astronomy

X-RAYS

New point source

X-ray detectors flown on a rocket from White Sands Missile Range in New Mexico on Sept. 21, 1968, confirmed the positions of two known X-ray sources and discovered a new one. Drs. A. N. Bunner and T. M. Palmieri of the University of Wisconsin report in ASTROPHYSICAL LETTERS for October that the new source, which they designate GX341-6, is located in the constellation Ara at right ascension 17 hours 16 minutes and declination minus 48 degrees 42 minutes.

METEORS

Tape aids observations

A machine that will greatly facilitate studies of the origin of meteors, their spectral density and their physical structure has been perfected by a team of research scientists at Sheffield University. The team is led by Prof. T. R. Kaiser.

This precision instrument, an automatic digital recording system for the processing and analysis of radar echoes, was recently installed at the university's radio astronomy laboratory at High Bradfield.

For the past 12 years, meteors have been observed at Bradfield by bouncing pulses of radio energy from the ionized trail left behind by meteors and recording the echoes. The analysis of the radar echoes has been a slow and laborious business.

Using the new digital analysis system, the basic characteristics of the radar echo, its magnitude, time of occurrence and the range of the reflecting meteor trail, will be recorded on magnetic tape. A seven-track incremental tape recorder is being used. This tape can then be studied using the university's computer.

Showers of meteors will be studied in detail and the continuous sporadic influx of meteor particles will be measured throughout the year. The rate of decay of the meteor trail will also be recorded, as will be the distortion of the trail by the winds in the region of the atmosphere 50 to 70 miles up.

COSMIC RAYS

Perhaps an unknown quantity

When high-energy cosmic rays strike the atmosphere, the collisions produce showers of particles that descend through the air. Usually such showers are rich in mu mesons, but a small percentage, 0.1 percent of the showers produced by cosmic ray particles with more than a million billion electron volts of energy, are notably poor in mu mesons.

Drs. P. H. Catz and R. Maze of the Cosmic Ray Physics Laboratory at Verrières le Buisson in France, and J. Gawin, M. Przasnycki, J. Wdowczyk and A. Zawadzki of the Cosmic Ray Physics Laboratory at Lodz in Poland, have been studying the muon-poor showers, looking for some reason for the anomaly.

They report in PHYSICAL REVIEW LETTERS for Oct. 27 that their data suggest that the showers are formed in two steps. In the first step a primary cosmic ray particle interacting in the atmosphere produces an intermediary particle with a very-high energy, about 50 percent of the primary energy, which then decays principally into electrons.

Such a particle could be a high-energy mu meson. But a possibility which the observers call "very attractive" is that the intermediary is a previously unknown particle with "a relatively long life" (about a 10-billionth of a second). For the moment they are unable to suggest any further characteristics of the hypothetical particle.

MOLECULES

No ice grains found

During the past two years astronomers have looked for and found more and more complicated chemical substances in clouds in interstellar space.

One substance being sought is ice; some astronomers have suggested that the interstellar dust clouds that obscure certain portions of the sky may be made of ice grains or of graphite flakes coated with ice.

In the October ASTROPHYSICAL JOURNAL, Drs. R. F. Knacke, D. D. Cudaback and J. E. Gaustad of the University of California at Berkeley say that this is unlikely. They have obtained infrared spectra of three highly reddened supergiant stars, VI Cygni No. 12, CIT 11 and HD 183143. They looked for an absorption band at 3.07 microns wavelength that could be fitted to the absorption spectrum of ice, but found nothing strong enough to indicate that there is any sizable amount of ice in the interstellar grains.

COSMIC RAYS

Origins and acceleration

A few years ago Dr. Stirling A. Colgate of the New Mexico Institute of Mining and Technology suggested that cosmic rays originate in supernova explosions and are accelerated to their great energies by shock waves in such explosions.

Two Russian observers, Drs. V. L. Ginzburg and S. I. Syrovatskii, objected to this hypothesis on the ground that heavy atomic nuclei, which are found among the cosmic rays, could not survive the acceleration mechanism. The shock, they said, would accelerate heavy nuclei and protons at different speeds. This would cause collisions that would disintegrate the heavy nuclei. In addition, the shock wave would contain very energetic photons, and these too would disintegrate the heavy nuclei.

But Dr. James H. Kinsey of Goddard Space Flight Center at Greenbelt, Md., argues in support of Dr. Colgate's hypothesis. A theoretical study of conditions in supernova shock waves, he writes in the October ASTROPHYSICAL JOURNAL, shows that all ions from protons to the heaviest nuclei would be accelerated at the same speed. There would thus be no chance of collisions between protons and heavy nuclei.

Collisions with photons remain a possibility, he says, but only for nuclei the energy of which went above 1,000 billion electron volts (GeV) per nuclear particle. Present observations only go to 50 GeV per particle so for the foreseeable future Dr. Colgate's hypothesis cannot be disproved on this ground, he says.