physical sciences notes

ASTRONOMY

Astronomical Events for 1968

The year 1968 will be a lively one, astronomically speaking. For astronomers and physicists, as well as for the general public, the most interesting event will be the close approach of the asteroid Icarus on June 15, when that minor planet will come within 4,258,000 miles of earth (SN: 11/18/67).

Although this is a close approach astronomically, contrary to a widespread rumor, there will be no collision between earth and Icarus, the nearest distance being 178 times that between earth and the moon.

How many new comets will be spotted cannot be predicted, but rediscovery of 11 comets, whose orbits are known, can be forecast. All of them are too faint to be seen without a large telescope.

There will be four eclipses, two of the sun and two of the moon. Of these, the total eclipse of the sun on Sept. 22 will be barely visible from North America. It will be seen as a partial eclipse in extreme northeastern Canada; the path of totality crosses Siberia. A partial eclipse of the sun on March 28 will be visible only from the South Pacific and Antarctica.

Both eclipses of the moon, one on the night of April 12-13 and the other on the night of Oct. 5-6, will be visible from North America. Only the end of the October event will be seen from the Northwest.

Bright meteor showers, when a single observer can detect at least 50 shooting stars an hour, will occur on Aug. 11—the Perseids—and on Dec. 13—the Geminids.

The solar cycle is approaching its peak, which may occur during 1968, so increasing occurrences of auroras, as well as of interference with long distance communications by shortwave radio, can be forecast.

During 1968 the range of the moon's declination is approaching its greatest value, so that the moon occults the stars of the Pleiades. Jupiter, Saturn and the bright stars Antares (SN: 1/6) and Spica are also occulted this year.

HOLOGRAPHY

Cylindrical Holography Now Possible

A new way of making holograms that can be viewed through angles of either 180 degrees or 360 degrees has been devised by Dr. Tung H. Jeong of Lake Forest College, Lake Forest, Ill. This has been done before with mirrors but Dr. Jeong's method is much simpler.

He uses a strip of 35mm film, ringing the inside of a glass cylinder 80mm in diameter, with the emulsion facing inward. The object to be recorded is placed at the center of this cylinder. The laser beam strikes the object from the top of the system, after having been diverged by a microscope objective lens and filtered by a pinhole, Dr. Jeong reports in the November JOURNAL OF THE OPTICAL SOCIETY OF AMERICA.

The central portion of the beam illuminates the object, while the remainder falls directly onto the film, thus providing a reference beam (SN: 8/26/67). For viewing the hologram thus obtained, the developed film is placed back into the original configuration, with the object removed.

After the initial exposure, but before development, a different object can be introduced and the film can be exposed again, with light entering the cylinder from the opposite end. The resulting hologram records two unrelated scenes, each of which can be viewed independently of the other, in all perspectives, depending on the direction of the illumination used for reconstruction.

The system is simpler than using mirrors to reflect the laser light and also has the advantage that, since the cylinder is opened ended, the object can be a projectile shot through the cylinder while its image is recorded.

GALACTIC STRUCTURE

Stellar Rings, A New Type of Grouping

A new form of stellar aggregation has been discovered by the West German astronomer, Theodor Schmidt-Kaler at Ruhr University, Bochum.

While studying the dark clouds of the Milky Way galaxy, Dr. Schmidt-Kaler became aware of large numbers of stellar rings, which appear on photographs as regular elliptical groups of stars that are sharply bounded on the outside. He found that typical rings contain between 25 and 200 stars and that the stellar density averages four times higher than in the surrounding field.

A complete inspection of the Palomar Observatory Sky Survey yielded 1,002 stellar rings, and three more were discovered on the plates of the Lick Observatory Sky Atlas. Statistical tests show that 80 to 90 percent of the rings are real, and only 10 to 20 percent are accidental groupings of stars.

Accurate distances within individual rings could be determined in four cases since they contained stars of known absolute and apparent magnitudes. The diameters of the four turned out to be very similar, roughly 23 light years across, a value supported by determinations in nine other cases, leading to the hypothesis that all rings have nearly equal minor diameters.

On this assumption, the angular diameter of a stellar ring indicates its distance. By plotting the space positions of the rings, the structure of the Milky Way can be charted out to a distance of about 23,260 light years. The resulting picture is consistent with other models of galactic structure.

HIGH ENERGY PHYSICS

Evidence for New Particle

Preliminary evidence for the existence of a new, extremely high energy particle is reported by five University of Utah scientists in the Dec. 25 PHYSICAL REVIEW LETTERS.

They studied the tracks made by charged mu mesons in spark chambers. Current theories hold that the intensity of mu mesons should be much greater when incoming cosmic rays have a longer path through the atmosphere and, therefore, more chances to interact. The path length is determined by the angle at which the cosmic ray particles enter the atmosphere.

However, the Utah scientists found only a slight increase, instead of the sharp increase expected, indicating that what they may be tracking are decay products of an unknown particle. Dr. Jack Keuffel is group leader of the continuing experiment.

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