

THE CRUFT LABORATORY

TO THE PRESIDENT OF THE UNIVERSITY:—

SIR,— In the latter part of January the Cruft Laboratory building was completed and was opened for instruction and research in high-potential and high-frequency electrical phenomena. Lectures and laboratory work in Physics 17, Physics 4c, Physics 15, Physics 20c and 20h, and Engineering *E* 20d were held in this building during the second half-year.

The building has a very rigid reinforced concrete skeleton with heavy concrete floors and roof, which render it highly stable for the use of delicate measuring instruments. The outer walls are of brick and the partitions are of hollow tile. All wood, except in the doors and window frames, has been avoided, to obviate as far as possible danger from fire, — a precaution that is especially advisable because of the high tension electrical currents to be used.

The building is surmounted by two steel lattice-work towers, each 102 feet high measured from the roof. These give supports 155 feet above the earth for the attachment of the antennae belonging to the radiotelegraphic equipment of the laboratory. The building has four stories, one of which is entirely below the surface of the earth. This underground apartment contains four constant-temperature rooms, a large hallway and tunnel to Pierce Hall, and a room 40 x 42 feet to contain a storage battery of 50,000 cells now under construction. Above ground there are twenty-two rooms chiefly used for research, but comprising also a lecture-room and large laboratory for general instruction and shops for machine work and carpentering.

A part of the apparatus was supplied from the Jefferson Physical Laboratory, where the courses of instruction were formerly given. To this was added a considerable stock of new equipment and machinery and a very complete system of electric wiring and switch-board devices paid for from a liberal equipment fund appropriated by the Corporation. Additional apparatus will be purchased or manufactured during the present year.

Researches during the occupancy of the building in the second half-year were made as follows: Professor C. A. Culver, of Beliot College, on the transmission and reception of radiotelegraphic

signals on low-lying antennae; Lieutenant Robert T. S. Lowell, of the United States Navy, on the output and efficiency of the Poulsen arc and the Chaffee gap; Captain Clark, of the United States Army, a student of Aeronautics at the Massachusetts Institute of Technology, a preliminary study of radiotelegraphic equipment for aeroplanes; Mr. Fulton Cutting, of the Graduate School of Applied Science, on the 500-cycle oscillograph, and on the design of transformers for radiotelegraphy; Mr. Harry Lawther, on dielectric constants and dielectric losses in condensers; Dr. E. L. Chaffee, on improvements in the mercury-vapor relay; Mr. Ho, under the direction of Professor Duane, preliminary work on the wave-lengths of X-rays. I have been occupied with further developments of gaseous relays and gaseous oscillators, and in measurements of condenser resistances and antenna resistances at high-frequency.

Our most urgent need at the present is the new high-voltage storage battery, which is being constructed from very careful experimental designs made by Dr. H. L. Blackwell. Dr. Blackwell has most generously given a large part of a year to this problem, and has devised a very practical installation. When completed this battery should find immediate application to many important questions in theoretical and practical physics.

The considerable expense of the battery is to be defrayed from a generous anonymous gift for the purpose.

The building itself is the gift of the late Miss Harriet Otis Cruft of Boston as a memorial to her four brothers, graduates of Harvard College in the years between 1831 and 1846. A memorial tablet for the building has been designed by Mr. A. W. Jackson and will be erected as soon as the casting is finished. The Departments of Physics and Engineering are very grateful.

G. W. PIERCE, *Director.*