage of a special introductory price: \$3000 for a complete dome system.

HOME-DOME ads appear in the March issues of *Sky and Telescope* and *Astronomy*. The response has been strong — more than three dozen astronomers from throughout the country called for information in the first two weeks.

If you are among those dreaming of an observatory but cannot attend the March NCA meeting, call the Menkes at Technical Innovations, 301/972-8040, for a free brochure.

NCA Building at Naval Observatory Needs Repair

The building which housed the 5 inch Clarke refractor at the Naval Observatory has been condemned because of a weak floor. Because of this problem, you won't be able to use the facility until this matter is resolved.

Telescope for Sale

Unbelievable views! Coulter Odyssey II, 17.5 inch reflecting telescope. Dobsonian mount allows easy setup and use. Very good f 4.5 mirror. 26 mm eyepiece with Lumicon premium H-beta filter, good for the Horsehead Nebula. No wait, available now. \$950. Carl Adams 703/391-8838.

Maryland Viewing Site Offered

John and Meg Menke are making their small farm in Barnesville, Maryland available for night viewing by NCA members. Their "observatory hill" is as free of light pollution as any place in northern Montgomery County and features their HOME-DOME. Barnesville is in the shadow of Sugarloaf Mountain on the Montgomery/Frederick County border. The Menke's farm is easy to find, just five miles from the Hyattstown exit (RT.109) on I-270.

The Menkes request that you call before coming to let them know your plans and to get more detailed directions. The phone number is 301/972-8040.

EXCERPTS FROM THE IAU CIRCULARS

by R.N. Bolster

1. January 9 - E. Helin and J. Alu discovered a comet (1992a) of 16th magnitude in Hydra on photographs taken by them and K. Lawrence with the 46-cm Schmidt telescope at Palomar.
2. January 11 - W. Liller, Vina del Mar, Chile, discovered a supernova of 14th magnitude in NGC 1380 on PROBLICOM exposures.
3. January 31 - W.A. Bradfield, Dernancourt, Australia, discovered a comet (1992b) of 10th magnitude in Lupus. Orbital elements by McNaught indicate that the comet will reach perihelion on March 19 at 0.5 AU from the Sun.

National Capital Astronomers, Inc.

is a non-profit, public-service corporation for advancement of the astronomical sciences and is the astronomy affiliate of the Washington Academy of Sciences. For information, call NCA: (301) 320-3621.

SERVICES AND ACTIVITIES:

A Forum for dissemination of the status and results of current work by scientists at the horizons of their fields is provided through the monthly NCA Meeting. (See monthly *Stardust* for time and location.) All interested persons are welcome; there is no charge.

Expeditions frequently go to many parts of the world to acquire observational data from occultations and eclipses which contribute significantly to refinement of orbital parameters, the coordinate system, navigation tables and timekeeping. Other results of this work under continuing study include the discovery of apparent satellites of some asteroids, discovery of apparent small variations in the solar radius, and profiles of asteroids.

Discussion Groups provide opportunities for participants to exchange information, ideas, and questions on preselected topics, moderated by a member or guest expert.

Publications received by members include *Sky & Telescope* magazine and the monthly publication of NCA, *Star Dust*.

The NCA Public Information Service answers many as-

tronomy-related questions, provides predictions of the paths and times of eclipses and occultations, schedules of expeditions and resulting data, assistance in developing programs, and locating references.

The Telescope Selection, Use, and Care Seminar, held annually in November, offers the public guidance for those contemplating the acquisition of a first telescope, and dispels the many common misconceptions which often leads to disappointment.

Working Groups support areas such as computer science and software, photographic materials and techniques, instrumentation, and others.

Telescope-Making Classes teach the student to grind and polish, by hand, the precise optical surface that becomes the heart of a fine astronomical telescope.

NCA Travel offers occasional tours, local and world-wide, to observatories, laboratories, and other points of interest. NCA sponsored tours for comet Halley to many parts of the southern hemisphere.

Discounts are available to members on many publications and other astronomical items.

Public Programs are offered jointly with the National Park Service, the Smithsonian Institution, the U.S. Naval Observatory, and others.

PLEASE ENROLL ME IN NATIONAL CAPITAL ASTRONOMERS MEMBERSHIP

Regular (\$38 per year) Each regular membership receives *Sky & Telescope* & *Star Dust*.

Junior (Only open to those under age 18) Date of birth: _____

Junior members pay a reduced rate and may elect not to receive *Sky & Telescope*.

Sky & Telescope and *Star Dust*. (\$25 per year)

Star Dust only (\$10 per year)

First name Middle Last name (____) _____
Telephone

Street or Box Apartment City State Zip

If family membership, list names of additional participating immediate family members in same household, with birthdates of all those under 18 years old: _____

Note: If you already subscribe to *Sky & Telescope*, please attach a recent mail label, or indicate the expiration date: _____. A prorated adjustment will be made. Make check payable to National Capital Astronomers, Inc., and send with this form to:

Leith Holloway 10500 Rockville Pike Apartment. M-10, Rockville, MD 20852.

The following information is optional. Please indicate briefly any special interests, skills, vocation, education, experience, or other qualifications which you might contribute to NCA

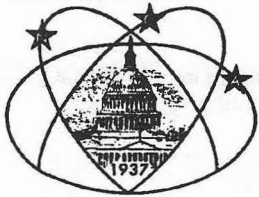
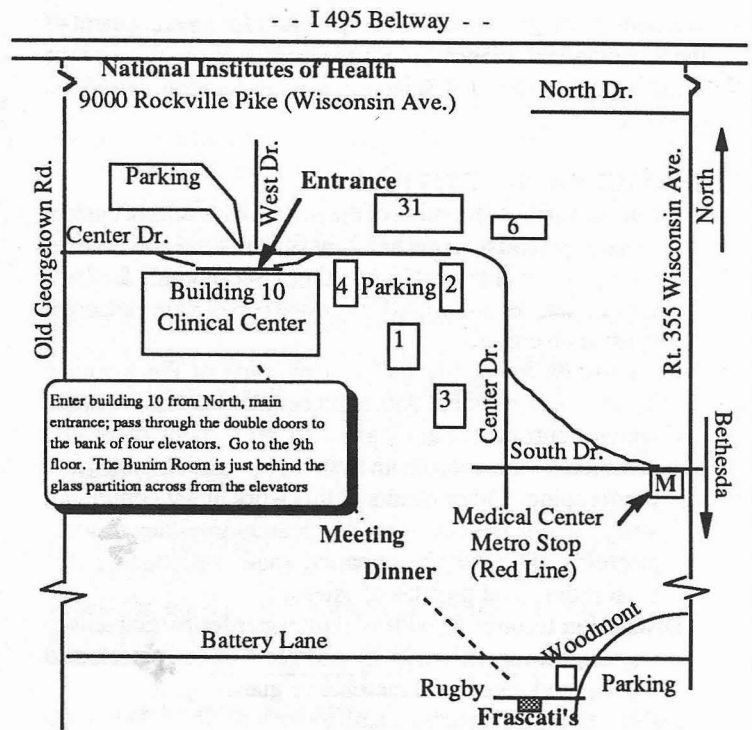
Thank you, and welcome!

Getting to the NCA Monthly Meeting

•Subway Riders - From Medical Center Metro Stop: Walk down the hill, pass the bus stops and turn right at the anchor (onto Center Drive). Continue uphill to building 10, the largest building on campus.

•To Frascati's: Proceed down Wisconsin Avenue toward Bethesda. Bear right onto Woodmont (or the next right onto Battery Lane), follow Woodmont across Battery, take a right onto Rugby and park. The restaurant will not guarantee seats after 5:30.

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