

# physical sciences

## ORGANIZATIONS

### European Physical Society founded

The newly formed European Physical Society was formally inaugurated in Geneva last month. The new society aims to provide European physicists with a forum for discussion of matters of common interest and a center of initiative for activities which can only be handled efficiently at the international level.

Membership is open to physicists either on an individual basis or indirectly through national organizations that are members of the international one. The European Physical Society's main secretariat is located at the Institute Battelle in Geneva.

Need for such a society has been felt more and more as European physics has gone international. Not only are the largest laboratories international in administration, but many universities and smaller national laboratories have become international in personnel. The old national societies were beginning to find problems with which they could not cope.

In 1966 Prof. Gilberto Bernardini of the Scuola Normale Superiore in Pisa convened a committee of physicists to discuss an international society. After a series of further meetings, important decisions on the constitution of the society were taken at a meeting in Prague in May. Both Western and Socialist-bloc countries are members.

## METEOROLOGY

### Charge transfer in lightning

Estimates of the maximum amount of electric charge that can be transferred between a cloud and the ground by a lightning stroke will have to be revised upward, says Dr. L. N. Nelson of the Institute of Atmospheric Physics of the University of Arizona.

He reports in the Sept. 15 *JOURNAL OF GEOPHYSICAL RESEARCH* that among 17 flashes recorded in five nighttime storms in the summer of 1963 there was one which carried 855 coulombs of charge. The previously accepted maximum had been about 300 coulombs.

Dr. Nelson does not feel he has enough data to revise previous estimates of the average charge transfer, about 90 coulombs. His measurements depend on observing sudden changes in the local magnetic field as the charge moves; previous observers used changes in the electric field.

One coulomb is the amount of charge carried past any point in one second by a current of one ampere.

## GEOPHYSICS

### New gravimetric maps

The U.S. Geological Survey, in cooperation with other Federal and some local agencies, is making a new series of maps of mountainous regions in California and Alaska to measure variations in the gravitational force of the earth. The new maps, which should be complete by 1970, will give a reading every five miles in California and every 15 miles in Alaska.

Measurements already made, says Dr. Howard W. Oliver of the Geological Survey, show that mountains

made of light rock, like the Sierras, are in part floating on heavier plastic rock material in the same way an iceberg floats on water.

The new maps are expected to be useful both in geological research and in prospecting for mineral deposits.

## QUANTUM THEORY

### Interference

If two beams of laser light of the same wavelength are put into phase with each other and shone through separate narrow slits onto a screen, a characteristic pattern of light and dark fringes will appear.

On the theory that light consists of particles, it is difficult to see how the particles, photons, in one beam can react to the existence of the other beam and can consequently go only to certain parts of the screen. As Drs. R. L. Pfeegor and Leonard Mandel of the University of Rochester conclude (SN: 4/6, p. 338), one is driven to say that one and the same photon was in both beams at once.

Profs. Louis de Broglie and J. Andrade e Silva of the Institut Henri Poincaré in Paris present in the August 25 *PHYSICAL REVIEW* an explanation based on wave-particle duality which they consider simple and satisfying. They see the photons bound to electromagnetic waves which, though real, carry almost no energy except in the locations where photons happen to be, and therefore can only be observed at the points in space where they are carrying photons.

The waves produce the interference, as waves ordinarily will do in this situation. The motion of the photons is constrained by the waves and so they go to the portions of the screen where the waves permit them and not to others.

## GEOPHYSICS

### Protons and the magnetosphere

Low energy protons and alpha particles from the sun can freely cross the boundary between the solar wind and the earth's magnetosphere, although in most theories it would be difficult or impossible for them to do so, says Dr. L. J. Lanzerotti of Bell Telephone Laboratories.

He draws this conclusion from simultaneous observations over the equator and the poles, which he reports in *PHYSICAL REVIEW LETTERS* for September 23.

The equatorial observations were made at about five and a half earth radii from the surface by the satellite ATS-1; the polar observations at about 33 earth radii on IMP-F satellite (SN: 8/31, p. 216).

Other observers had taken previous observations of free entry at the poles in support of an open model of the magnetosphere—that is, that the northern and southern halves of the magnetosphere do not join together on the antisolar side of the earth, but stretch out indefinitely in two parallel ribbons. Dr. Lanzerotti says the observation of easy proton entry through the magnetospheric boundary at equatorial latitudes means that observations of these particles are not sufficient evidence to distinguish between open and closed models of the magnetosphere.