Physical Sciences Notes

X-RAY ASTRONOMY

New X-Ray Source Found

During a balloon flight in December 1965, an X-ray telescope detected a new extended source of X-ray emission. E. Boldt and his co-workers at Goddard Space Flight Center have identified the source with the Coma cluster of galaxies. The measured X-ray flux at wavelengths near half an angstrom was comparable to that from the Cygnus X-1 source, it is reported in the December Sky and Telescope.

LASERS

Laser Beam Crumbles Rock

Two Massachusetts Institute of Technology students have crumbled hard rock with a laser beam, an achievement that may make it possible in the future to bore through rock masses to make tunnels for highways and railroads, as well as for distributing water. They used a continuously operating carbon dioxide gas laser with an output of one kilowatt in an infrared beam. The unfocused laser beam was tested mainly on granite and marble, substantially reducing the strength of both.

REACTOR PHYSICS

Power From Boiling Reactor

Useful nuclear power has been produced for the first time by a boiling water reactor fueled with man-made plutonium. The Experimental Boiling Water Reactor at Argonne National Laboratory is operating with a fuel core containing plutonium as the major fissionable component, making electricity for use at the Laboratory. The EBWR, completed for research purposes in 1956, was the first facility in the AEC's civilian power reactor development program to be placed in operation.

HIGH ENERGY PHYSICS

Stanford SLAC Operating

The long-awaited two-mile linear accelerator for speeding up electrons to energies of 10 to 18 billion electron volts is now in operation. Stanford University's $114-million machine, called SLAC, was built for the Atomic Energy Commission.

It was started on its research program some six months ahead of schedule, with about half of the "beam time" being devoted to studying the equipment itself and the other half to physicists. By next June, research is expected to occupy 90% of the beam time.

ELECTRIC PROPULSION

Successful Ion Engine Test

The development of propulsion systems for long-range space missions took another step forward when an electric engine successfully completed 341 days of continuous operation in a space simulation chamber. This was the longest duration test of any United States space thruster system.

The 8,189-hour test of a cesium electron bombardment engine was performed for the National Aeronautics and Space Administration by engineers at Electro-Optical Systems, Inc., Pasadena, Calif. The electrostatic thrustor used in the test is one of three types of electric rockets being investigated by NASA.

DROUGHT-HYDROLOGY

Freeze Locks Drought

The oncoming winter freeze may "lock up" the six-year drought for another year in parts of northeastern United States.

Some states—Maine, Vermont, northern New Hampshire and parts of West Virginia—received enough rainfall this autumn to relieve the long drought, said Henry Barksdale, hydrologist with the U.S. Geological Survey. Yet other states such as Connecticut, Massachusetts, Rhode Island and New York are still suffering from depleted water supplies. If no rain falls before winter sets in, these latter areas may have to face the drought extended through the winter into next spring; additional water cannot seep through frozen soil to recharge groundwater supplies which in turn feed into streams, rivers and reservoirs.

INORGANIC CHEMISTRY

Nitrogen From Air Foreseen

A discovery by a research chemist is seen hastening the day when man will be able to wring nitrogen from the air to meet the increasingly high demand for fertilizer. Prof. James P. Collman of the University of North Carolina made the discovery while doing basic research on a new class of inorganic compounds. During a systematic study of compounds containing iridium and rhodium, he found two compounds in which molecular nitrogen is bound to a metal ion derived from the element iridium. Nitrogen, an essential component of fertilizers, is abundant in the atmosphere in a chemically inert form. The molecular nitrogen compound could give up its nitrogen and react directly with air to pick up more nitrogen.

RADIATION DOSIMETRY

New Neutron Dosimeter

A lightweight portable neutron dosimeter that will enable scientists to establish work programs so that the radiation doses they receive while working around particle accelerators are within acceptable limits has been developed for the National Research Council, Canada. The monitor is a lightweight version of neutron dosimeters available commercially but weighs only nine pounds instead of 30 or 40. A polyethylene sphere is used to slow down the neutrons sufficiently so that they can be measured. A cadmium shell within the sphere also helps to slow down the neutrons before they strike the unit's counter. The device can also be used as a remote control instrument.