state & society

Radioastronomers charge two satellites with interference

Tests conducted by radioastronomers in cooperation with NASA reveal, according to a group of radioastronomers, that there is radiofrequency interference in two observational bands caused by two satellites launched this year. A communications satellite, ATS-6, is causing interference in the 2690–2700-MHz radioastronomy band and a weather satellite, SMS-1, transmits interfering signals in the OH-observation band (1660–1670 MHz), according to a spokesman for the group.

The ATS-6 tests were conducted in June with ten observatories in North America participating; the satellite's transmitter was turned on and off by NASA to aid the observers. Two sets of tests with SMS-1 were run—the first in July at the University of Illinois showed no interference, but quantitative measurements were not possible because the telescope in use there could not be pointed directly at the satellite. Interference from SMS-1 was observed at the Jodrell Bank Observatory in the UK, confirming the need for a second group of observations that took place at the National Radio Astronomy Observatory (Green Bank, W. Va.) in the first week of August.

Two satellites, ATS-6 (left) and SMS-1 (both shown during pre-launch preparations) are now operating in space and, say some astronomers, are causing interference in two radioastronomy bands. The frequency bands that are involved are at 2690–2700 MHz and at 1660–1670 MHz.

Satellite descriptions. ATS-6 is an "applications technology satellite" (see PHYSICS TODAY, December 1972, page 73) and will serve in educational communications by rebroadcasting television programs to remote regions of the US for its first year of operation. It is scheduled to serve India in its second year. The satelite is in synchronous orbit, 22 300 miles above Earth and can broadcast with an effective radiated power of 90–100 kW at 2667.5 MHz with a bandwidth of 30 MHz.

SMS-1 is a "synchronous meteorological satellite" and is part of the World Meteorological Organization weather-satellite program. It is also in synchronous orbit and scans Earth in both the visible and infrared regions to observe storm definition and movement on a real-time or close to real-time basis. The center of the band is at 1681.6 MHz with a 28 MHz bandwidth. Images are digitized and sent at the rate of 28 megabits per second to Wallops Island, Va. where the signals are repro-

continued on page 78

High-energy panel advocates three new machines

A subpanel on new facilities of the High Energy Physics Advisory Panel has recommended the construction of a major new facility at SLAC, development work for a major new facility at Brookhaven and an accelerator development program at the Fermi National Accelerator Laboratory aimed at reaching 1000 GeV or more 10–15 years hence.

The subpanel, headed by Victor Weisskopf (MIT), submitted its recommendations on 15 June. On 19 July its parent organization, HEPAP, headed by Sidney Drell (SLAC), strongly endorsed the subpanel's recommendations and submitted them to the AEC for further action, presumably in time for the fiscal-year 1976 budget cycle. Pointing out that by that time it will have been eight years since authorization of the last major construction project, the Fermi Lab, the subpanel maintained that the time is ripe for new steps to ensure the vitality of the US high-energy physics effort.

Among the discoveries that may await us in the next energy range, the subpanel says, are: the possible theoretical synthesis of weak, electromagnetic and perhaps even strong interactions as they become comparable in strength; production of the intermediate vector boson, excited leptons and other exotic new particles; detailed exploration of the inner structure of hadrons, and conceivably the discovery of a new sub-nuclear world with totally unexpected features.

The subpanel notes that information gained from lepton and hadron probes is becoming increasingly interdependent. As an example they cite the hadron production at SLAC's electron–positron storage rings, the exploration of the structure of hadrons at SLAC using electron beams and at the Fermi Lab using muon and neutrino beams, and the anticipated lepton production in proton–proton collisions at the CERN Intersecting Storage Rings. With still higher energy the richness of this interrelationship is expected to grow. The subpanel concluded that increasing the energy of both lepton and

WEISSKOPF

hadron probes is necessary.

Recommendations. For fiscal year 1976 the subpanel recommends authorization of the joint Lawrence Berkeley Laboratory–SLAC proposal for construction at SLAC of an electron–positron colliding beam device, PEP, (PHYSICS TODAY, August, page 20) with a design luminosity of 10^{32} cm^{-2} sec^{-1} and an energy in each beam of 15 GeV. The estimated construction cost is $53 million (in fiscal-year 1974 dollars), the cost of equipping the new installation is estimated at $20 million, and the additional operating expense at SLAC is estimated as $4 million/year.

Also in fiscal year 1976 the subpanel recommends that $3–4 million be provided to Brookhaven to complete fabrication of prototypes of superconducting magnets. This effort would lay the groundwork for early construction at Brookhaven of ISABELLE, a proton–proton colliding-beam device (PHYSICS TODAY, August, page 20) with a design luminosity of 10^{33} cm^{-2} sec^{-1} and an energy in each beam of 200 GeV. The subpanel notes that the project represents a very large step in the use of superconductive systems; it believes that the program will have wide impact on many fields of science and technology. Construction cost is estimated at $127 million (in fiscal year 1974 dollars).

The subpanel's final recommendation is that funds be provided to support an accelerator-development program at the Fermi Lab directed toward the long-term goal of fixed target and/or colliding-beam systems in the region of 1000 GeV and above. This program should include such features as the energy doubler (PHYSICS TODAY, July, page 19) and other steps toward attaining energies in the TeV range. The subpanel foresees the need for a multi-TeV accelerator within 10–15 years. If no technical innovations are found to reduce substantially the cost of a multi-TeV, fixed-target machine, the subpanel suggests that an international approach might be advisable, either as a joint US–European effort or on an even wider scale to include the Soviet Union and/or other nations.

In resting its case, the subpanel argues that its three recommendations can be implemented over the next ten years and still keep the combined support of the AEC and NSF for operations and equipment at $200 million/year (in fiscal-year 1974 dollars). Past experience shows that 20–25% of the total high-energy physics budget should go toward new and innovative facilities, they say. The subpanel's first two recommendations would allow initiation of research at PEP and ISABELLE in 5–8 years. The subpanel hopes that electron–proton facilities will also become available, either by adding an electron beam to ISABELLE or a proton beam to PEP. In making its projections the subpanel assumes that some lower-energy activities at existing machines would be reduced considerably or phased out as the new facilities become operational.

The subpanel said that the dispersal of high-energy physics facilities around the country was desirable. It felt strongly that such a dispersal, with PEP on the West Coast, a TeV facility in the Midwest and ISABELLE on the East Coast, offers the "diversity of physics, style and intellectual input which is desirable for a fruitful scientific endeavor." —GBL

Petrone takes up new post at NASA

As part of the reorganization of the National Aeronautics and Space Administration Headquarters, Rocco Petrone, currently director of the Marshall Space Flight Center, Huntsville, Ala., has been named associate administrator. He will be responsible for the overall management of the Agency's research and development programs, directing the activities of the Headquarters program offices, including manned space flight, space science, applications, aeronautics and space technology, and tracking and data acquisition. These offices previously reported to the administrator.

Deputy associate administrator will be John Naugle, who is now the associate administrator for space science; he will continue in that role until a successor is named.

George M. Low, NASA deputy administrator, will serve as acting associate administrator for center operations until a permanent appointment has been made. Edwin C. Kilgore has been named deputy associate administrator for center operations.

Abernathy heads NSF energy-research office

Frederick H. Abernathy, previously director of the National Science Foundation's division of engineering, has been named head of the newly created NSF Office of Energy-Related General Research. Deputy head of the office is M. Kent Wilson, who has been head of the NSF's chemistry section.

The new office will coordinate internally all energy-related research within the Research Directorate, also working in conjuction with programs in other Federal agencies. Its staff will consist of six task coordinators located in various NSF divisions.

The Research Directorate budget includes $130.1 million for energy-related research in 1975. The budget also shows $233.6 million for basic research in areas not related to energy.

Bruce Hannay becomes president of IRI

N. Bruce Hannay has been named president of the Industrial Research Institute, an association of 230 companies engaged in industrial research. Hannay, vice-president of research and patents for Bell Laboratories, succeeds Herbert I. Fusfeld as IRI president. Arthur M. Bueche, vice-president for R&D at General Electric is the new president-elect and Donald J. Blickwede, vice-president and director of research for Bethlehem Steel, is the new IRI vice-president.

Hannay has been at Bell since 1944 and has served as a member of the solid-state sciences committee of the National Research Council and is the past chairman of the National Materials Advisory Board.

Satellites

continued from page 77

cessed and sent back to SMS-1 at 1.75 megabits per second—this slower rate signal is then rebroadcast to other receiving stations.

Test results. ATS-6 tests, according to Frank J. Kerr, spokesman for the National Academy of Sciences Committee on Radio Frequencies, show that significant interference was recorded in a field within approximately 10–20 deg from a direct line to the satellite by those observatories trying to monitor low-level signals from such sources as distant galaxies, fields of ionized hydrogen or quasars. Kerr said that at 2690

continued on page 80