PHYSICS

Atom Aristocracy Backed

Although American physicist Dr. Geoffrey Chew believes in democracy among atomic particles, Russian scientist Dr. Vladimir I. Veksler supports the aristocracy view.

➤ ACADEMICIAN Vladimir I. Veksler, the Soviet Union's leading physicist, is a proponent of aristocracy—at least within the atom.

He has taken issue with an American physicist who said the proton, the neutron and other "aristocrats" of atomic matter should be stripped of their status among the growing population of atomic particles.

At the centennial celebration of the National Academy of Sciences in Washington, D. C., Dr. Geoffrey Chew of the University of California had supported a "notion of democracy"—that no particle is more elementary than another. (See SNL, 84:275, 1963)

That idea is in the "wishful thinking area," said Academician Veksler who attended the Academy centennial and received the Ford Foundation's Atoms for Peace Prize for his work in high-energy physics. Co-winner of the prize was Nobelist Dr. Edwin M. McMillan of the University of California.

Addressing a meeting at the National Science Foundation, Academician Veksler said the Chew theory implies "an ever-deepening break" between the behavior of weakly interacting particles, called leptons, and strongly interacting particles, such as protons.

There are only four known types of leptons, the electron, the mu meson and the two kinds of neutrinos. The scores of types of strongly interacting particles influence each other with equal power, Dr. Chew believes.

"If Dr. Chew is correct, all strongly interacting particles have to be considered as belonging to the same kettle and no main group emerges," Academician Veksler said.

"This eliminates the possibility of drawing any further analogies between leptons and strongly interacting particles."

Academician Veksler also objected to Dr. Chew's theory on the grounds that it does not lend itself to mathematical proof.

"It is a multi-particle problem," he said, "yet in quantum mechanics the ray function for even three particles has not been solved yet."

Dr. Chew said that proof of his theory would require the building of a particle accelerator five times more powerful than the biggest ones existing, which are the 30-billion-electron-volt (Bev) machines at Brookhaven National Laboratory, Upton, L. I., N. Y., and in Switzerland.

A 150 Bev accelerator is theoretically possible, Academician Veksler said, but at present the Soviet Union has its hands full building a 70-Bev machine.

He said the big magnet and associated equipment for the accelerator are nearing completion. They will be assembled near Moscow and the accelerator will be ready for "its birth pangs" in 1965.

He said he doubts that the machine will reveal any more "elementary" particles.

"Although the binding forces of the proton and neutron still are not understood," he said, "we know all the basic bricks of which matter is built. . .

"The particles we call elementary are simply those particles whose internal structure is not known to us."

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General Electric

PIONEER IN SCIENCE—Dr. William D. Coolidge, who played a leading role in the development of X-ray technology, is shown in his laboratory. He was awarded the Roentgen Medal by the city of Remscheid-Lennep, West Germany, the birthplace of C. W. Roentgen, dicoverer of X-rays. The presentation was made at the General Electric Research Laboratory, Schenectady, N. Y., where Dr. Coolidge, who was 90 on Oct. 23, was director before his retirement.

ASTRONOMY

Sun Flare Story Reported

➤ AN UPDATED VERSION of the rise and fall of the mysterious and disturbing flares that appear on the sun has been assembled.

New, highly specialized radio techniques have painted "a fairly detailed picture" of the larger flares, Dr. J. P. Wild of the Radiophysics Laboratory, Sydney, Australia, reported.

Speaking before a symposium on the physics of solar flares at Greenbelt, Md., cosponsored by the American Astronomical Society and the Government's Goddard Space Flight Center, Dr. Wild said the following biography can now be written of a large solar flare:

A small region of the sun's lower atmosphere gradually warms up during a period of several minutes. The region is close to dark sunspots that appear from time to time on the solar surface.

In the same region energy is suddenly released. This is called the "flash phase." A series of about ten sharp bunches of electrons travel outward at speeds up to about half the speed of light. Each bunch packs around 100,000 electron volts.

The bunches that travel downward towards the sun's surface excite short radio waves and X-rays. Those traveling upward through the sun's "halo" excite long radio waves.

At the same time a powerful blast wave, or a succession of them, begins moving out from the center of the disturbance at a much slower speed of about 600 miles a second.

This wave, which can be traced by the long radio waves it emits, is thought to be responsible for several profound effects.

It is believed to give shoves to solar electrons that are trapped in the sun's magnetic fields and generate storms of radio emission lasting hours or days.

The wave is thought to push solar protons, too, giving them enough energy to escape and be detected minutes or hours later as they cross the earth's orbit.

The wave also is thought responsible for pesky radio blackouts, and colorful "northern lights" that occur a day and a half to three days later on earth.

Dr. Wild said the basic mechanisms and sources of energy of solar flares are among the many unsolved problems of solar physics.

Dr. Robert Howard of Mount Wilson and Palomar Observatories, Pasadena, Calif., reported that flares tend to occur during the growth of a sunspot group, although there is evidence that flares with the greatest geophysical effects occur in decaying spot groups.

He said flares, especially the big ones, are more likely to occur in magnetically complex active regions than in magnetically simple active regions.

While the recording of the radio output of a flare is already quite perfect, the optical record is still poor and not good enough yet for working out a firm theoretical model, reported Dr. K. O. Kiepenheuer, director of the Fraunhofer Institute, Freiburg, Germany.

"The probability that—at the same time—good observing conditions, ready equipment and the observer, sunshine and a flare will be available, is small," he said.

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