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EXPLORING THE ATOM AT HOME

Atoms can be investigated with simple apparatus. Some old tin cans, glass jars, discarded inner tubes, etc., and you are on your way. A practical cloud chamber may be made from a whiskey glass. Nuclear physics, as a hobby, need be neither costly nor hazardous

SOMEONE ONCE SAID that all the equipment a scientist really needs is a pencil, some paper – and a brain. James Clerk Maxwell and Albert Einstein managed to push back the frontiers of knowledge without so much as a synchrocyclotron to their names. But for research in nuclear physics, a pencil and paper are not quite enough. The minuteness of atomic materials puts them beyond the grasp of our senses. You can't toss an electron onto a pan balance and take its weight, or time the spin of a proton with a stop watch. Yet, should you invent a theory about atomic phenomena and hope to tie it to nature, you must somehow make physical contact with the atom, directly or indirectly. Failing this, you must at least measure as many consequences of the atom's behavior as possible.

The problem of learning how the atom is put together and what happens inside it has been likened to that of finding out how an automobile is made without being permitted to see inside the factory. You must reconstruct what happens inside by examining the raw materials that enter the building and the finished product that comes out. There's no rule against blindly probing the interior with a pole or knocking the factory to bits with a cannon ball. You are even permitted to photograph the flying debris, a technique perhaps neither as accurate nor delicate as you might wish. But crude as the technique may be, experience has demonstrated its effectiveness in chipping the outer layer of mystery from the atom.

this demonstration the high sweep-rate of 60 cycles per second is made possible by limiting the experiment to a test solution of ferric nitrate. Few substances are so responsive.

Incidentally, the magnetic-resonance spectrometer can also be used for measuring the strength of magnets. The magnet to be tested supplies the biasing field. It is modulated as described above, and the oscillator is adjusted to resonance. The strength of the unknown field in gauss is equal to the frequency of the oscillator when it is at resonance divided by 4,228.5.

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A HOMEMADE ATOM SMASHER

For less than the average cost of a set of golf clubs, you can equip yourself for playing with electrons – the minute "spheres" surrounding the atom. With this apparatus you can transmute the elements, alter the properties of some common materials and, incidentally, learn much at first hand about the structure of matter. F. B. Lee, a chemical engineer and faculty member of the Erie County Technical Institute in Buffalo, N. Y., tells how to build and operate the machine. Some safety measures are suggested on page 359

THE PARTICLE ACCELERATOR, more popularly known as the "atom smasher," has about the same relationship to nuclear physics that the telescope has to astronomy. The accelerator probes the microcosm; the telescope, the macrocosm. Like the telescope, the accelerator can open exciting vistas to the amateur. But unlike the telescope, the accelerator has failed to attract a large amateur following. The notion seems to have got around that a small particle accelerator is little more than a toy. But in 1932 the British