ASTRONOMY

Astronomy in the extreme ultraviolet

After millenia of confinement to observations in visible light, astronomers are now extending themselves into all regions of the spectrum of electromagnetic radiation. One of the latest regions to be attacked is the extreme ultraviolet, the stretch where ultraviolet light begins to graduate into X-rays. A recent EUV survey of part of the southern sky reported in the Oct. 1 ASTROPHYSICAL JOURNAL LETTERS gives some statistics on the number of EUV sources astronomers may expect to find and some suggestions about the evolution of white dwarf stars.

Before this survey, only four EUV sources had been found, the brightest of which is identified with the hot white dwarf HZ 43 in the constellation Coma Berenices. All these sources had been found by checking preselected objects. So Patrick Henry of the Center for Astrophysics in Cambridge, Mass., Stuart Bowyer of the University of California at Berkeley and C. G. Rapley and J. L. Culhane of England's Mullard Space Science Laboratory decided to do a systematic survey of a 3,700-square-degree region around the South Equatorial Pole of the sky to try to get some statistics on sources radiating at a characteristic wavelength of this range, 90 angstroms.

They found one source of about the same intensity as HZ 43. It lies at about the southwestern edge of the large Magellanic Cloud but is apparently not in the cloud. From this they concluded there are about 10 EUV objects as bright as HZ 43 in the whole sky. Since the objects expected to be sources of EUV radiation are hot white dwarfs this implies a limit on their numbers that has a bearing on how they evolve and exactly what mechanisms (neutrino emission or radiative cooling) serve to cool them. Further study of EUV emissions may help answer questions in white dwarf theory.

Long-period X-ray transients

Among the many X-ray sources discovered in the sky are nearly a dozen transient sources, whose luminosity varies with characteristic times on the order of weeks. Many shorter-period X-ray variables have been identified as members of binary systems. Astrophysically, this is helpful because it permits a theory that the X-rays are produced by heating of matter falling from one member of the binary onto the other. But it has not until now been possible to observe these long-period transients for enough time to see whether they are in binaries.

In the Sept. 15 ASTROPHYSICAL JOURNAL LETTERS S. Rappaport, P. C. Joss, Hale Bradt, G. W. Clark and J. G. Jernigan of the Massachusetts Institute of Technology report that the satellite SAS-3 was able to observe one of these, A0535+26, for long enough to make a determination that the source probably belongs to a binary and to figure some of its orbital parameters. The model the observers propose is that A0535+26 is a neutron star in a long-period orbit (17 days or greater) about a star of the class OB, which emits a variable stellar wind.

Solar radio bursts at night

Like light, radio waves travel usually in straight lines, so radio bursts emitted by the sun should be seen only in the daytime. Yet in the Sept. 30 NATURE J. J. Riihimaa of the University of Oulu in Finland reports recording a high-level burst in the frequency range 20.85 to 23.20 megahertz at Kiiminki, Finland, when both the sun and Jupiter were well below the horizon. At the same time stations in Australia, Texas and Colorado saw a solar radio burst, and Riihimaa suggests his observation was the same thing, guided over the north pole by unusual conditions connected with an auroral substorm.

BIOMEDICINE

Shingles and anesthesia treatment

Shingles (herpes zoster) is an acute viral infection of certain nerve pathways in the body. It leads to sharp or burning pain for several weeks until the infection subsides. Some patients even experience pain long after infection has gone, which is known as post-herpetic neuralgia. Such pain can last for months or years. Until now, there has been no known specific therapy for the disease.

Local anesthesia treatments can banish the pain of shingles and even that of post-herpetic neuralgia, Murugiah Mani and his anesthesiology team at Cook County Hospital in Chicago reported this week at the annual meeting of the American Society of Anesthesiologists.

Mani and his co-workers treated 17 shingles patients with local nerve block anesthesia. Procaine, mepevacaine or another local anesthetic was injected into the nerve tract infected with herpes. Pain relief immediately followed the block in all the patients and persisted indefinitely in 10 of them. Local anesthesia also helped relieve pain in 4 of the 7 patients who went on to develop post-herpetic neuralgia.

Any anesthesiologist can perform this treatment on a shingles patient, Mani says, and on an outpatient basis.

Charcoal perfusion for liver failure

In many cases following acute or chronic liver failure, toxic waste products normally removed by the liver accumulate in the blood, leading to coma and death. To date, there has been no fully acceptable treatment for the problem. Now a charcoal perfusion technique, developed in England and being tested at Georgetown University Hospital, may be the answer.

In a recent Georgetown University case, a young boy suffered from liver and kidney failure. So much toxic waste had built up in his bloodstream that he was in a deep coma and bordered on death. Standard methods of treatment, such as kidney dialysis and blood exchange transfusions, did not help him. Michael C. Gelfand, co-director of the dialysis unit at Georgetown, decided to try to cleanse his blood with charcoal perfusion. Blood was pumped from a special connection in an artery in his foot to a container of sterile-coated charcoal. Toxins in his blood bound to the charcoal. The cleansed blood was then returned to his body.

After two charcoal perfusions, the boy came out of his coma, and within 10 days, his liver function returned to near normal.

New treatment for multiple sclerosis

Two years ago, E. H. Eylar, then of the Merck Institute and now of the University of Toronto, reported that a particular protein was intimately involved in triggering multiple sclerosis. Specifically, he and his colleagues found that a protein taken from the brains of multiple sclerosis patients, a so-called A-1 protein, and injected into experimental animals, sensitized the animals' lymphocytes (immune cells). The lymphocytes then migrated to the animals' brains and spinal cords and produced experimental allergic encephalomyelitis, the animal equivalent of multiple sclerosis.

Even more intriguing, they found that if they put the protein in saline solution and injected it into the diseased animals, the protein desensitized their lymphocytes and reversed their disease permanently (SN: 6/15/74, p. 383).

Now Eylar and colleagues at the University of Toronto are setting up a clinical trial to give the A-1 protein to a "few carefully selected multiple sclerosis patients." Clinics in the United States and Europe have also expressed interest in setting up similar trials.