★ STAR DUST

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NEW VISTAS IN PLANETARY RADIO ASTRONOMY

JOSEPH ALEXANDER

Joseph Alexander, Head of the Galactic Studies Section of Goddard's Radio Astronomy Branch, will address the June 7 meeting of NCA on recent discoveries from radio emissions of the planets.

In the past few years, radio astronomical observations of the planets have provided new insights as significant as the initial discoveries of nonthermal radio emission from planetary magnetospheres in the late 1950's. Measurements from space-borne radio astronomical instruments have provided our first view of the Earth as a natural radio source, of the complete spectrum of Jupiter's low-frequency radio emission, and of the emission from Saturn's heretofore-undetected magnetosphere. Our speaker will review some recent, important developments in planetary radio astronomy and look ahead at what the next few years might bring.

A native of Virginia, Mr. Alexander received his B.S. and M.S. degrees in physics from William and Mary College, where he specialized in ionospheric radio propagation. He joined Goddard's Space Sciences Division in June 1962 as a member of the Planetary Ionospheres Branch. He is currently deputy principal investigator of the Radio Astronomy Experiment on the Mariner Jupiter Saturn mission, scheduled for launch in 1977.

Mr. Alexander has authored and coauthored dozens of papers in the field. He is a member of the American Astronomical Society, the International Scientific Radio Union (URSI), and the International Astronomical Union.

JUNE CALENDAR — *The public is welcome.*

Monday, June 2, 9, 16, 23, 30, 7:30 PM — Telescope-making classes at the Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

Friday, June 6, 13, 20, 27, 7:30 PM — Telescope-making classes at American University, McKinley Hall basement. Information; Jerry Schnall.

Saturday, June 7, 6:15 PM — Dinner with the speaker at Bassin's Restaurant, 14th Street and Pennsylvania Avenue, NW. Reservations not necessary.

Saturday, June 7, 8:15 PM — NCA monthly meeting at the Department of Commerce Auditorium, 14th and E Streets, NW. Mr. Alexander will speak.

Saturday, June 14, 9:00 PM — Exploring the Sky, presented jointly by the NCA and the National Park Service. Glover Road south of Military Road, NW, near Rock Creek Nature Center. Information: Bob McCracken, 229-8321.

NEW OFFICERS ELECTED

At the NCA annual meeting on May 3 the following officers were elected for the fiscal year beginning July 1, 1975:

President	Benson J. Simon
Vice President	Wolfgang A. Schubert (second term)
Secretary	William Pala, Jr.
Treasurer	Larry C. Torrance (second term)
Trustee	Henning Leidecker (4-year term)
Trustee	Jerome Schnall (for completion of term vacated by the resignation of John Eisele)
Sergeant at Arms	Paul Burnett (second term)

NCA WELCOMES NEW MEMBERS

Peter L. Petrakis
12115 Bluhill Road
Wheaton, Maryland 20902

Chris C. Ison, #4
1009 Kensington Street
Arlington, Virginia 22205

Charles Edmonds, #203
3707 Silver Park Drive
Suitland, Maryland 20023

ASTRONOMICAL LEAGUE CONVENTION AUGUST 13-16 IN ATLANTA

Preregistration for the annual AL convention, to be held at the new Ramada Inn Central, is being accepted until July 23. Fees range from $7.50 to 45.00 depending on inclusions. For further information call Bob Wright, 384-6748.

NOTE ON CURRENT RESEARCH

Quasar energy sources: black holes? — J. G. Hills presents an argument that tidal breakup of some of the vast number of stars in the nuclei of galaxies — and of the stellar material in quasi-stellar objects — is the source of energy that powers these objects. He postulates a black hole to cause the breakup. Writing in *Nature*, March 27, 1975, the University of Michigan professor elaborates on the effects of black holes as follows:

Stars passing inside the Roche limit of a hole will be broken apart by tidal forces. Some of the gas will escape the galaxy or quasar, much will ultimately be accreted by the black hole. Stars passing inside the smaller gravitational radius of the hole will be directly absorbed. Collisions between gas clouds originating from the breakup will release enormous amounts of energy and can explain several quasar phenomena. Eventually the gas-cloud kinetic energy is dissipated and the black hole absorbs it. Far ultraviolet and X-ray radiation released by ionization during this absorption produces many of the spectral features observed.

Concepts of normal stellar evolution show that if stellar density within a galactic nucleus is greater than two- or three hundred solar masses per cubic parsec, any seed black hole of 10 solar masses present would have had time to grow in density to the point where the associated radiation (not, of course, from *within* the black hole) would approach the maximum possible for the tidal breakup process, the Eddington limit. The brightest quasars are observed to radiate at nearly this intensity.

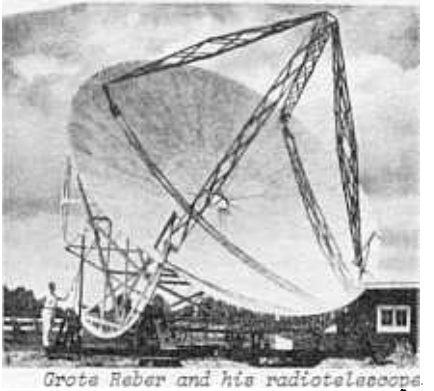
Hill considers the possibility that the observed infrared point source near the center of the Milky Way is due to the aggregation of stars broken up by a central black hole. If so, this hole would have about 100 solar masses and won't reach its Eddington limit for another 10^{10} years.

THE CHALLENGE OF NEW WORLDS TO CONQUER: RADIO ASTRONOMY

GROTE REBER - *1947 photo*

In June 1894 Sir Oliver Lodge announced his search for radio emission from the Sun. By about 1900 he decided that his efforts with his coherer and galvanometer in an unshielded shed were entirely inadequate; success was beyond the state of the art at that time. It was not until 1932 that Karl Jansky, a Bell Laboratories radio engineer, while studying noise sources with a directional antenna discovered one source which returned four minutes earlier each day. After many observations he correctly surmised that this noise source was extraterrestrial; radio astronomy was born. The 1974 Nobel Prize in physics was awarded to two radio astronomers, Martin Ryle and Antony Hewish; Jansky's work went almost unnoticed. Almost. One man, a radio engineer with Stewart-Warner in Chicago, Grote Reber, saw in Jansky's work a new world to conquer. For the next decade Grote Reber was alone in radio astronomy. Working out of pocket at his home in Wheaton, Illinois, he designed and built the first radiotelescope — the 31-foot steerable paraboloid shown here — in his backyard, where it was the source of many a question and rumor among his neighbors. With it and his dogged persistence ("I am a rather stubborn Dutchman") he pioneered the radio astronomy technology, undertook a radio survey of the sky, and by 1942 published the first radio map of the cosmos (*Proc. IRE*, August 1942). His subsequent work extended and refined his early data and included much solar work. In 1947 the National Bureau of Standards acquired Reber and his radiotelescope, which was dismantled and reassembled at the NBS field station near Sterling, Virginia. There, Reber studied the effects of cosmic noise on radio communication. The following year, Grote Reber became vice president of National Capital Astronomers!

The succeeding years brought rapid, worldwide recognition of the importance of the new science; larger and larger radiotelescopes proliferated. Still, in the United States — where it all began — more years passed before any serious effort was undertaken to stay abreast. In January 1954 a conference on radio astronomy was held in Washington, D. C., jointly sponsored by the National Science Foundation, the Carnegie Institute of Washington, and the California Institute of Technology. There began the concept that eventually resulted in a contract between the NSF and Associated Universities to establish the U. S. National Radio Astronomy Observatory at Green Bank, West Virginia. There, in the beautiful, mountain-rimmed valley, still unspoiled by the presence of the observatory, much of the finest work in radio astronomy is done. And there, beside the main entrance, stand the reconstructed Jansky antenna and the Reber radiotelescope — monuments to two devoted men who were ahead of their times.



Grote Reber and his radiotelescope at the Sterling, Virginia field site of NBS in 1947. Photos courtesy Walter Weinstein, NBS historian.

EXCERPTS FROM THE IAU CIRCULARS

1. April – Eyles, Skinner, and Willmore, University of Birmingham, and Rosenberg and Berthelsdorf, Mullard Space Science Laboratory, report a new transient X-ray source in Taurus. First observed on April 21 by Ariel-5, it was brighter than the Crab Nebula by April 28.

2. Gottlieb and Liller, Harvard and Smithsonian Observatories, report that irregular optical variable X-Perseii, identified also as an X-ray source, has been fading since early 1974, and is now fainter than at any time since 1936. Observed in April at (blue) magnitude 6.8, it has varied from 5.9 to 7.

3. Liller, Harvard and Smithsonian Observatories, and Murdin, Royal Greenwich Observatory, have suggested SAO 077348 as an optical candidate for transient X-ray source A0535+26. Liller has reported brightness variations of 0.7 magnitude of this 10th-magnitude peculiar B-emission star.

4. 1976 April 8 – G. E. Taylor, Her Majesty's Nautical Almanac Office, predicts an occultation of ε-Geminorum by Mars on this date. From Washington, the occultation will occur under favorable conditions between 0h56.9m and 1h02.0m UT.

This listing courtesy R. N. Bolster.

SATELLITE TRACKS SATELLITE

NASA's Applications Technology Satellite-6 (ATS-6) was recently used to track and communicate with newly-launched GEOS-3 Geodetic Satellite. ATS-6 is in an equatorial Earth-synchronous orbit south of Kansas City, Missouri. As GEOS-3 disappeared behind the Earth, ATS-6 continued to track its position across the Earth, again locked onto GEOS-3 as the latter emerged, and tracked it for more than half of its orbit. One ground station can track only 15% of the orbit of GEOS-3; two of the ATS-type satellites could give world-wide coverage.

ATS-6 will be similarly used to track the Apollo-Soyuz manned mission later this summer. It will also relay communications, including color television. For the Apollo-Soyuz mission, ATS-6 is now being slowly moved to a position over equatorial East Africa, where it will arrive about July 1.

STERLING ANDERSON DIES

Sterling R. Anderson, long-time member and 1967-68 president of NCA, died Sunday, May 24 at his home in Annandale, Virginia.

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