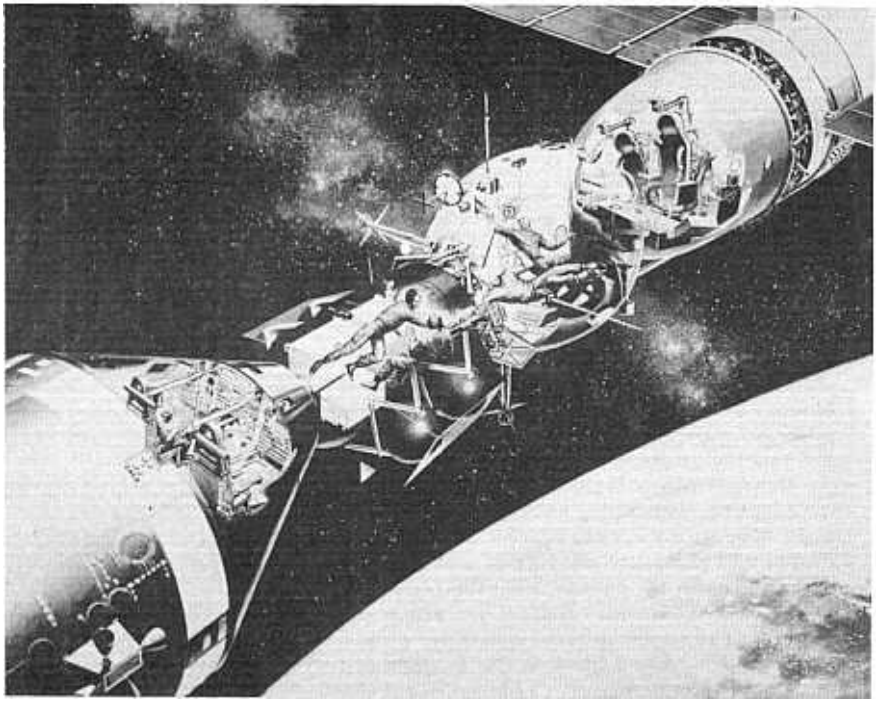
☆ STAR DUST

Volume XXXI Summer 1975 Number 11

APOLLO/COLO3-HISTORIC SPACE MEETING



Astronauts greet cosmonauts with handshakes in the Apollo / Soyuz docking module. NASA artist is Davis Meltzer.

JULY AUGUST CALENDAR

Friday, July 11, 18, 25, August 8, 15, 22, 29, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information: Jerry Schnall, 362-8872.

Saturday, July 12, August 9, 9:00 PM — Exploring the Sky, presented jointly by NCA and the National Park Service. Glover Road south of Military Road, NW, Near the Rock Creek Nature Center. Information: Bob McCracken, 229-8321.

Monday, July 14, 21, 28, August 4, 11, 18, 25, 7:30 PM — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Tuesday, July 29 — Aquarid meteor observation. See page 43.

Saturday, August 16 — Orbital calculations group discussion. See page 43.

JUNE LECTURE

Joseph Alexander, Head of the Galactic Studies Section of the Radio Astronomy Branch, Goddard Space Flight Center, surveyed the status of planetary radio astronomy, and discussed some important recent work regarding the non-thermal radio emissions of the three planets now known to be radio emitters, Earth, Jupiter, and Saturn.

Workers at Carnegie Department of Terrestrial Magnetism first detected intense, sporadic radiation from Jupiter in the dekameter-wavelength region in 1955; lower frequencies cannot penetrate the Earth's ionosphere, hence, are not detectable at the surface of the Earth. In 1958, using the new 50-foot radiotelescope, workers at the Naval Research Laboratory attempted to measure the temperature of Jupiter at 10-cm wavelength, which yielded 583°K. A later measurement at 31 cm gave 5500°K, and at 68 cm, 20,000°K! Infrared measurements had indicated a much more reasonable temperature of 140°K. Obviously, these radio emissions were non-thermal. It was at about this time that the Van Allen radiation belts of the Earth were discovered; the same sort of mechanism was the source of Jupiter's radiation: high-energy relativistic electrons trapped in Jupiter's strong magnetic field. Jupiter's thermal radiations, at much higher frequencies, indicate a temperature of about 130°K — in good agreement with the infrared measurements.

Radio Astronomy Explorer 1, launched in July 1968, received intense radiation from the Earth's auroral zone. At an altitude of 6,000 km, it was too close for definitive measurements, and the strong source interfered with the detection of other, celestial sources. RAE 2 was launched in June 1973 to orbit the Moon, where celestial sources could be measured by using the Moon as a shield, and Earth sources could be resolved by timing their occultation by the Moon. This technique disclosed a source about one Earth radius above the midnight meridian, intense, sporadic, and another within one Earth radius of the sunrise quadrant, weaker, continuous.

Interplanetary Monitoring Probe 6, using a spinning-dipole-pattern direction-finding technique, surveyed these sources over a 500-day period. The night source centers at about 300 kHz, the morning source at a somewhat lower frequency. Satellite photographs of auroral activity show precise correlation with the irregular bursts from the night source.

Open geomagnetic field lines which penetrate the bow shock of the Earth offer access to the auroral zones for solar-wind particles, accounting for the night source. Open lines at the magnetotail of the Earth likewise account for the morning source.

Jupiter also has two sources corresponding to those of the Earth: one night source, intense and sporadic, one morning source, weaker and continuous. A significant decrease in the intensities of both of these sources over 14 years of observation is not well understood. Another interesting phenomenon is the correlation of the emission of the night source with both the position of Io, the innermost of the Gallilean satellites, and the central meridian of the planet.

Saturn has now been found to be radiating non-thermally. The spectra of the three planets are similar, but peak at different frequencies. From the frequencies the magnetic fields can be determined. This yields a field of 13-16 Gauss for Jupiter, 1-2 Gauss for Saturn. Pioneers 10 and 11 measured the Jovian field to be between 10 and 16 Gauss.

The angular momentum of a planet is also related to its magnetic field, if it has one. A value of 1.8 Gauss is thus given for Saturn. On this basis, it is possible to predict that the magnetic field of Uranus, if it has one, is about 1.2 Gauss, corresponding to a radiation peak of about 0.5 MHz. Radio astronomers are now seeking such radiation from Uranus.

Using our knowledge of the Earth to help interpret our observations of the other planets, we can learn a great deal more about the internal processes in

NEW ACTIVITIES PROGRAM STARTS IN JULY

New NCA activities are getting underway in July and August which will continue in the fall as an added dimension to NCA programs.

1. A meteor observation and photography evening is planned for the Aquarids shower, Tuesday, July 29. Call Daniel Costanzo at 841-0051 or Dr. Henning Leidecker at 864-6816 for information. A practice run will be made before that night.

2. An orbital calculations group planning meeting will be held Saturday, August 16. Contact Dr. Victor Slabinski at 379-7180 for information.

3. An observation-discussion-photography evening will be held Saturday, September 20 at the home of Benson and Mary Ellen Simon. Photography and measurement of lunar crater shadow movements will be attempted. Call the Simons at 776-6721 for information.

4. Special-interest sections of the Association are being established to (1) develop programs of whatever scope the participants desire, and (2) to sponsor at least one mid-month discussion or demonstration program during the year aimed at the general membership. Mid-month observing and discussion sessions will be held during months when section programs are not scheduled.

Proposed sections are listed below together with an NCA member who will serve as an initial contact and organizer. Please call the listed person to express your interest and obtain further information. You may also phone NCA president Benson Simon at 776-6721 or vice-president Wolfgang Schubert at 321-9617 for information or to offer assistance with the program.

1. American Association of Variable Star Observers (AAVSO) activities, including photometry: Daniel Costanzo, 841-0051, and nova patrol: Bob Wright, 384-6748.
2. Association of Lunar and Planetary Observers (ALPO) activities, including transient lunar phenomena: Daniel Costanzo, 841-0051
3. Astrophysics, stellar evolution: Henning Leidecker, 864-6816
4. Celestial mechanics, orbital calculations: Victor Slabinski, 379-7180
5. Cosmology: Henning Leidecker, 864-6816
6. Extraterrestrial life: Mary Ellen Simon, 776-6721
7. Meteor observation: Daniel Costanzo, 841-0051
8. Occultations, precise timing techniques: Walter Nissen, 528-6671
9. Optics, instrumentation, telescope selection: Benson Simon, 776-6721
10. Radio astronomy: William Pala, Jr., 356-6007
11. Solar phenomena: William Winkler, 937-6927

BUSY SUMMER AT NASA – APOLLO/COIO3, MARS VIKING LANDERS I, II

Although the United States has launched satellites for many other countries, Apollo-Soyuz will be the first international manned project. Both Americans and Soviets will perform an array of experiments. The results of those having astronomical interest will be reported in *Star Dust*.

Mars Viking Landers I and II have been described in numerous NCA lectures and articles. NASA's Dr. Richard Young recently discussed the biological work (*Star Dust*, February and March 1975). Other investigations by these highly sophisticated probes will involve imaging, ionosphere, gravitation, thermal mapping, water vapor mapping, rotation, relativity, atmospheric parameters and composition, meteorology, geology, magnetics, seismology, physical and chemical surface properties, particle transport, and others.

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the planets, more about planetary evolution, and, in turn, more about our Earth.

Mr. Alexander closed with a brief summary of the planetary probes and investigations planned into the 1980's. An extensive question period followed.

EXCERPTS FROM THE IAU CIRCULARS

1. May 16 — Gibson, Hjellming, and Owen, National Radio Astronomy Observatory, detected variable radio emission at 8085 MHz from the eclipsing binary star RT Lacertae. The observations were made with the N. R. A. O. interferometer.

2. May 28 — W. Lowder, AAVSO, observed an outburst of CI Cygni. At magnitude 9.5, it was about 1 magnitude brighter than normal. E. Hayden and J. Bauer reported similar observations on the following day.

3. June 7 — J. Buff, MIT, reported a 20-fold increase in X-ray brightness of Aquila X-1 detected by the SAS-3 satellite. At energies of 1-5 keV the source became as bright as the Crab Nebula.

4. June 10 — A. J. Longmore, Siding Spring Observatory, discovered a comet on a plate taken with the 122-cm Schmidt by P. R. Standen. In Pavo, Comet Longmore (1975g) was reported to be of 17th magnitude.

5. June 12 — Hearn and Richardson, MIT, reported the discovery of a very soft X-ray source in Coma with the SAS-3 Satellite.

6. July 2 — T. Kobayashi discovered an 8th-magnitude comet, also reported by Berger and Milon. Comet Kobayashi-Berger-Milon (1975h) was in Aquarius near M2 on July 7 and is moving northward.

INFLATION

NCA had a small operating deficit this past year, and our two biggest expense items will increase significantly next year. *Sky and Telescope* subscriptions, our largest expense, will increase $1 each. Postage, our second largest expense, is also expected to go up sharply, with lower increases for paper, printing, etc. The trustees have concluded that a dues increase has become unavoidable. Renewal notices will reflect a $2.00 increase for all classes of membership, the first dues increase we have had in many years.

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FIRST CLASS MAIL