AND THE HUMANITIES ON CAMPUS

The new Van de Graaff generator under construction on the U of A campus will produce 6 million volts (6×10^6V) of energy for experimenting with low-energy nuclear reactions.

Total cost for the generator and building is estimated at $1,200,000 split about equally between the University and the National Research Council.

The building has a total height of 100 feet. The Van de Graaff machine, which itself takes up only one-third of the tower's height, is enclosed by an insulation tank filled with a mixture of carbon-dioxide and nitrogen gases at a pressure of 200 pounds/square inch. The remainder of the tower is occupied by a vacuum tube which requires height for particle acceleration and by a permanent crane to lift the tank if repairs to the machine are needed.

The purpose of the Van de Graaff generator is to produce sufficient voltage to measure energies of nuclear particles and the angle of particle emission. This aids in determining the structure of the atomic nucleus.

Electricity is put on at the bottom of a vertical belt and carried up to a sphere. When sufficient voltage has been built up, nuclei of the simple elements hydrogen and helium are accelerated down a vacuum tube to strike a target. Protons(H^1), deuterium(H^2), tritium(H^3), He^3, He^4 can be accelerated to speeds of 20,000 miles/second with a 6 millon volt machine. Common target materials are the rare isotopes of Lithium, Berillium, and Boron,(Li^6), (Li^7), (Be^9), (Be^{10}), (B^{11}), obtained from the Atomic Energy Research Establishment in England. A standard representative reaction is $Be^9 + H^2 \rightleftarrows B^{10} +$ neutron + energy.

From reactions like this the properties of arrangement of nuclear particles can be deduced. The energy of the neutron given off is of discrete levels which allow the determination of the excitation energy levels in the nucleus. Secondly, the angular momentum of the nucleus is determined from the angle of neutron emission.

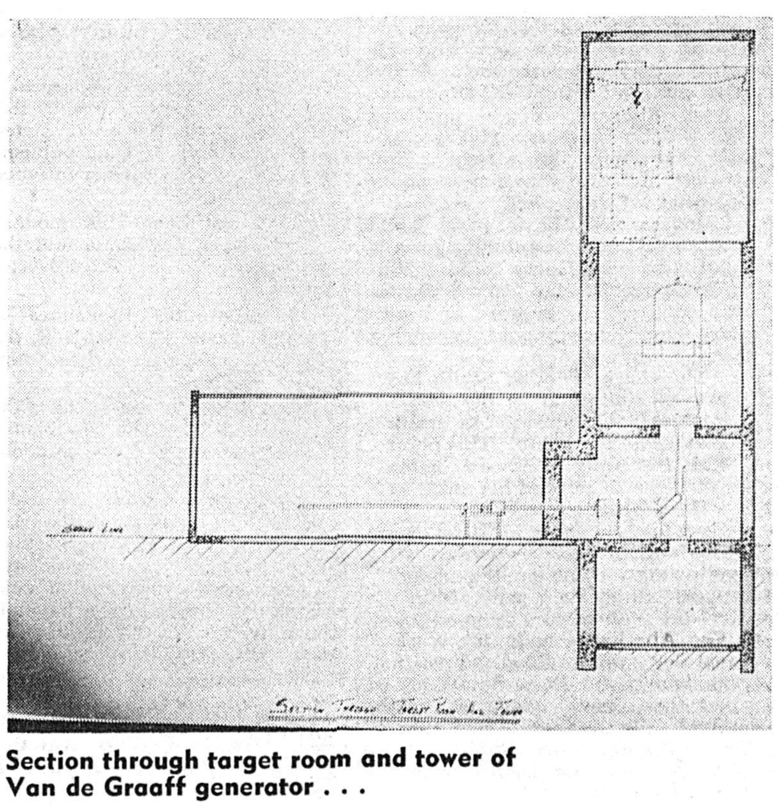
Determination of neutron energy is difficult because the particle is uncharged. This is solved by putting in protons, for example, in short bursts and measuring the time taken for the neutron to be dislodged from the nucleus. The energy can be determined by the relationship $\frac{1}{2}mv^2$. An electron volt is the energy gained by one electron when it is accelerated through a potential of one volt. A 2 Mev (million electron volt) neutron travels 6 feet in 100×10^{-9} seconds. Since measurement must be accurate within 10^{-9} seconds (1 billionth of a sec.) the burst of protons causing the neutron emission must last no longer than 10^{-9} seconds.

Such a short burst may be achieved in several ways. The protons may be shot through a tube crossed by 15 Mev of 167 mc Radio Frequency. The end of the tube is closed off except for a tiny hole. As the beam of protons is sprayed up and down short bursts come through the hole at intervals.

A second method is the use of the Mobley Compression Magnet. This compresses a long burst into a short one. A device emits a burst of protons 10×10^{-9} in length, down the vacuum tube. The vacuum tube is curved by a 75 ton iron magnet with a radius of curvature of 75 inches The beam of protons is bent by the magnet and compressed to a burst lasting 10^{-9} seconds with a gain of 10 in intensity. At the U of A neutron energies of 2 to 20 Mev will be achieved.

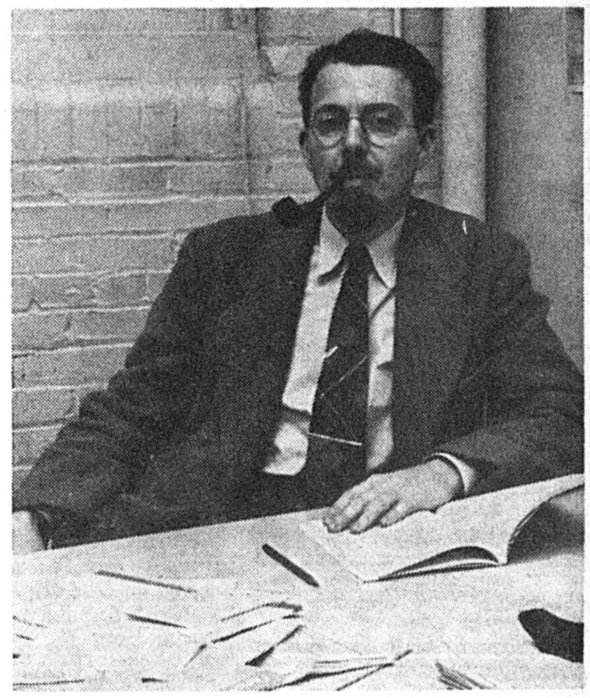
The emission of a neutron from the nucleus is accompanied by the emission of energy in the form of x-rays, alpha-rays, and beta-rays. Radiation hazards will be minimized by the 3 foot thick concrete walls (equivalent to 1 foot of lead).

Warning lights and locks will be used for the safety of personnel while the actual operation of the machine is accomplished by remote control. All radioactivity ceases when the machine is shut off. That is, the low-energy reactions worked with do not involve radioactive elements like radium and uranium.



Section through target room and tower of Van de Graaff generator . . .

Photographs by Heinz Moller



Dr. W. F. Dawson . . .

Books on Canadian political procedure are scarce. Dr. W. F. Dawson, currently an associate professor in the department of political economy, is the author of the recently published book, "Procedure in the Canadian House of Commons."

The volume is a result of ten year's work, and is basically a reduced version of Dawson's doctorate thesis. Most of the material was collected during his three years as Assistant Chief, English Journals Branch, House of Commons, Ottawa.

Dr. Dawson has been working for two years on a second book about the Canadian Senate. He plans to take sabbatical leave next year to complete the book. This summer he plans to tour Europe to study European Upper Chambers, and complete the writing at Oxford.

Dr. Dawson received his B.A. at University of Toronto, his M.A. at Queen's and his doctorate in Oxford in 1955 and has been on the staff of U of A since 1958.

Using classical mythology as a basis, Mrs. Sheila Waston has published three short stories and a novel. "Brother Oedipus" and "The Black Farm" were published in the Queen's Quarterly and "Antigone" was published in the Tamarac Review.

"The Double Hook," Mrs. Waston's novel, was published in 1956, the first novel in Canada to be published originally as a paperback.

Behind the writing of "The Double Hook" lies some years of experience in the Cariboo district of Northern British Columbia. Here a people possessing poetical impulses are unable to articulate these feelings, perhaps because as an heterogenous group, they have lost any culture of their own. There is in ritual of communication.

Mrs. Watson has been a professor in the English department of U of A for two years, having come from the University of Toronto.

Mrs. Sheila Watson . . .