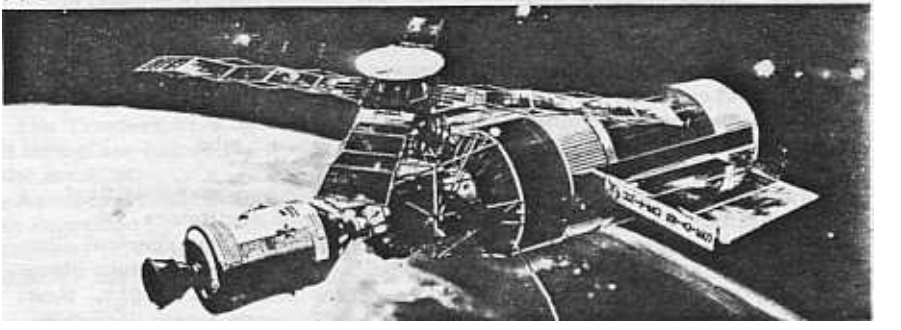
☆ STAR DUST

Volume XXVIII June 1972 Number 10

NCA PRESENTS TRIPLE-FEATURE FILM NIGHT



Artist's conception of SKY LAB 1973. In future years, space shuttles, the subject of one of our films this month, may make low-cost travel possible between earth and such manned orbiting laboratories. NASA photo.

Three NASA color films will be shown at the June 3 meeting of National Capital Astronomers, in a departure from the usual guest-lecturer format of the meetings.

Flight Without Wings portrays the developments leading to design of the planned reuseable space shuttle, designed for low-cost manned flight between earth and space stations. (Silver medal, International Film and TV Festival.)

Mariner-Mars '69 shows the rich results of the Mariner 6 and 7 spacecraft fly bys of Mars. Many newly computer-processed pictures of Martian landscapes are included. (Gold award, U. S. Industrial Film Festival.)

Apollo 13 dramatically depicts the teamwork between Houston Mission Control and three astronauts en route to the moon that safely returned the explosion-damaged spacecraft to earth from beyond the moon. (All are G-rated.)

JUNE CALENDAR

Friday, June 2, 9, 16, 23, 30, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, June 3, 8:15 PM — NCA Monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Three NASA films will be shown. Election of new officers will take place BEFORE the films. ALL MEMBERS PLEASE BE PRESENT SO THAT THERE IS A QUORUM. The annual meeting was postponed from May. (No speaker's dinner in June.)

Monday, June 5, 19, 9:00 to 10:00 PM — Neighborhood Astronomy on the observing deck of the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Rene Lamadrid, 585-5569.

Friday-Sunday, June 9, 11 — Middle East Region Astronomical League convention at Ramada Inn, near Harrisburg, Pennsylvania. Most sessions are on Saturday, with several professional talks scheduled. See May, 1972 *Star Dust* or Bob Wright, EV4-6748, for details.

Saturday, June 17, July 22, 9:00 PM — Exploring the Sky, presented jointly by NCA and National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Information: Bob McCracken, 229-8321.

NCA MAY LECTURE

Richard Keating of the Naval Observatory Time Service Division spoke at the May 6 meeting about atomic clocks, their history and use in experimental tests of relativity theory. His small division plays a part in nearly all agencies of the U. S. Government by virtue of its role as the Nation's timekeeper.

Keating reviewed the instruments used in stellar time determination. He discussed the development of *continuous* timing methods such as the water clock, of *aperiodic* timing methods such as escapements, and of *resonance* methods such as pendulums and crystals.

Quartz crystal clocks did not replace pendulum clocks as official instruments at USNO until 1950. Among milestones in the development of resonance timekeeping were:

1857 — Tuning fork operated electrically
1919 — Tuning fork vibrations amplified by vacuum tube
1919 — Quartz crystals used in timepieces
1928 — Energy-state separation of neutral atoms by a magnetic field
1940-1955 — Perfection of stable crystal electric oscillators
1948 — Quartz crystal oscillator controlled by molecular spectral line
Early 1950's — Atomic clock developed using resonance in cesium atom

The first commercial atomic clocks were accurate to one part in 10^{11}. Now they attain one part in 10^{14} accuracy. After diagramming the principles behind atomic clocks, Keating noted their coming importance in preventing high-speed aircraft collisions, where the lack of synchronization of travelling conventional clocks is a serious problem.

During an extensive question period, Mr. Keating called for much more experimentation in support of relativity theory, noting that results from his around-the world atomic clock flights confirmed Einstein's special theory but not the general theory. He said that the hydrogen maser is today's best atomic clock.

The first atomic-beam clock, developed at the National Bureau of Standards in 1950-52. It used a line in the hyperfine-structure spectrum of cesium. (NBS photo.)

1972 SCIENCE FAIR AWARDS

NCA this spring awarded nine area county science fair exhibitors one-year membership in the Society and a one-year subscription to *Sky and Telescope* to begin in September. The winners, who will receive certificates at the June 3 meeting are:

Dana Brown (Photoelectric Astronomy)
Gilad Gordon (Solar Mass)
Stephen Shellnutt (Black Holes)
John Campbell (Astrophotography)
Aubrey Jackson (Atomic Radiations)
Kenneth Keene (Stellar Properties)
John Ramos III (Relativity)
Tanya Semper (Solar System Origin)
Frank Hopke (Meteorite Impacts)

Congratulations to this year's winners. Honorable mention goes to Tamara Ann Shapiro and Mark Wilfinger.

1972 NCA ELECTION

At the June meeting, members will elect officers for the fiscal year beginning July 1, 1972. The Nominating Committee presents the following slate:

President — Dr. John A. Eisele
Vice President — Dr. Henning W. Leidecker
Secretary — Estelle Finkle
Treasurer — Richard A. Horwitz
Trustee — William R. Winkler
Sergeant at Arms — Lawrence C. Torrance

George E. Gould was nominated for President at the April meeting by petition. It will be possible to nominate by petition at the June meeting also. Signatures representing 10 full votes are required.

The Trustees have agreed that only the election part of the annual meeting will take place before the films. Members shall register and receive a single ballot form.

A proposed constitutional change, requiring voting by mail for officers, has been suggested by Jerome Hudson and Rene Lamadrid, among others. Discussion of this will take place at the meeting. ALL MEMBERS PLEASE BE PRESENT SO THAT THERE WILL BE A QUORUM.

CARL SAGEN — "THE VIEW FROM MARINER 9"

A number of NCA members attended the "Frontiers of Geophysics" session of the American Geophysical Union annual meeting on April 19. They will agree, I think, that the Cornell professor's lecture was as entertaining as it was erudite. Sagen stressed photographic results of the Mariner 9 Mars orbital mission yet noted that it was not primarily a photographic mission.

The polar caps are now believed to be layers of different kinds of chemical frosts, overlain by an atmosphere of mostly CO_2 but also CO and H_2O. Winds of 80 m/s may be expected on Mars. The planet-wide dust storm that Mariner 9 initially encountered was associated with a temperature pattern $25^{\circ}K$ warmer than that following the storm. A present mystery is how the Martian craters became so much more eroded than those of the moon. The vast part of the South Polar Cap which disappears seasonally is only centimeters thick. The topography under this part of the cap is quite featureless. The vast wrinkle-like features are of doubtful origin. Were they caused by tectonic forces or primeval water?

DID YOU KNOW THAT...

It is reported that when the second Soviet unmanned lunar lander returned to earth with its samples, horses and wagons were included in the recovery team?

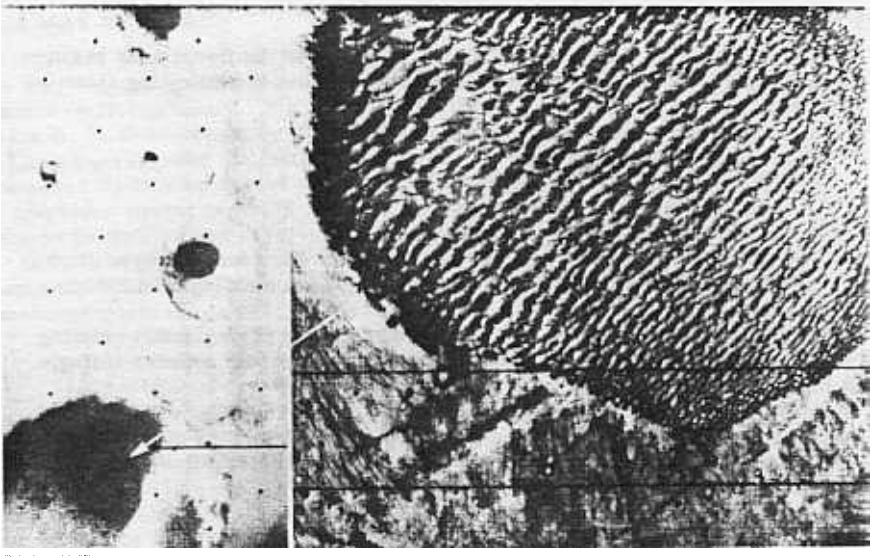
Calculations show that bodies in orbit around black holes could produce interstellar gravity waves of the type observed by Weber at the University of Maryland?

The May 1972 editions of *Scientific American* and the *Griffith Observer* contain good qualitative summaries of the concepts on which black holes are theorized?

That Apollo 16 Astronaut John Young leaped *"in air"* (on the moon) to salute the U. S. Flag, according to a *New York Times* picture legend, April 22, 1972?

CHANGE OF ADDRESS

Dr. James Q. Gant
1835 Eye Street NW, Suite
Washington, D. C. 20006



One of the last regularly scheduled pictures from Mariner 9 shows a wide-angle view of a 93-mi wide crater (left) in Hellespontus and a narrow-angle view (right) of a dune field of loose material within it. The dunes are 1 mi apart and believed to have been formed by the very strong southwest winds possible on Mars. (NASA photo courtesy Dick Horwitz.)

* STAR DUST

Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit, public-service organization for the promotion of interest and education in astronomy and the related sciences. President William Winkler, 1001 Rockville Pike, Apt. 1033, Rockville, Md. 20852 (762-5135); Vice-president, John Eisele; Treasurer-membership, Charles Shephard (364-8367). Star Dust production, William Winkler and Robert McCracken. Deadline: fifteenth of each month