astrophysics

Gathered at the Fourth Texas Symposium on Relativistic Astrophysics

GRAVITY WAVES

600-mile coincidences

Prof. Joseph Weber of the University of Maryland, who has been looking for gravity waves for some time (SN: 4/27/68, p. 408), recently set up a detector on the grounds of Argonne National Laboratory to see whether the sort of events he had been seeing at College Park, Md., would excite an apparatus 600 miles away.

He reports three events in the last six weeks of operation that excited three detectors at College Park and one at Argonne. The chance that one of these would occur on all four detectors by accident he gives as one in 1,000 years. For the other two the probability of accident is larger.

Prof. Weber is still not certain he has seen gravity waves, but three such events in about 50 days he finds promising. "If you ask how many we expected to see," he says, "I say zero. If you ask how many we'd like to see, I'm reminded of Snoopy and Baron Von Richthofen, who kept raising the score."

QUASARS

Evolution from Seyfert galaxies

One of the serious problems that has confronted the students of quasars is their huge energy output. No other celestial object was known that came near them.

Dr. Maarten Schmidt of Mt. Wilson and Palomar Observatories gives the famous quasar 3C-273 as an example. It gives off 10^{46} ergs per second in visible light, and when radio is added in the figure becomes 10^{47}. The largest galaxies give about 10^{44} in visible light and very little in radio.

Now, however, studies by Dr. Frank Low and others of infrared emanations of Seyfert galaxies (SN:4/6/68, p. 330) show those objects giving 10^{46} ergs per second. Thus, says Dr. Schmidt, "we need not worry about more than a factor of 10." Some kind of evolutionary connection between quasars and Seyferts becomes imaginable. Both Seyferts and some radio galaxies have definite nuclei, a feature ordinary galaxies do not have. Emissions of both these classes of objects also now show variations from week to week as quasars do.

Says Dr. Schmidt: "We now see things in galaxies similar to what we have been seeing in quasars."

QUASARS

Absorption red shifts

The radiation from quasars shows peaks, called emission lines, at certain frequencies where the output is high. Other lines, called absorption lines, represent frequencies that have been subtracted from the quasar's radiation on its way to earth by gas in space.

Two groups, one at California Institute of Technology and the other working with Dr. E. Margaret Burbidge of the University of California at San Diego in La Jolla, have been studying the absorption lines.

One quasar, for example, shows an emission red shift of 2.2, but absorption shifts ranging down from 2.20 to 1.36. This means, if red shift means velocity, that the absorbing medium is moving slower than the emitter. Scientists suspect it is gas shot out from the quasar in the direction of the earth.

"The stuff with the lowest red shift," says Dr. Maarten Schmidt of Mt. Wilson and Palomar Observatories in Pasadena, Calif., is shot out with 30 percent of the velocity of light." Nobody is yet suggesting what is going on to make it fly out that fast.

The velocity spread in the ejected matter is less than 300 kilometers per second, that is 1/300 for the ratio of velocity spread to velocity of emission. "This is awfully good shooting for a gas," says Dr. Schmidt.

SOLAR PHYSICS

Two solar rotation periods

Two different periods for the rotation of the sun have been found by Drs. Gerard van Hoven of the University of California at Irvine and Paul Switzer of Stanford University.

As Dr. Peter A. Sturrock of Stanford reported to the meeting, Drs. van Hoven and Switzer studied the motions of 1,100 solar flares recorded over a six-and-a-half-year period. The flares occurred at solar latitudes between 5 and 45 degrees.

The Stanford observers found that rotation periods of 28.80 days and 31.63 days had similar likelihoods. They conclude that each period refers to a different layer of the sun, the short one to the core and the long one to the outer layer.

This could mean, Dr. Sturrock says, that the sun is aspherical, a phenomenon that Dr. Robert H. Dicke of Princeton University has been trying to find for some time. A great deal of controversy has been generated over the matter since solar asphericity could lead to major revision of Einstein's general relativity theory (SN: 6/1/68, p. 532).

GAMMA RAYS

Pulsars as sources

Up to now the results of the search for gamma rays from pulsars have been inconclusive.

A group working with Dr. Neil A. Porter of Dublin, Ireland, may be the closest to success. Dr. Porter's group reports a "possible positive effect" in the results obtained when their gamma ray telescope was pointed at pulsar CP-1133. But a group under Dr. Trevor C. Weekes at the Smithsonian Astrophysical Observatory's station in Arizona reports no evidence, for X-rays, up as high as the gamma region, from CP-1133.

These results are not necessarily incompatible with Dr. Porter's, says Dr. Weekes, if the output of gamma rays was off at times and on at others. Dr. Weekes and his co-workers are using the 34-foot instrument installed this summer atop Mt. Hopkins.