

Physical Sciences Notes

ASTRONOMY

Interference and Radio Astronomy

Last December, a U.S. scientific satellite had to be launched with an important experiment deliberately disabled because it would have seriously interfered with radio telescope reception over half the earth.

The experiment was an ionospheric sounder transmitting at a frequency of 406.8 megahertz, according to a letter in the Feb. 3 *Science* by G. W. Swenson Jr. of the National Radio Astronomy Observatory and R. N. Bracewell of Stanford University.

They urged scientists contemplating transmission near radio astronomy frequencies to check first with the International Frequency Registration Board, Palais Wilson, Geneva, Switzerland.

HIGH-ENERGY PHYSICS

New Approach to Particle Theory

A new approach to the study of sub-nuclear particles has been proposed by Dr. Julian Schwinger of Harvard University. Dr. Schwinger, speaking at an international meeting of high-energy physicists at Coral Gables, Fla., termed the new approach "sourcery," since it concentrates on the source of new particles rather than their subsequent behavior.

Many of the particles which physicists are discovering in experiments with high-energy accelerators are so short-lived that they can never be detected. Their existence is tracked down by working backwards from particles whose path can be detected. All these evanescent particles are created from the collision of more stable particles.

Dr. Schwinger says that in a collision the particles whose tracks can be detected can be considered as the source of the physical properties of a particle which cannot be detected but whose existence must be deduced. This approach, Dr. Schwinger says, may give a better view of the interaction of particles.

ASTRONOMY

Saturn's New Moon Named

The newly-discovered tenth moon of Saturn (SN:1/14/p. 33) will be called Janus, after the two-faced Roman god of the doorway. New observations taken on Jan. 9 (the feast of Janus) from the Pic du Midi Observatory in the French Pyrenees, with 12 other photographs taken from France and America, confirm that Janus orbits in an almost perfect circle just outside the rings of its planet.

TSUNAMI

Sea Floor Guides Tidal Waves

A new mathematical theory to explain how tsunami, or tidal waves, can severely damage one harbor, yet leave a nearby spot untouched, was reported last week to the American Physical Society meeting in New York.

The purpose of the theory, developed by Dr. George Carrier, an applied mathematician at Harvard University, is to understand how the tsunami's energy is channelled in order to "maybe do something about it."

Tsunami is the end result after an earthquake rocks the ocean floor, releasing huge amounts of energy, most of which is carried away by water waves. The all-engulfing water mass, only one foot high as it travels over the open ocean can reach a height of 40 feet when it piles up on shore.

Dr. Carrier has found that the earthquake energy carried away by the giant ocean ripples can be channelled by ridges on the ocean floor. The ridges, and the troughs between them, give the sea bottom a washboard-like effect.

When the earthquake-caused waves travel across the ocean floor "washboard," the ridges and troughs have little effect on the propagation. However, when the waves travel parallel to the ridges a high amount of energy is channelled along a relatively narrow path.

PHYSICS EDUCATION

Serious Consequences for Nation

The American Institute of Physics declares that production of physicists by American educational institutions is not large enough to meet the needs of the nation. "America's scientific future may be in doubt if current trends continue," according to the AIP report, *Physics Manpower 1966*.

The number of undergraduate physics majors has been decreasing over the past five years, the report declares; the number of physics bachelor's degrees reached a peak in 1962 and has since leveled off; the number of physics graduate students has increased steadily.

COSMOLOGY

Heavy Element Formation

Elements heavier than helium could not have been formed in the "big bang" in which the cosmos may have been created, models of universes calculated mathematically on a computer have shown. This neither proves nor disproves the big bang theory, but it puts the formation of the elements heavier than helium on a different time scale.

Drs. William A. Fowler and Robert V. Wagoner of the California Institute of Technology, with Dr. Fred Hoyle, director of the Institute of Theoretical Astronomy in Cambridge, England, tested out mathematical models of every conceivable universe.

None of them, Dr. Fowler reported to the American Physical Society in New York, allows for synthesis of any elements other than hydrogen and helium, the lightest and second lightest known. The heavy elements are believed to have been formed later in violent or explosive events, such as a supernova.

At the same meeting, Dr. Hans A. Bethe of Cornell University, Ithaca, N.Y., reported that he has been able to bring the theoretical structure of the nucleus of heavy elements into very close agreement with experimentally-observed binding energies, which are 15.8 billion electron volts.

Dr. Bethe's calculations give 16 Bev, with a possible error of 3 Bev above or below that figure, a significant improvement over the past best theoretical structure, which gave only 4 Bev.