ASTRONOMY

Dietrick E. Thomsen reports from the meeting of the American Astronomical Society in Atlanta

An odd couple

Halton Arp of the Hale Observatories has been collecting instances of the pairing or grouping of astronomical bodies with very different redshifts in their light. He does this in furtherance of his contention that redshifts are not always due to the relative speed and therefore distance of the objects but may come from other causes. If that is true, then objects with different redshifts may be at the same distance and so can be physically linked.

At the meeting, Arp presented an instance where a high-redshift object appears to be in front of a low-redshift one. There appears to be a bright object with a redshift corresponding to a speed of 13,300 kilometers per second in front of the E galaxy NGC 1199, which has a redshift corresponding to 2,600 kilometers per second. Arp argues that the bright object is in front of the E galaxy because it is surrounded by a disk of dark matter that appears spectroscopically as if it is absorbing light from the E galaxy. If the bright object were behind the E galaxy, it would add to the brightness of the image, and the absorption by the dark disk would not be seen. Therefore, most of its redshift must come from some cause other than motion of recession, he says.

The ring in the center of the galaxy

Studies of the absorption of background radiation by molecules of formaldehyde and hydroxyl have shown that there appears to be a ring-shaped structure of molecular matter around the center of our galaxy. T. M. Bania of the Arecibo Observatory reports that study of carbon monoxide emissions from the same region confirm that there is indeed an irregular shaped ring and that it goes all the way around, a point on which the previous observations were not definite.

The ring appears to have a radius of 190 parsecs and is both rotating and expanding away from the center of the galaxy. The rotation speed appears to be 65 kilometers per second, and the expansion velocity 150 kilometers per second. Bania says that the easy way to explain such a ring is to suppose that something that had about 2 million times the sun's mass exploded in the center of the galaxy about 400,000 years ago, but when one tries to fit such a model to the observations there are many uncertain parameters. In short, he says, "There is good evidence for the ring structure, but there are severe problems with the explosion model."

Interstellar shock chemistry

The passage of a shock wave through a gas heats the gas behind it. This phenomenon, observed countless times in the laboratory, may also be happening in interstellar space, in the Orion nebula. Discovery in June 1976 of radiation from vibrationally excited hydrogen molecules led to a suggestion that a shock wave, presumably produced by an ancient supernova explosion, is proceeding through the nebula.

T. Hartquist of Harvard University reports that a theoretical model derived from the observed conditions fits a shock moving at 8 kilometers per second, which would heat the gas immediately behind it to 2,500° K. Several molecules (H_2S, SiO and HS) that do not form at lower temperatures should be observable in the postshock region, and their discovery there would serve to confirm the existence of the shock, Hartquist says.

SPACE SCIENCES

Viking mission may be lengthened

The four Viking spacecraft, now scheduled to continue their study of Mars through May 31, 1978, may be kept on the job for an additional eight months. Program officials at Jet Propulsion Laboratory in Pasadena, control center for the mission, plan to submit such a proposal this month to National Aeronautics and Space Administration management, who would, if they approve, seek funding for the plan for fiscal 1979.

The two landing craft would continue to provide meteorological data and occasional photos (the biology and organic-chemistry instruments have been turned off), and lander 2's seismometer would go on listening for tremors. The major reasons for proposing the extension, however, have to do with the two orbiters. During the first six months of the primary mission, the orbiters' scientific activities—photography, water-vapor measurements and infrared "heat-mapping"—were largely devoted to support of the landers. The proposed extension, says mission director G. Calvin Broome, would in part serve to "fill the gap," making up for lost coverage in that somewhat restricted period. There would be a lot of high-resolution photo-mapping, part of it perhaps devoted to seeking routes across the surface for future automated roving vehicles.

The extension would also allow Viking's radio science team to repeat its general relativity experiment, which involves measuring the sun's bending effect on radio signals from the spacecraft to earth. This is possible because on January 20, 1979, near the end of the eight-month period, Mars will again be in superior conjunction (directly across the sun from the earth). On both sides of that date, the signal path will thus pass very close to the sun, which also enables the density and other characteristics of the solar corona to be inferred from the coronal interference with the radio beam. Similar measurements were made during the mission's earlier superior conjunction, centered on last Thanksgiving Day.

The cost of the extension has not yet been determined, says Broome, but it is anticipated that the mission would be conducted by a "barebones" flight team of about 180 people, compared with the 300 working at the present and the more than 700 used during the primary mission last year.

Known meteorites are 'biased' sample

The known examples of chondritic meteorites may well represent only a "biased and incomplete selection" of the primitive material of the solar system, despite the fact that 85 percent of them fit into three distinct groups of so-called "ordinary" chondrites with a wide range of chemical and petrologic properties. So conclude Richard W. Bild and John T. Wasson of the University of California at Los Angeles, based on samples from the Netschaëvo meteorite, found in Russia in 1846.

Netschaëvo seems in many ways to be an "ordinary" chondrite, they report in the July 1 SCIENCE, except that it is atypically rich in iron. This suggests that otherwise plausible models for the formation of the ordinary chondrite sequence must be stretched to encompass materials with iron/silicon ratios 25 percent greater than those in type CI carbonaceous chondrites. It is likely, the researchers feel, that the variables used to define chondrite classes are actually continuous, and that the groupings appear discrete only "because most meteorites come from a limited number of parent bodies." Continuous fractionation has been proposed before, but the authors remain aware of the seductiveness of quantification. "Although we are tempted to designate Netschaëvo an HH chondrite," they say, "we believe it is better not to propose new symbols for meteorite groups having only one member."