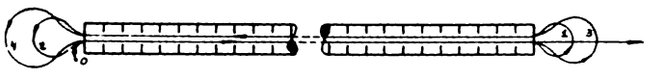
Physical Sciences Notes

HIGH ENERGY PHYSICS

Doubling a Linac's Punch

A method for doubling the energy of a linear accelerator without doubling the price has been developed by Dr. Andrei A. Kolomensky of the Lebedev Physical Institute.

Instead of sending the particle beam through the accelerator only once, Dr. Kolomensky proposes to loop it



back on itself for a return trip through the same cavity, using large magnets at the end of the tube to reverse the beam.

He says that calculations at the Institute indicate that beam reversal is feasible and that scientists there are now experimenting with small test devices.

Dr. Kolomensky is generally acknowledged to be the Soviet Union's leading accelerator designer. He reported to the Sixth International Conference on High Energy Accelerators that for a linear accelerator three kilometers long, reversal in flight for two or three times could be done with conventional magnets 100 to 200 meters square.

Superconducting magnets would cut this by a factor of 10 Dr. Kolomensky said, and they will probably ultimately be used. He calls the new system a "linetron," since it is linear but also has some of the repeating acceleration advantages of a cyclotron.

SOLAR SYSTEM ASTRONOMY

A Neutrino Search

Solar neutrinos were not detected in the first 48 days of exposure of a tank containing 100,000 gallons of tetrachloroethylene. Dr. Raymond Davis Jr. of Brookhaven National Laboratory heads the research team trying to detect the phantom particle in the tank, 5,000 feet deep in a South Dakota gold mine (SN: 1/16/65).

ATMOSPHERIC PHYSICS

World's Temperature Changing

Dirty air apparently is causing the temperature of the earth's air envelope to drop, according to Dr. James P. Lodge of the National Center for Atmospheric Research in Boulder, Colo.

The average temperature has dropped one-half a degree F. since 1950, he finds, reversing a trend of slowly rising temperatures. The average temperature is now what it was in 1850.

Dr. Lodge reports that air pollution, in the form of fine particles, blocks some sunlight from reaching earth. Calculations made on the amount of cooling to be expected from pollutants came to just about the half-degree experienced in the last 17 years.

The shift in temperature since 1950 is the equivalent of moving the frost line about 100 miles south, according to Dr. Richard D. Cadle, also of the Boulder center.

NUCLEAR CHEMISTRY

Heaviest Atom Created

The heaviest known speck of matter, an isotope of mendelevium with an atomic weight of 258, has been created in the Heavy Ion Linear Accelerator at the University of California's Lawrence Radiation Laboratory in Berkeley.

Each of the 30,000 atoms of mendelevium so far made has 101 protons and 157 neutrons, giving the isotope its atomic weight, and 157 electrons orbiting in seven shells. Mendelevium 258 was produced by bombarding three micrograms of einsteinium with the nuclei of helium atoms. The target atoms absorbed the two protons and two neutrons of the alpha particles to form the new isotope.

Mendelevium 258 has a special importance because it has a half-life of about two months—unusually long for an element in this region of the periodic table. This means it can be made in sufficient quantities to carry on substantial tracer chemical studies. Most of the other artificial elements decay so rapidly they are virtually useless for scientific investigations.

ATMOSPHERIC PHYSICS

Water Saver

A method of wringing water out of clouds over suitable seashore or island areas is proposed by Drs. J. Lamar Worzel and Robert D. Gerard of Columbia University's Lamont Geological Observatory in the Sept. 15 SCIENCE.

They suggest using deep, cold seawater as a source of cold, pumping this water to condensers on shore in the path of highly humid tropical air masses. This air, when cooled, produces moisture on the condenser tubes. Windmill-driven generators could supply low-cost power for the operation.

Side benefits, the scientists note, would derive from using the nutritious deep water to support aquaculture in nearby lagoons. The condensers could also be used as an air conditioning device for nearby residents.

They studied the islands of the Caribbean as an example of a location in which the trade winds provide nearly optimum conditions for operating such a system.

SOLAR SYSTEM ASTRONOMY

New Evidence for Lunar Capture

The theory that the moon was originally an independent planet in solar orbit close to earth and that it was then captured by earth (SN: 5/11/63) is given support in the Sept. 16 NATURE by three scientists from Australia.

Their evidence is based on measurements of the radioactivity of lead isotopes in volcanic rocks from earth's upper mantle. During the postulated close approach of the two bodies, tidal energy would have caused extensive melting in the mantle, changing the ratio of lead isotopes.

They find evidence for such an abrupt change 1.5 billion to 2.5 billion years ago.