astronomy

MOLECULES

Solid hydrogen controversy

Molecular astronomy is a new science and one of its chief tasks is to figure out what substances can exist under interstellar conditions in order to know which ones it may be profitable to look for.

Drs. J. M. Greenberg of Rensselaer Polytechnic Institute and T. de Jong of the Leiden Observatory in the Netherlands have addressed themselves to the question whether solid hydrogen might condense on the dust grains in interstellar space. Other astronomers have suggested this, but Drs. Greenberg and de Jong say no.

The possibility depends on the temperature of the dust grains and the pressure of hydrogen gas in the interstellar region, they say in the Oct. 18 NATURE.

The temperature of the grains depends, in turn, on the balance between their ability to absorb radiation and their ability to reradiate it. For a silicate grain with the largest possible emissivity in the microwave part of the spectrum, the lowest possible temperature is 4.0 degrees K., they say. If the grains are assumed to absorb an unusually low amount of ultraviolet radiation, the temperature could be pushed down to 2.7 degrees K.

At 2.7 degrees K. condensation would require a hydrogen density of 100,000 atoms per cubic centimeter, but at this density atomic collisions will raise the grain temperature to well over 10 degrees K. So one way or another, there is little likelihood of solid hydrogen condensation, they say.

SOLAR SYSTEM

New solar telescope dedicated

A telescope 365 feet long was dedicated at the Sacramento Peak Observatory in New Mexico on Oct. 15. The solar observatory is operated by the Air Force Cambridge Research Laboratories and is located in the Sacramento Mountains at an altitude of 9,200 feet.

Of the new telescope's length, 227 feet are a shaft running into the ground. The rest appears as a conical tower 138 feet high. Its dimensions are comparable with those of the biggest solar telescopes elsewhere.

Sunlight enters the telescope through a 30-inch aperture and is focused by a 64-inch mirror at the bottom of the shaft.

The new telescope will be used to study solar energy processes, especially sunspots and flares.

QUASARS

Clustering explains red shift

The red shifts of the quasars are the cause of a serious argument among astronomers. Usually astronomers consider that the amount a body's light is shifted toward the red end of the spectrum is a measure of its distance. If this is done for quasars, it puts them at the edge of the observed universe.

But if the quasars are so far away, then they must generate a fantastic amount of energy to appear as bright as they do. If they generate so much energy, then they ought to be very dense and have strong gravitational fields. The fields will cause a part of the red shift, and the argument is how much to assign to the field and how much to the distance.

Analysis of 150 quasars' red shifts leads Dr. Morley B. Bell of the Canadian National Research Council to suggest that quasars form clusters. In the Oct. 18 NATURE he describes several such clusters, showing that they form spiral patterns that cover large area of sky.

The inference from this, he says, is that the quasars are much nearer than the edge of the universe since the patterns would have to be relatively close to take up so much of the sky. If so, a large part of the red shift would have to be gravitational, he concludes.

GALAXIES

Internal motions in NGC 5128

The galaxy catalogued as NGC 5128 is an ellipse with a dark lane running through the middle. Dr. J. L. Sérsic of the Observatorio de Córdoba in Argentina has been studying it for two years in an attempt to see whether there is relative motion between the stars and the gas in the galaxy.

This can be determined by comparing the emission spectra generated by the stars and the absorption spectra of the gas to see whether the frequencies of prominent lines are shifted from one to the other.

The observations show, Dr. Sérsic reports in the Oct. 18 NATURE, that the galaxy is surrounded by a gaseous ring that rotates around it. This had been suggested in 1962 by Drs. E. Margaret and Geoffrey Burbidge, but Dr. Sérsic does not find that ring is falling toward the center of galaxy as they did.

Dr. Sérsic also finds that dark matter and stars in the dark lane are moving toward the earth and to the north of the elliptical galaxy at a rate of 1,000 kilometers a second. The dark lane, he says, is an object that is separating itself from the elliptical galaxy; the north rim of the lane is nearest to the earth.

GALAXIES

An object with a blue shift

The light from nearly all objects outside our galaxy appears to be shifted more or less toward the red end of the spectrum. This is held to be evidence that the external galaxies are moving away from us and that therefore the universe is expanding.

There are few extragalactic objects that exhibit a shift toward the blue instead of the red. This means they are moving toward us. It does not necessarily contradict the expanding-universe hypothesis since various kinds of explosions of rotation make an object move backward.

One such blue shifted object is a blob called IC 3258. Drs. E. Margaret Burbidge and M.-H. Demoulin of the University of California at San Diego report that IC 3258 is moving toward us at 490 kilometers per second. The object is in the direction of the cluster of galaxies in the constellation Virgo.

The most interesting possibility, say Drs. Burbidge and Demoulin in the September ASTROPHYSICAL LETTERS, is that IC 3258 was ejected from the Virgo cluster in some outburst of one of the radio galaxies in the cluster.