★ STAR DUST

Volume XXXIX May 1983 Number 9

MAY FEATURES: ELECTION, AWARDS, FILMS, AND A TRIP

At the 7 May meeting of National Capital Astronomers, officers will be elected for fiscal 1984. Following the election, membership awards will be made to five winners in astronomy in area science fairs. Two films will follow the awards: *New Eyes on the Universe* and *Powers of 10*, courtesy of the National Air and Space Museum and Rock Creek Nature Center, respectively.

On the weekend of 14-15 May, NCA members will have an opportunity to tour the Naval Radio Astronomy Observatory at Sugar Grove, and the National Radio Astronomy Observatory at Green Bank, West Virginia. See page 35 for details, and *act promptly!*

The Nominating Committee, Nancy Hueper, Chair, Jerry Schnall, and Pat Trueblood, have presented the following slate: President, Robert H. McCracken (incumbent); Vice President, Geoffrey Chester (now Sergeant at Arms); Secretary, Stanley G. Cawelti (incumbent); Treasurer, Ruth S. Freitag, (incumbent) Trustee, Bill Pala, and Sergeant at Arms, Frank Baffa.

Other nominations may be made by petition of ten full members in good standing presented to the Secretary prior to the election.

The annual National Capital Astronomers Science Fair Awards will be presented to Karlton Johnson, Friendly High School, Oxon Hill, Maryland; James McAdoo, McLean High School, McLean, Virginia; Miss Sibani Pati, Robert Goddard Middle School, Lanham, Maryland; Corey S. Powell, Walt Whitman High School, Bethesda, Maryland; and Patrick Wamsley, Hammond High School, Alexandria, Virginia.

These winners will receive a one-year membership in NCA, including *Star Dust* and *Sky and Telescope*, and a certificate suitable for framing.

We thank the NCA judges for their services: James Gilfillan, John Lehman, Gary Thom, and James Trexler.

The two short but interesting films will be presented in lieu of the usual lecture in order to meet time constraints.

MAY CALENDAR — *The public is welcome.*

Tuesday, May 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, 362-8872.

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

Friday — Monday, May 6, 7, 8, 9 — Cluster-Validation Group expedition to Shenandoah Mountain Meadows site. Information: Jim Trexler, 839-3490.

Saturday, May 7, 6:15 pm — Pre-meeting dinner at the Thai Room II, 527 13th Street, NW. Reservations unnecessary.

Saturday, May 7, 8:15 pm — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Election, awards, films.

Friday, May 13, 9:00 pm — *Exploring the Sky*, presented jointly by NCA and the National Park Service. NOTE different day. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Planetarium if cloudy.

Saturday, Sunday, May 14-15 — Trip to Sugar Grove and Green Bank. Page 35.

Saturday, May 21, 8:00 pm — Discussion group at the Department of Commerce, Conference Room D: Coordinate systems and coordinate-conversion algorithms. Bob Bolster, 960-9126.

APRIL LECTURE

Dr. Henning Leidecker, Associate Professor of Physics at American University, addressed the April meeting of National Capital Astronomers. After reviewing the history of thoughts on gravitation he presented the results of new theoretical work soon to be published by a colleague, Joseph Goldman, which denies the existence of black holes.

Dr. Leidecker began with Newton's *Principia*, which explained most of the observations of celestial mechanics of his day, as well as the phenomenon of the tides. As one example, he cited Kepler's third law, which states that the cube of the mean distance from a planet to the Sun varies as the square of the orbital period. (Ed. note: Newtonian mechanics leads to a slightly different and better law.) Further, *Principia* predicted new results and led to progress by others, notable Halley's theory of comets. Later, it was used to predict the existence of Neptune and led to its discovery.

Principia established strong principles for celestial mechanics: Newton's first law: Force = mass x acceleration — and the clear concept of an inertial reference frame. But Newton emphacised that it also posed a dilemma — action at a distance. How can the influence of one body on another with which it is not in contact be explained? A series of exchange-particle theories has been evolving over the last century. Leidecker gave a wide range of examples.

It began in chemistry ("physics too complicated for physicists"). J. J. Thompson found the electron, a universal component of matter. G. N. Lewis conceived the shared-electron covalent chemical bond. Pauling explained it through quantum mechanics: It is a minimum-energy arrangement of the electrons, which depends critically on the mass of the electron.

Maxwell established the notion of the electromagnetic field. Planck saw that all classical explanations must be wrong, and introduced the quantum of action. in the 1910's Einstein saw black-body radiation as a "sea of light particles" — photons: Every charged particle is surrounded by a photon gas. Shake (accelerate) a charged particle and it radiates photons.

In the early 1930's the very short-range ***strong force*** was found. It is 10 to 100 times as strong as the electromagnetic (Coulomb) force. Yukawa associated it with a particle, the Yukawa pion, whose nature follows from the range of the force.

The ***weak force*** allows beta-decay of atoms. its W (for "weak") particle was recently found. It has a mass of about 90 times that of the proton. There are also "less elementary" forces: Chemistry's is that of the electron. Superconductivity was explained about a decade ago through its phonon exchange particle.

Gravitation remained a dilemma; it "should" involve gravitons. (Ed. note — as exchange particles — not the gravitons of the long-abandoned graviton theory which postulated the pressing together of mutually shielded masses by bambardment.) As gravitation is extremely weak, the particles would be extremely massive.

Einstein never accepted gravitons. His general relativity follows Maxwell and mocifies Newton with a finite propagation velocity of electromagnetic radiation. In general relativity acceleration and gravitation are indistinguishable. Energy is equivalent to mass; kinetic energy appears as increased mass. Gravitation is interpreted as curved space. This is the canonical explanation today. There is gravitational radiation but no associated particles in the Einstein theory. The theory is nonlinear. Forces are described in terms of tensors.

Wheeler proposed black holes, where gravitational potential is so large that not even light can escape. In relativity, clock rates slow (time flows more slowly) in a gravitational field. A paradox results: a (foolish) observer enters a black hole very quickly and can never escape. Observed from the outside, however, he is seen to approach the black hole asymptotically, slowing in the

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OCCULTATION EXPEDITIONS PLANNED

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

UT Date	UT Time	Place	Vis Mag	Pcnt Sunlit	Cusp Angle	Min Aper
05-15-83	01:29	Bordentown, NJ	7.7	06	1N	15 cm
05-18-83	04:07	Longmont, CO	4.7	33	6N	5 cm
ASTEROIDAL:			Star Mag	Delta Mag	Name of Asteroid	
05-14-83	11:01	sw USA, Mexico	7.2	7.0	(521) Brixia	5 cm
05-29-83	04:57	Florida & Texas	4.8	5.0	(2) Pallas	3 cm

NCA WELCOMES NEW MEMBERS

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NCA GREEN BANK, SUGAR GROVE TRIP SET. DON'T MISS THIS ONE!

Another memorable weekend for National Capital Astronomers will be the 14th and 15th of May, when members will tour both the Sugar Grove facility of the Navy and the National Radio Astronomy Observatory at Green Bank, West Virginia.

Our chartered (Gold Line) bus will leave at 10:00 am on the 14th for Sugar Grove, with a lunch stop enroute. Following our afternoon tour, we continue to the Marlinton, West Virginia Motel, where two dining rooms are available for dinner, and a dark area is available under dark sky. Designated individuals will provide telescopes. (To leave sufficient space for baggage.)

After Sunday breakfast we begin our tour of the National Radio Astronomy Observatory, including the 300-foot (football-field sized) radiotelescope. On our last tour, we were priviledged to hear and see (electronically) simultaneously, "live" pulsars using the big dish! We will also see the 140-foot equatorial, the interferometer, now the only dedicated astrometric interferometer in the world, Grote Reber's original radio telescope, and the laboratories.

In the afternoon we will return to Washington, with appropriate meal stops

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EXCERPTS FROM THE IAU CIRCULARS

!. March 17 — J. A. Graham, Cerro Tololo Interamerican Observatory, found a starlike object in Herbig-Haro 57 in Norma on image-tube photographs taken with the Yale 1-m telescope. No object was seen there on 1976 photographs, and ESO-SRG Atlas photos show only a faint, diffuse object. He suggests it may be a pre-main-sequence object such as a T-Tauri star.

2. March 28 — Suggs and Beebe, New Mexico State University, reported that plates taken by Murrell at Tortugas Mountain Observatory showed a bright white cloud at latitude +38 deg. on Saturn.

3. Okazaki, Kahoku-machi, Yamagata, Japan, discovered a supernova of 13th magnitude in NGC 4753 on a photograph taken with a 25-cm Wright telescope. The object was independently discovered visually two days later by R. Evans, Maclean, NSW, Australia.

APRIL LECTURE — Continued

increasing field as he approaches, thus never reaching it. For the outside observer, the black hole thus does not exist.

Dr. Leidecker introduced Dr. Joseph Goldman, whose interpretation of standard relativity does not admit black holes.

The difference between the metric for gravitons and that for photons rests on the graviton's having spin 2, vice spin 1 for the photon. Its very high mass implies a very short range.

Goldman's theory no longer requires the Hawking process. Hawking showed that quantum mechanics implies that black holes evaporate, the rate increasing with progressive mass loss.

John B. Lohman

GREEN BANK TRIP — Continued

enroute.

Depending upon the number (last time we filled our quota) the transportation cost will be about $37.00. Rooms are $18.00 double, $25.00 single. A West Virginia room tax of 5 percent will apply.

Make checks (for transportation only) payable to National Capital Astrono mersmers, and mail to Nancy L. Hueper, 5504 Christy Drive, Bethesda, MD 20816, in time to be received by 10 May. Some small adjustment may be made after the list is complete.

For further information, call NCA at 320-3621. If no answer, call 229-8321 and leave your name and number on the tape for a call back.

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