PHYSICS

"Crazy" Particles Studied

Physicists are attempting to find some order among the many different characteristics of the 21 elementary particles known to exist in atomic cores.

➤ CRAZY, mixed-up particles having unpredictable properties and behavior patterns are found in atomic cores.

To try to bring order out of this chaos, some 250 scientists from 26 nations gathered to open the 1958 Annual International Conference on High Energy Physics meeting in Geneva. It was the first time this meeting, considered the most important yearly event for nuclear physicists, had been held in Europe.

The European Organization for Nuclear Research, or CERN as it is called from its initials in French, sponsored the meeting. CERN, Europe's atomic research center run jointly by a dozen countries, is building one of the world's largest particle accelerators. It will speed up protons to energies of 25 billion electron volts.

Among the world-famed physicists that attended the conference were Dr. J. R. Oppenheimer, director of the Institute for Advanced Study, Princeton, N. J., last year's Nobel Prize winners in physics, Drs. C. N. Yang and T. D. Lee, also of the Institute; Prof. W. Heisenberg of Germany, whose basic equation tying together all elementary particles was much discussed; Prof. Leprince Ringuet of France; Prof. E. Amaldi of Italy; Prof. Hideki Yukawa of Japan; Prof. E. Scherrer and Prof. W. Pauli of Switzerland; Sir John Cockcroft and Prof. P. M. S. Blackett of the United Kingdom, and the Russian physicists, E. I. Tamm, S. Ia. Nikitin, Ia. A. Smorodinsky and L. D. Landau.

The meetings emphasized the most recent findings about nuclear particles by both theoretical and experimental scientists. The problems of what atomic cores are made of and how they are held together are attacked by the theoretical specialists using information garnered by the experimentalists.

There is at present no satisfactory theory of elementary particles. There are now some 21 known to exist. A few have lifetimes measured in billionths of a second. One of them, the neutron that triggers the atomic bomb, lives approximately 15 minutes.

Scientists Probe Matter

➤ THE PROPERTIES of matter at very low temperatures, some 459 degrees below zero Fahrenheit, are being probed by scientists around the world.

Their studies are directed at a better understanding of how atoms are held together but they may also yield new and cheaper methods for transmitting electric power.

Helium is the only substance that remains liquid under ordinary pressure at temperatures near absolute zero. All others freeze to the solid state when cooled sufficiently low. The discovery that helium remains liquid at extremely low temperatures was made by Kamerlingh Onnes of the University of Leiden on July 10, 1908.

At ordinary temperatures, the random heat motion of atoms and molecules masks the quantum behavior of the individual particles, and matter behaves in its familiar way. Helium, however, because it remains liquid near absolute zero, has strange properties and behaves in unfamiliar ways.

Its properties can be understood only in terms of quantum mechanics, the peculiar system of laws that govern behavior of matter on an ultra-microscopic scale, the world of individual atoms and molecules. In liquid helium, matter displays quantum properties on a bulk scale.

Demonstrations of its quantum effects are striking. An electric current, once started, continues seemingly indefinitely. This is known as superconductivity and was also discovered by Onnes. If liquid helium is poured into a flask separated into two chambers by a partition, the two levels quickly become equal. This is due to its lack of viscosity and is known as superfluidity.

One form of the material, liquid helium four, conducts heat about 1,000 times better than copper at room temperature.

At the University of Leiden, in the Netherlands, scientists commemorated the 50th anniversary of the discovery of liquefied helium by a week-long international meeting.

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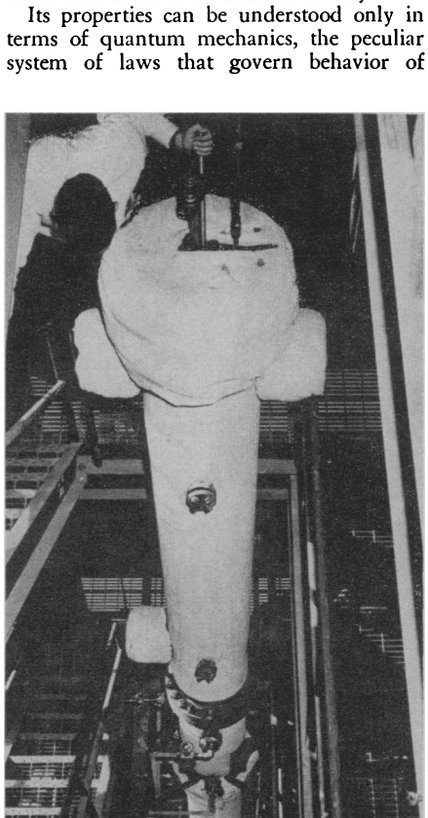

CONTROL ROD—A prototype control rod drive for the projected nuclear power plant, the Commonwealth Edison Dresden Station near Chicago, is undergoing tests in a 50-foot simulated reactor vessel at the General Electric atomic power equipment department.

GEOPHYSICS

Satellites Show Earth Not So Flat as Thought

➤ THE WORLD is only as flat as the Russians have thought.

A preliminary report on the oblateness or flatness of the earth has been released by Col. F. O. Diercks, commanding officer of the U. S. Army Map Service, Washington, D. C. and Dr. John A. O'Keefe, chief of Research and Analysis.

The report is based on data gathered from the orbits of artificial satellites 1958 alpha, the Explorer, and 1958 beta 2, the first Vanguard satellite launched by the U. S.

Scientists have long known that, technically, the earth is "an oblate spheroid, slightly flattened at the poles." The amount of this flatness is measured in terms of how much shorter the radius of the earth is at the poles than at a point on the equator. The internationally accepted figure has been 1/297; that is, the polar radius of the earth is shorter by 1/297, or about 13 miles, than the equatorial radius. This amounts to a difference of about one-third of one percent.

However, the late Dr. F. N. Krassovsky, a Russian geodecist, arrived at the figure of 1/298.3 in 1942, asserting that the polar areas were not quite so flat as our scientists had thought.

A recent study by Dr. H. G. Hertz and Marvin Marchant of the Research and Analysis Branch of the Army Map Service from radio measurements of the Vanguard and Explorer satellites, results in the figure 1/298.38, proving that the Russians were right all along.

Dr. Krassovsky arrived at his conclusions through gravity measurements and triangulation procedures. The current study, although preliminary in nature, tends to support the Russian figures, and agrees with a similar investigation begun earlier by Smithsonian Astrophysical Observatory physicist Dr. L. G. Jacchia.

"Because of its height, the Vanguard was the best thing in the sky for geodetic purposes," Dr. O'Keefe said, "and the Explorer was next."

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