One criterion for fusion breakeven

All the world's experiments in controlled thermonuclear fusion (CTR) are striving toward one goal: scientific breakeven. Scientific breakeven means getting as much energy out of a CTR experiment as is put in to set up the conditions where fusion occurs. Recent runs with the Alcator C at the Massachusetts Institute of Technology in Cambridge, which culminated Nov. 3, have achieved part of the criteria necessary for scientific breakeven, Ronald C. Davidson and Ronald R. Parker of MIT reported in Los Angeles at this week's meeting of the Plasma Physics Division of the American Physical Society.

Alcator C is a tokamak, a doughnut-shaped or toroidal chamber in which magnetic fields hold ionized deuterium (a deuterium plasma) while electric currents and other means heat it. Scientific breakeven, physicists believe, depends on two main criteria: the temperature of the plasma and the product of its density, and the length of time the plasma can be confined by the magnetic fields, which is known as the Lawson criterion. The latest Alcator C experiments have recorded a Lawson criterion between 7 and 9×10^{13}, twice the value in previous Alcator C experiments and more than the 6×10^{13} believed necessary for scientific breakeven.

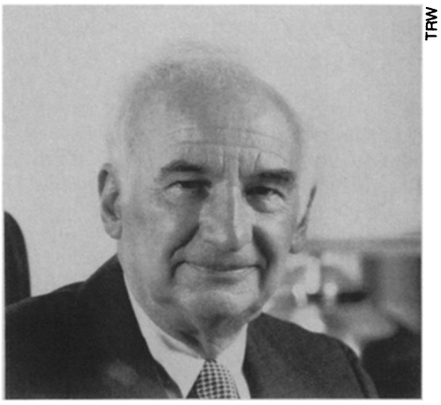
Other experiments have achieved the temperature, 100 million kelvin, expected to represent scientific breakeven. Now the effort will concentrate on getting temperature and the Lawson criterion high enough in the same plasma at the same time. This may prove more difficult than reaching the criteria separately. If scientific breakeven can be demonstrated, a large engineering effort will be necessary to see whether a practical power plant can be designed.

—D. E. Thomsen

Ramo wins new medal

For "demonstrated statesmanship in the determination of science and technology public policy, and for his active role as a spokesman of technology and industry-government-university relationships," the National Academy of Engineering bestowed the first annual Bueche Award and medal on Simon Ramo last week. The award honors the late Arthur M. Bueche, a former senior vice president for corporate technology at the General Electric Co. Bueche was probably best known as a spokesman for the nation's technical community, especially on the topics of energy and innovation.

Ramo, a director and founder of TRW Inc., first gained world recognition for his pioneering investigations of microwaves as a General Electric Co. research scientist. He later gained prominence as director of the air defense's guided-missile program and as chief scientist for the nation's Intercontinental Ballistic Missile Program. A founding member of the National Academy of Engineering and a member of the National Academy of Sciences, Ramo already holds a Presidential Medal of Freedom (the nation's highest civilian award) and a National Medal of Science (the nation's highest science award). □



TRW

Linear collider starts

On Oct. 31 ground was broken for the Stanford Linear Collider (SLC) at the Stanford Linear Accelerator Center in Palo Alto, Calif. The SLC is the first of a new variety of particle accelerator (SN: 7/30/83, p. 71). In the SLC the existing linear accelerator will energize beams of electrons and positrons. After acceleration the electrons and positrons will pass through opposite sides of a pair of curving arms that will bend them around and collide them with each other. At this point the energies of the beams will be 50 billion electron-volts each. The apparatus is thus intended to be directly competitive in energy with the European project LEP now under construction in Geneva. The SLC is expected to be completed by 1986. □

Emergency asbestos limit

The Occupational Safety and Health Administration (OSHA) announced last week that "workers exposed to asbestos under exposure conditions existing under the current [OSHA] standard face a grave danger of developing incurable cancer and asbestosis." In response, OSHA issued an emergency standard reducing permitted workplace exposure to the mineral by 75 percent. The new limit permits exposure to no more than 0.5 fibers (longer than 5 micrometers) per cubic centimeter of air during an eight-hour (time-weighted) average. Noting that a new permanent standard would be proposed within six months, OSHA also warned it was stepping up its enforcement activities in response to the emergency. □

Gene marker for Huntington's disease

A Venezuelan woman with 14 children died of Huntington's disease more than a century ago. Now her family tree of more than 3,000 members has provided the key to identification of a genetic marker for Huntington's disease and determination of the chromosomal location of the gene.

This discovery is the first success of recombinant DNA methods to find a gene whose location had been unknown, the scientists say. The technique is expected to allow, within a year or two, diagnosis of Huntington's disease before any symptoms are evident.

More than 20,000 people in the United States suffer the symptoms of Huntington's disease, usually beginning after the age of 30. The hereditary disorder causes involuntary movements, intellectual impairment and psychological problems, especially depression. Every child of a parent with Huntington's disease has a 50 percent chance of having inherited the disorder, but there has not been a way of determining whether or not an individual has the disease before symptoms appear. About 100,000 people in this country have a parent with the disease and don't know yet whether they have it, and thus whether they could pass it on.

The genetic marker for Huntington's disease, which will be reported in the Nov. 17 NATURE, is a sequence of DNA lying close to the gene. James F. Gusella of the Massachusetts General Hospital in Boston found that depending on the sequence, a DNA-cutting enzyme can give one of four different patterns of DNA pieces. In an individual family, one of the patterns is associated with the defective gene causing Huntington's disease. Other members of the family showing the same pattern are very likely to have the disease.

The first hint of this linkage was in a large U.S. family in Iowa. The linkage was confirmed with data from the Venezuelan family. An expedition of investigators from 18 institutions, led by Nancy Wexler of the Hereditary Disease Foundation in Beverly Hills, Calif., performed neurological examinations and collected skin and blood samples from 570 members of this family who still live in a tiny village built on stilts in a remote lagoon.

The Huntington's disease gene was localized to human chromosome four by Gusella and Susan L. Naylor of Roswell Park Memorial Institute in Buffalo, N.Y.

"Now we know where to look for the Huntington's disease gene itself and we'll be able to determine just what the defect is," Gusella told reporters. "I am optimistic that pre-symptomatic and prenatal diagnostic procedures will emerge in the near future." He also predicts the approach they are using will be successfully applied to other genetic diseases. *—J. A. Miller*