ASTRONOMY

Space X-Rays From Star

➤ THE BEST source of X-rays yet found in the heavens is most likely a neutron star, the American Astronomical Society was told in Ithaca, N.Y.

New evidence indicates that Scorpius XR-1, as the X-ray source is called, is within 600 million million miles of earth, a relatively short distance in astronomical terms. It is the closest and most intense known X-ray source, according to calculations by three scientists at the Naval Research Laboratory's E. O. Hulburt Center for Space Research, Washington, D.C.

Dr. Herbert Friedman, chief scientist at the Center, reported that Scorpius SR-1 could be the remnant of an ancient supernova. Dr. E. T. Byram and T. A. Chubb, also at the Center, and Dr. Friedman base this on X-ray measurements made from rockets.

These measurements show that the X-rays from Scorpius actually originate in two equally intense sources, one radiating at a temperature of 50 million degrees C., the other at one or two million degrees. The sun's visible surface temperature is 6,000 degrees C., rising to some two million degrees in its tenuous corona, or halo.

This picture is consistent with that of a neutron star, Dr. Friedman told the astronomers meeting at Cornell University. A neutron star is only about 10 miles in diameter and is so dense that a cubic inch of its matter weighs a billion tons.

Scorpius XR-1 is an old neutron star that has cooled down to radiate at about two million degrees, surrounded by a corona radiating at 50 million degrees. If the X-ray source were not relatively close to earth, the neutron star's radiation at a wavelength of 50 Angstroms could not have been detected.

Source of the star's tremendous energy, Dr. Friedman suggested, is the vibrations, or oscillations, of the neutron star. In the collapse that leads to the compact star and the accompanying explosion into space of the outer layers of the presupernova, the magnetic lines of force are twisted by the stellar rotation until they form a magnetosphere, or corona. Oscillations of the neutron star can accelerate electrons in the corona to sufficiently high energies to radiate the observed X-rays.

SPACE

Tiny Whipcrack Rocket To Launch Bigger Rocket

➤ A TINY ROCKET motor with the crack of a bullwhip is being developed to push the projectiles of hand-operated rocket launchers out into clear territory before they ignite.

No bigger than a flashlight, the motor produces all of its several hundred pounds of thrust in only one-twentieth of a second, which amounts to a very efficient kick. It does this by having almost the entire burning area of the propellant exposed at once.

The development that made such a rocket possible is called Foilac, a thin layer of extremely fast-burning propellant bonded to a corrugated strip of aluminum foil. In cross section it looks similar to the side wall of a corrugated cardboard box. The strip is rolled like a carpet and loaded as a cartridge into the motor casing.

Rocket launchers mounted on aircraft would have no need for the secondary motor. Field units, however, often have several men nearby when the projectile leaves the launch tube. The Foilac motor has finished firing while it is still well down in the tube, and the missile itself does not ignite until it is well away from the launch crew. The result is increased safety from blast and emerging gases.

Lockheed Aircraft Company, Redlands, Calif., says that a small Foilac motor has enough power to boost a "good sized field rocket" to a velocity at which it is stable in flight.

TECHNOLOGY

Water Can Oxidize Fuel in Rocket Engine

➤ THE OLDEST and most abundant enemy of fire, water, has been used to start and sustain intense burning in the combustion chamber of an experimental rocket engine.

Scientists at United Technology Center, Sunnyvale, Calif., said they have successfully test-fired a back-pack size rocket whose propellant consists of a solid fuel and water as an oxidizer. The water provides the oxygen needed to burn the fuel.

Combustion occurs instantaneously when water is sprayed into the hollow core of the solid fuel grain, or charge, the researchers said. Chemicals in the fuel react violently with the water, generating 4,000-degree gases which are expelled through a nozzle to produce thrust. When injection of the water is halted, combustion stops.

While the concept of a water oxidizer for rocket propulsion has been discussed for more than a decade, the UTC research team said this is the first known demonstration that shows such a system is practical.

The rocket could provide underwater propulsion for submarines or torpedoes, as well as on earth and in space, the research team predicted.

The new rocket could be used as a back-pack unit for guerrilla warfare troops, propelling them over jungles, water, and treacherous terrain. Troops could draw their supply of oxidizer from any source of water.

TECHNOLOGY

Shadow Photos Help Solve Reentry Problems

See Front Cover

➤ HUNDREDS of thousands of shadows per second are being photographed and examined by space scientists trying to spot spacecraft reentry problems in advance.

At the National Aeronautics and Space Administration's Ames Research Center in California, air is pumped in and out of a spectacular 75-foot wind-tunnel to simulate the atmospheric pressure at varying altitudes.

The average test "flight," in which a half-inch model may crash into the air at 20,000 miles per hour, lasts less than one-fiftieth of a second. Yet even that brief interval leaves about five milliseconds leeway for "errors in timing."

Photos of tests such as the one seen on the cover, do not actually show the model at all. What they do show is its shadow, plus the "schlieren photograph," or refracted light pattern, of the shock wave around it.

(Cover photograph by Ames Research Center.)