

## A gamma-ray galaxy

Galaxies radiate energy over a wide range of the electromagnetic spectrum. They have been observed in visible light, radio and X-rays. Astronomers have believed that galaxies probably radiate gamma rays too. The trick was putting up equipment sensitive enough to find a galactic gamma-ray signal.

The Soviets have done it, according to a report by Drs. S. A. Volobuev, A. M. Gal'per, V. G. Kirillov-Ugryumov, B. I. Luchkov and Yu. V. Ozerov of the Moscow Engineering Physics Institute. The Satellites Cosmos-251 and Cosmos-264 were equipped with gamma-ray detectors that measured a slight increase over background radiation in gamma rays of more than 100 million electron-volts energy (less than a tenth of a milliangstrom in wavelength) when they were looking in the direction of the galaxy 3C120.

The resolution of the detectors was not very high, and the best that the observers could conclude is that the gamma rays were coming from an area of sky 20 degrees by 5 degrees. Usually astronomers would hesitate to identify the source with a visible object when there is such a large uncertainty in the direction, but the Russian astronomers give two reasons why they dared to do so. First, 3C120 lies right in the middle of the designated area. Second, 3C120 is a pathological galaxy, one that is subject to sudden outbursts, and it was having one at the time. Radio astronomers observing 3C120 recorded strong radio pulses at the time the Cosmos satellites observed the gamma rays.

Discovery of a gamma-ray galaxy marks a new extension of galactic astronomy. The nature of visible galaxies as distant stellar systems became clear in the 1920's. The first radio galaxy was found in the 1950's. X-rays came in the 1960's. Gamma rays complete the electromagnetic spectrum at the short end. □

### HEARINGS OPEN

## Science-mission reliability

Unmanned space science has suffered two severe blows in the last seven months—the loss of the unmanned Orbiting Astronomical Observatory III in December and last month's loss of the Mars-bound Mariner 8 (SN: 5/15/71, p. 330). Both scientific payloads were launched by the Atlas-Centaur vehicle. Both had launch-related failures in the Centaur stage. The total monetary cost, not to mention the loss to science, was about \$160 million.

This week Rep. Thomas N. Downing (D-Va.), chairman of the Congress-

sional oversight subcommittee for the National Aeronautics and Space Administration, began hearings on NASA's policy on back-up spacecraft for unique missions and on Centaur reliability.

Substitutes for both Mariner 8 and OAO III could have been fashioned from prototypes of the two spacecraft and been flown after the initial losses. But NASA testified that tight budget and time restraints prohibited doing so. Putting the OAO III prototype into shape would have cost about \$50 million; a substitute Mariner 8, about \$100 million.

NASA Deputy Administrator George Low said Mariner 9, now on its way to Mars, will be able to do most of the missions originally planned for both Mariner 8 and 9. As for OAO III, several small astronomy satellites to be launched in the next few years and OAO IV, to be launched next year, may recoup much of the scientific loss.

The general question of the reliability of unmanned spacecraft has always been a thorny problem for NASA. Manned spacecraft have redundant systems—back-up systems in case one fails. This method, called "man-rating a spacecraft," is costly. NASA policy has been to continue using non-redundant systems in unmanned spacecraft. □

### RADIOACTIVE WASTES

## EPA and AEC

The Atomic Energy Commission says it has met possible objections raised by the Environmental Protection Agency to storage of radioactive wastes from nuclear power plants in Kansas salt mines. AEC last week released its report on the environmental impact of a proposed demonstration project for storage of the wastes in a salt mine near Lyons, Kan. (SN: 3/6/71, p. 161).

In a letter to AEC dated April 29 and based on a draft of the now-final AEC report, Dr. Arthur H. Wolff of EPA's radiation office raised questions about the long-term integrity of the salt formation and its ability to contain the radioactive material and prevent contamination of surrounding earth or of groundwater; about contingency plans in case the radioactive material has to be removed; and about procedures for periodic evaluation and responsibility for long-term environmental studies.

The final AEC environmental statement, released this month, contains a letter to Wolff pointing to various sections of the revised report that AEC says answer EPA's objections.

So far EPA has not replied to the letter or the revised statement. But Wolff in his earlier letter told AEC that storage in salt formations "offers, at least at this stage, the best method of such disposal." □

## Another boat for Cheops

After 17 years archaeologists in Egypt are preparing to open a large, stone-sealed pit near the Great Pyramid of Cheops. In 1954 a similar nearby pit was opened and a 4,500-year-old cedar boat was found. Since the first pit was opened experts have dismantled, studied and reassembled the wood craft. Now that it is safely preserved nearby in a new air conditioned museum, the experts feel that it is time to examine the second pit. A new approach will be taken this time. First a hole will be bored into the pit and a special camera inserted to photograph whatever is inside. If, as the scholars suspect, it contains another boat, they will not remove it. A chamber will be cut into the rock and special glass, lighting and air conditioning will be installed. This work is scheduled to begin within a few months, and soon archaeologists may be able to view Cheops' boat as it was originally placed in the pit to accompany him to the next world. □

## Bonnie vs. Clyde

The Federal Bureau of Investigation's uniform crime report shows that the female crime rate in 7 of the top 10 categories is rising faster than the male rate. Women have not campaigned for but are beginning to achieve equality with men in criminal as well as business areas of society. From 1960 to 1969 property crime by men increased 59 percent. For the same period it increased 184 percent for women. Forgery and counterfeiting rates for men and women increased 20 and 92 percent respectively. For embezzlement and fraud the increases were 30 and 211 percent. For prostitution and vice the rates were 14 and 80 percent. And for narcotic and drug crimes the rates were up 487 and 516 percent. Women commit less than 20 percent of the crimes in most of these areas but at the present rate of increase it will not be long before they achieve total equality in the criminal field. □

## Lunar sample exchange

The first concrete result of the January Soviet-United States Space Agreement (SN: 5/1/71, p. 303) came about in Moscow last week: an exchange of lunar material. Academician A. P. Vinogradov of the Academy of Sciences of the U.S.S.R. presented to Lee R. Scherer of the National Aeronautics and Space Administration three grams of Luna 16 core material from the Sea of Fertility. In exchange, NASA presented Soviet scientists with three grams of material from the Apollo 11 site, the Sea of Tranquility, and three grams from the Apollo 12 site, the Ocean of Storms. □