aerospace

ASTRONOMY

A new X-ray pulsating star

The young field of X-ray astronomy has found another mystery: a second pulsating X-ray star quite different from the only other one known.

The new star, identified as Cygnus X-1 in the constellation Cygnus, generates pulses at the rate of about 15 per second, Dr. Riccardo Giaconni reported this week at the American Astronomical Society meeting in Baton Rouge. He is principal investigator for the SAS-A, called "Uhuru," launched from off the coast of Kenya on Dec. 12, which found the star.

Although Cygnus X-1 is an X-ray pulsar like NP 0532 in the Crab Nebula, it appears to have had a different origin. If the new star were the result of a supernova explosion, thought to have created the Crab Nebula and NP 0532, there should be a detectable remnant surrounding it. There is none, says Dr. Giaconni. In addition, Cygnus X-1's estimated age of 10,000 years is too short a time for a supernova remnant to have evolved and disappeared.

The new star could prove to be a theoretical "black hole" since there is speculation that X-rays may be produced in great quantities by material surrounding the black holes.

In addition to Cygnus X-1, the satellite has found 13 new X-ray objects, including several remote galaxies and confirmed X-ray emissions from quasar 3C 273, the radio galaxy Centaurus A (NGC 5128), galaxy M87 (Virgo A) and a Seyfert galaxy source, NGC 1275 (SN: 3/27/71, p. 209). Two new X-ray sources discovered include the distant galaxy M84 in the Virgo cluster and a Seyfert galaxy, NGC 4151. This brings to six the number of X-ray sources detected beyond the Milky Way galaxy.

COSMIC RAYS

As heavy as uranium

The origin of cosmic rays is a central question in theories of the universe. Scientists can study these from tracks made in laboratory cloud chambers and in lunar soil and by flying experiments into the upper atmosphere.

Until a few years ago, iron nuclei (atomic number 26) were the heaviest cosmic rays detected. Since determining the atomic weight, intensity and direction of cosmic rays is important in discovering their origin, scientists had been eager to find primary cosmic rays heavier than iron. In the last few years there have been three or four events in which scientists were fairly confident they had indeed found cosmic rays composed of nuclei as heavy as uranium (atomic number 92).

The latest cosmic-ray balloon experiment, launched Sept. 4, was supposed to collect 40 hours of data at 130,000 feet. The balloon, however, was lost; it drifted out over the Pacific, came back over Oregon and landed in a field near Regina, Saskatchewan. As a result it collected 347 hours of data.

"Preliminary look," says Dr. W. Zack Osborne, senior research associate at NASA's Manned Spacecraft Center in Houston and one of the investigators, "indicates that we have tracks from nuclei as least as heavy as uranium."

The total balloon detection time until this experiment equaled about one day's exposure of a 100-square-meter surface. The latest flight "almost doubles the available samples of cosmic-ray data," says Dr. Osborne. The balloon carried three detectors, a plastic track, a nuclear emulsion and a fast-film Cerenkov counter.

Co-investigator of the experiment is Dr. Buford Price of the University of California at Berkeley.

APOLLO 16

Crew selection

Two members of the backup crew for Apollo 13 and the astronaut who got bumped from that flight because of exposure to rubella have been named as the prime crew for Apollo 16. They are John W. Young, commander, a veteran of three space flghts already, and rookies Charles M. Duke Jr., lunar module pilot, and Thomas K. Mattingly II, command module pilot.

If all goes well with Apollo 15, to be launched to the Hadley/Apennine region of the moon July 26 (SN: 10/3/70, p. 286), Apollo 16 will be launched in March 1972. The target for landing has not yet been selected, but the area of Descartes crater is the prime choice. This, however, depends on the quality of Apollo 14 high-resolution Descartes photography that can be salvaged from the malfunctioned Hycon camera (SN: 2/13/70, p. 111). As a backup, Command Module Pilot Stuart A. Roosa took Descartes pictures with a 70-millimeter Hasselbad using a 500-millimeter lens. Other site preferences for Apollo 16 and Apollo 17 include Copernicus crater and the Marius Hills.

AERONAUTICS

Electronic control system

Flight control system of today's aircraft are mechanical-hydraulic networks of metal rods, hinges and lines that carry the pilot's signals from the control stick to the controls on the wings and tails. The problem with this system is its vulnerability to battle damage in military craft and to structural bending in commercial craft.

NASA is currently developing a digital "fly by wire" system similar to one used in the Apollo spacecraft for use on future aircraft. The electronic system would substitute lightweight wires for push-rods and add several redundant wire-paths at different locations in case of failure. Signals from sensors on the aircraft and from the pilot's control stick motion would be transmitted to a computer, processed and then sent via electronic pulses to the appropriate control surfaces.

The aircraft application is a direct result of the Apollo systems' performance. "The lunar module, Eagle, served me well in landing . . . at Tranquility Base," says Neil A. Armstrong, now deputy associate administrator for aeronautics at NASA.

The advantages of adapting the system to aircraft include increased reliability, reduced drag and pilot load. In addition, says Armstrong, it could "provide more positive control, improve maneuverability and ride quality, reduce control, structural weight and cost."

Such a system is being modified and built for installation this fall in an F-8 at NASA's Flight Research Center. Flight tests will begin next spring.

Science Service, Inc. is collaborating with JSTOR to digitize, preserve, and extend access to Science News. www.jstor.org