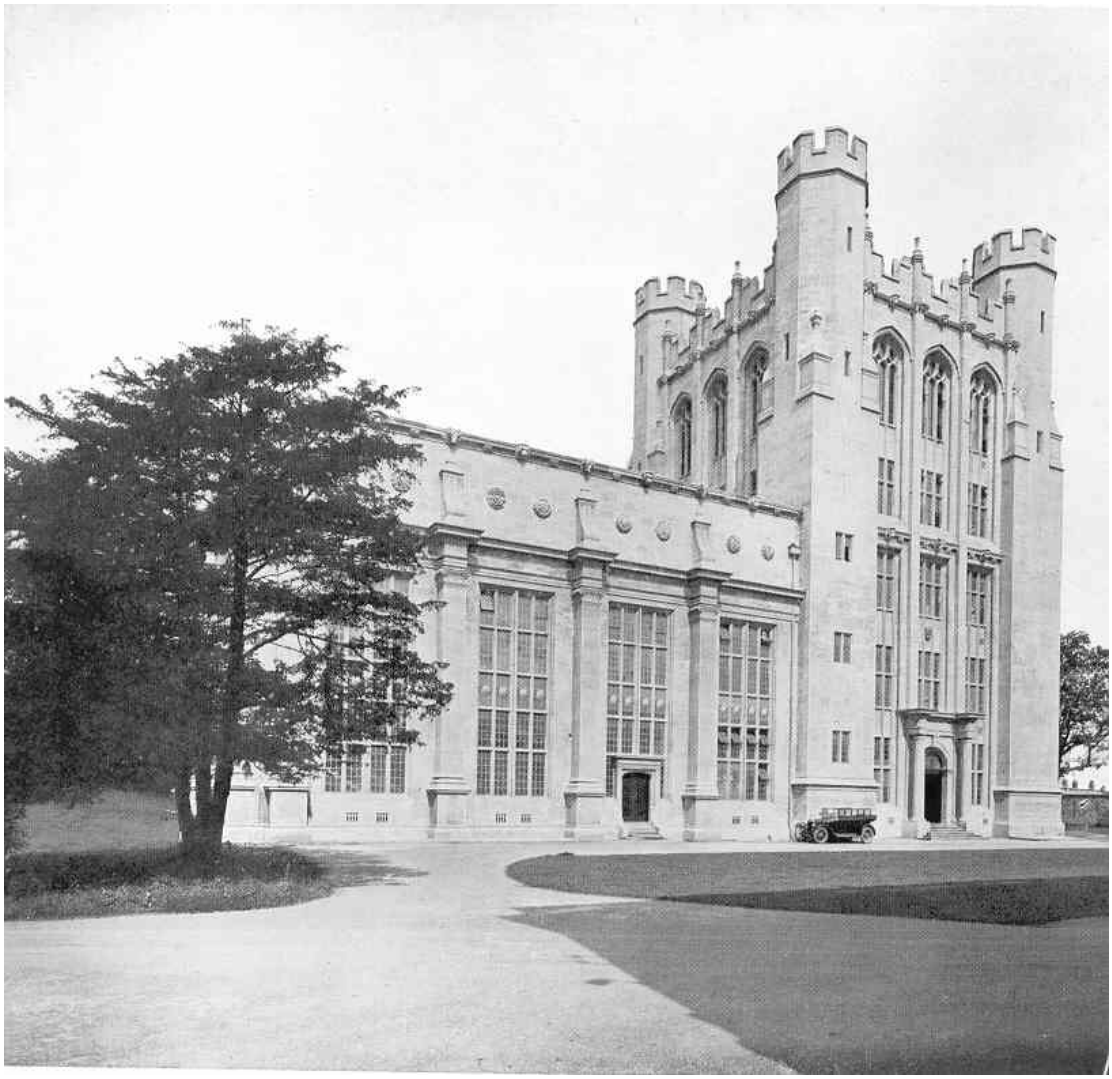
UNIVERSITY OF BRISTOL

HENRY HERBERT WILLS PHYSICS LABORATORY



The Tower, Theatre Wing, Entrance.

UNIVERSITY OF BRISTOL

HENRY HERBERT WILLS PHYSICS LABORATORY

FORMAL OPENING

BY

SIR ERNEST RUTHERFORD, O.M., LL.D., D.Sc., F.R.S.

President of the Royal Society

OCTOBER 21ST, 1927

Henry Herbert Wills Laboratory.

ACADEMIC STAFF, 1927.

Henry Overton Wills Professor of Physics and Director of the Laboratory	A. M. TYNDALL, D.Sc.
Professor of Theoretical Physics ..	J. E. LENNARD-JONES, D.Sc., Ph.D.
Lecturers	I. WILLIAMS, M.Sc. S. H. PIPER, D.S.O., B.Sc. W. SUCKSMITH, B.Sc.
Henry Herbert Wills Research Fellows	L. C. JACKSON, D.Sc. H. W. B. SKINNER, M.A., Ph.D.
Assistant Lecturer	H. H. POTTER, B.Sc., Ph.D.
Research Assistants in Experimental Physics	G. C. GRINDLEY, B.Sc. M. G. BENNETT, M.Sc.
Research Assistant in Theoretical Physics	Miss B. M. DENT, B.Sc.
Research Chemist for X-Ray Work ..	T. MALKIN, B.Sc., Ph.D.

HENRY HERBERT WILLS PHYSICS LABORATORY

THE late Mr. Henry Herbert Wills, a Pro-Chancellor of the University, impressed with the value to humanity of the great advances made in Physics in the last decade, decided to provide funds for the erection of a new Laboratory, through which he hoped the University of Bristol would become an important centre of Physical research and teaching for all time. His first munificent gift for this purpose was one of £100,000 made in June, 1919: this sum he supplemented with another £100,000 in 1920. He desired that this gift should be used mainly in the erection and general equipment of the building, and that the interest accruing during its erection should go towards the establishment of an endowment fund for its maintenance.

The plans of the building were entrusted to Messrs. Oatley and Lawrence, Architects. They were drawn up in co-operation with the Professor of Physics and in close consultation with the donor who, until his lamented death in 1922, took the keenest interest in its details.

A portion of the Royal Fort estate (an earlier gift to the University of the late Mr. H. H. Wills) was selected as the site for the new Laboratory. Building operations were started in 1921, and the Laboratory is now ready for use.

The building as designed is the first instalment of an extensive scheme of University buildings intended by the late Mr. Henry Herbert Wills

to crown the top of a hill overlooking the city, and to be a distinctive feature in distant views of the city. Until the whole scheme has been developed, either as Mr. Wills intended or on somewhat similar lines, the meaning of the design of this first unit, with its tower and reversed "L" shaped plan, cannot be fully grasped.

The lay-out of the scheme was governed by the existence of Royal Fort House, an interesting example of the Georgian period. In bulk, the short arm of the "L," viz. the Theatre Wing of the new building, balances roughly the bulk of Royal Fort House, and a line running E.N.E. axially central between the Theatre Wing and the House is the centre line of the general plan.

The Georgian style, however, being considered unsuitable for the purposes of the New Buildings, the earlier Renaissance was chosen, in order to give more elasticity of treatment, and to afford scope for more extensive fenestration.

The walls are of stone masonry, faced for the most part with stone from the Bath district, with a certain amount of Clipsham for the weather courses.

The floors of reinforced concrete construction on the Hennebique principle are of very solid construction, adopted to avoid the necessity of confining experiments requiring stability to the ground floor. The roofs are covered with old Delabole slates, and in some cases are of lead. North light is supplied to the top floor of the long arm of the building. In the experimental rooms the floors are finished with wood blocks; in other cases indiarubber or ruberoid is used, except in the entrance hall and on the staircases, which are faced with stone. The joinery is of teak and the furniture of teak or pitchpine.

The long arm of the "L" is arranged with a view to future extension; pending this, an external iron staircase is provided at its end. It contains four floors, together with one large and one small cellar completely underground, and suitable for research work requiring a

constant temperature. Reference to the appended plans shows that in general the rooms are arranged in units or multiples of units, in width 17 feet between centres. The corridors are 8 feet wide; on the north side of the corridors most of the rooms are 26 feet deep, and on the south side 16½ feet deep. The ferro-concrete floors have intermediate support on a single row of concrete pillars coinciding with the line of one of the corridor walls, and axially central in the building. The partition and corridor walls are of brick, either 4½ or 9 inches thick, to suit the special needs of the various rooms. The building, however, is designed more or less as a shell, and such internal divisions may be removed or rearranged as required.

The general scheme of this portion of the building is subject to alteration in later years as the work of the Laboratory develops. At present it is as follows:—

Ground Floor	..	Research Rooms, Power Rooms and Workshop.
First Floor	..	Research Rooms and Senior Teaching Laboratories.
Second Floor	..	Senior Optics and Junior Teaching Laboratories.
Third Floor	..	Library, a suite of Class Rooms, Seminars and Private Rooms.

On each floor one or more rooms are allotted for future extension and fittings are not yet provided; the necessary supplies are, however, brought to the rooms ready for distribution later as required. In particular, on the third floor advantage is being taken of space set aside in this way to maintain a close liaison with the Department of Mathematics, which, it is anticipated, will occupy the greater part of this floor for some years to the mutual benefit of both subjects. On this floor a

room 53½ by 26 feet, with a gallery, is allotted to the Library, and will provide accommodation for many years for the growing needs of the two departments in this direction.

An important bequest by Mr. John Exley to the University College of Bristol in 1900 has provided the library with valuable sets of back numbers of leading scientific periodicals. The supply of these has since been maintained by annual grants which will be supplemented, owing to Council's decision to allocate to the Physics Library the income from a capital sum of about £1,800 bequeathed to the University by Miss Maria Mercer.

The short arm of the "L" contains two storeys, and includes two theatres, apparatus rooms and cloak rooms. The larger theatre, on the first floor, contains seating for 300 as a minimum, but bench seats provide for a considerably larger audience on special occasions. It is fitted with windows on both sides and a circular flat ceiling light with electrically controlled blinds. The smaller theatre is beneath it, and is provided with a minimum seating for 130. The acoustic properties of both theatres have received particular consideration.

An additional entrance to the building has been provided in this wing, and the corridors outside the theatres are widened to provide extra accommodation for cloaks and to facilitate the rapid passage of students to and from lectures. The adjoining apparatus rooms on each floor are provided with mezzanine floors and inter-communicate by an internal staircase.

Under the roof of each arm of the building there is a large loft suitable for extensive storage or, if need be, for any special experiment requiring an uninterrupted length of space.

The junction of the two arms of the building is surmounted by a tower 64 feet square. In this tower there is a fourth floor containing two large rooms available for research. A joint passenger and goods lift feeds each floor and finishes at this level. From here a staircase

leads to the roof of the tower, which is made flat to provide for certain types of outdoor experimental work.

The tower is flanked by four turrets, one containing a ventilation fan connected to vitiated air trunks in the ceiling of each corridor in the building; another holds tanks for special water supplies. A third contains a vertical shaft, 4 feet by 3 feet, which goes to the bottom of the building, 90 feet below. Access doors at each floor and other fittings are provided for the use of this shaft in experimental work. The staircase continues to the top of the fourth turret, from which a commanding view over the whole of Bristol and the surrounding country is obtained. When the visibility is good, the Cotswold Hills to the north-east, the Welsh Hills across the Severn to the north-west, and the Mendips to the south-west are clearly seen. To the south, 300 feet below, at the foot of the hill upon which the building stands, lies the industrial portion of the city.

In the general equipment of the rooms special regard has been paid to the wishes of the donor that the furniture and fittings should be of such a high quality as would relieve the University from expenses of repairs for many years to come. The changing needs of any scientific laboratory in these days of rapid advance have, however, been constantly kept in mind, and nothing has been done to diminish the flexibility of the equipment essential to meet new conditions as required. In the provision of gas, water and electricity in the various rooms the rival claims of the overhead system and the floorduct system have been carefully considered. It was felt that in the main teaching laboratories, where the presence of a few fixed tables distributed over the floor has no inconvenience, the floorduct system has fewer disadvantages, and for this reason it has been adopted. In the research rooms, many of which are relatively small, the supplies of gas, water and alternating current are conveyed through the rooms in floorducts, and those of direct current of various voltages by bare wires overhead. At the same time, a horizontal duct with creeping way is provided in the roof of the main

corridors. This not only serves the purpose of a vitiated air duct in the ventilation system, but gives means for rapidly laying any temporary cable or piping as required to any room.

The supply of direct electric current to the laboratories is obtained from two 660 ampere hours batteries of 110 volts, one of which is sub-divided at the fourth and fifteenth cells. It is intended to use the undivided battery for the provision of the heavier currents, thus leaving the sub-divided battery free for the supply of smaller currents at reasonably constant voltages. The 250 ampere 110 volt. charging generator with booster is also available for the distribution of heavy currents. Six wires convey these supplies to the various rooms.

In addition, the Corporation of Bristol supplies to the building 210 volts single-phase, and 365 volts three-phase alternating current, and 500 volts direct current. The former of these is freely distributed for light and power, but at present the remainder is only in use for special machinery.

For the supply of compressed air and of vacuum, the unit system has been preferred to that of general distribution. Any worker who requires either of them has it thus under his own control.

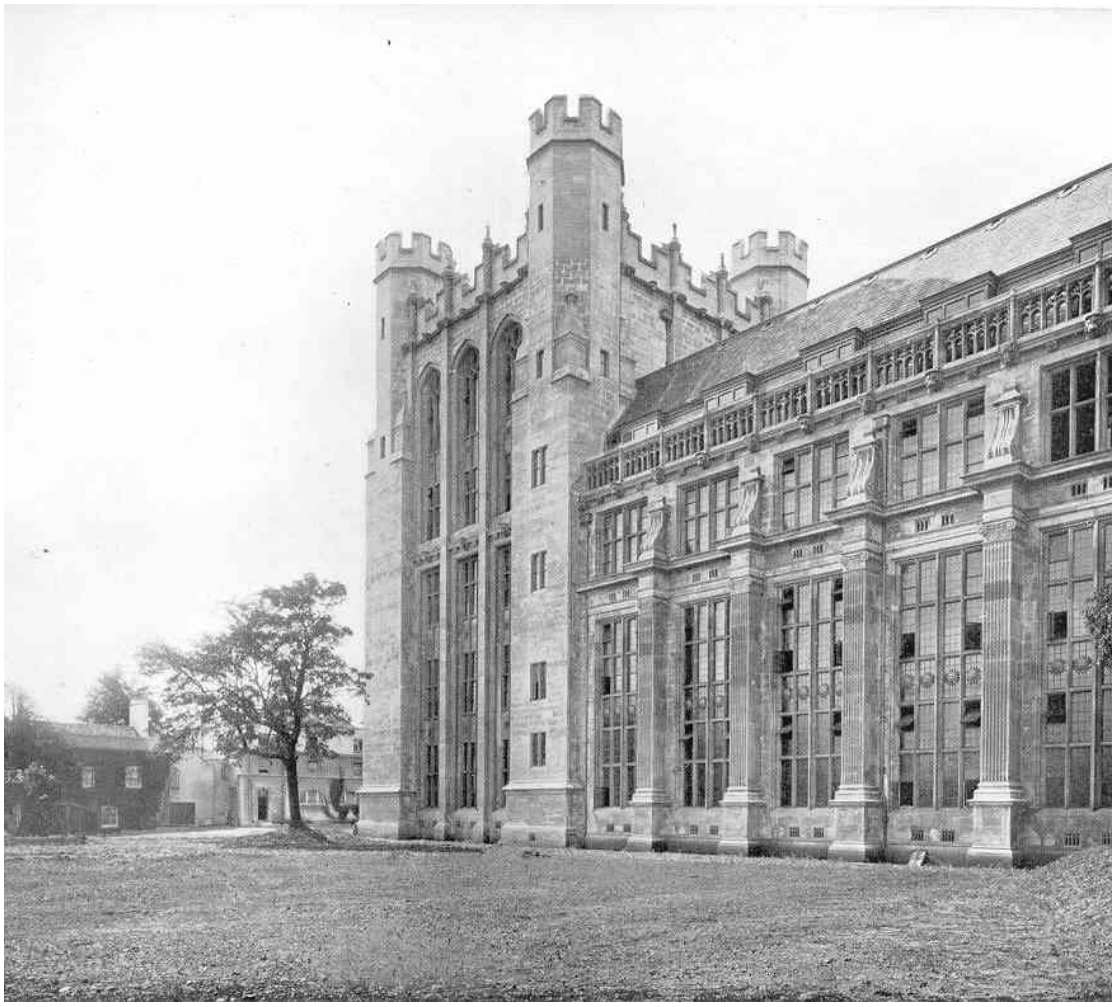
The machines in the workshop are partly unit and partly shaft driven, and space is provided for further machines and general extension.

The Automatic Domestic Telephone service installed in the main University buildings has been extended to a number of rooms in the Laboratory.

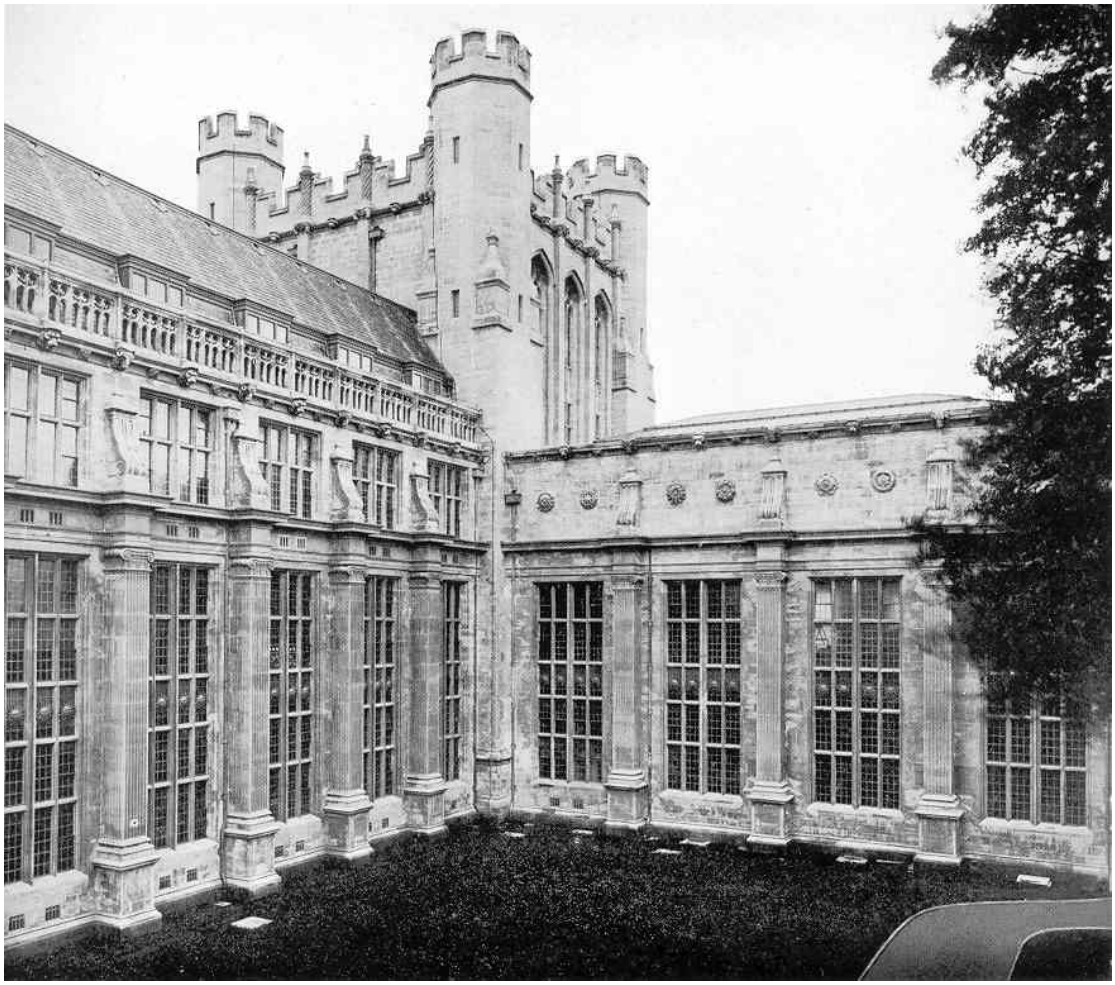
The University Council has been fully alive to the necessity for funds for apparatus and for additional personnel. It has, however, aimed at avoiding the mistake of installing special equipment of a costly character before men are available to use it, and equally that of creating a number of new posts before funds are available for the provision of the apparatus necessary for their investigations. In apparatus, therefore, immediate provision has been made for the researches of the existing

staff, and for the present requirements in teaching, while a small reserve fund has been set aside to form a nucleus for future needs.

In the provision of personnel, Council has found its way to meet some of the new requirements by the creation of a Professorship in Theoretical Physics and of two Henry Herbert Wills Fellowships. If, however, the laboratory is to be put to the full uses that its donor desired, further additions to the personnel and equipment will be necessary.



The North-East Wing.

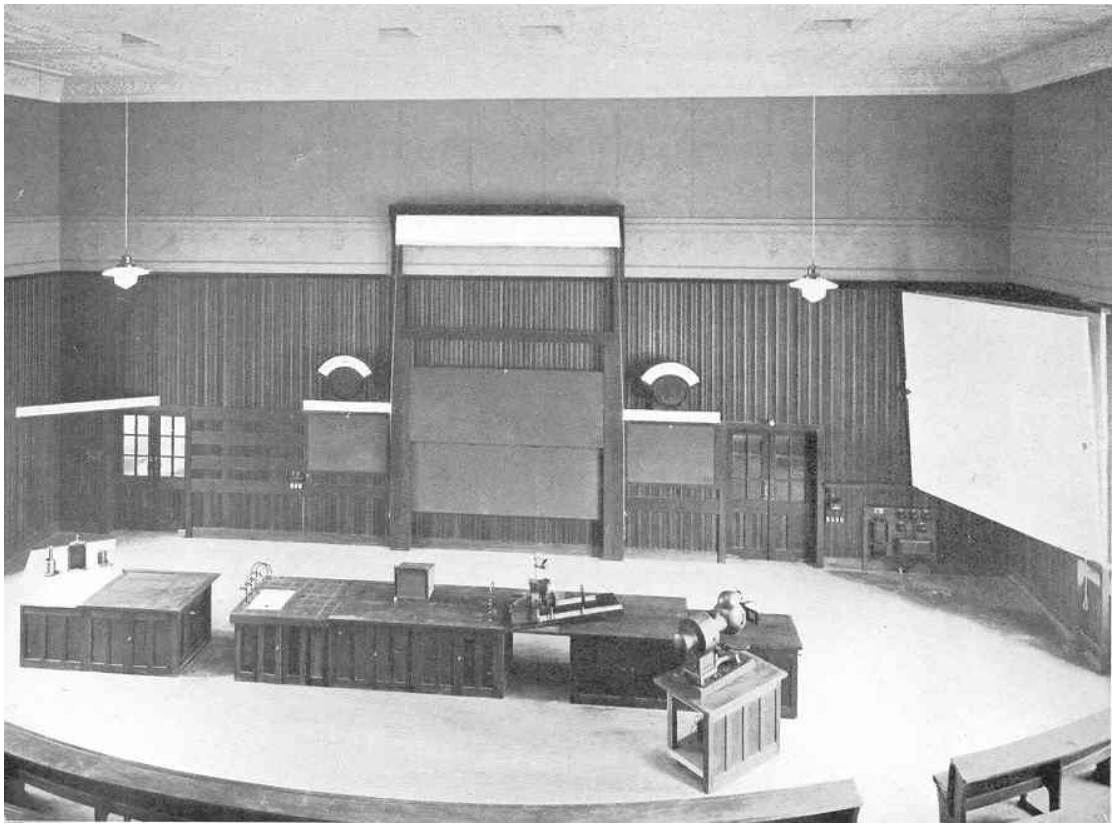


View from the West, showing portions of both wings.

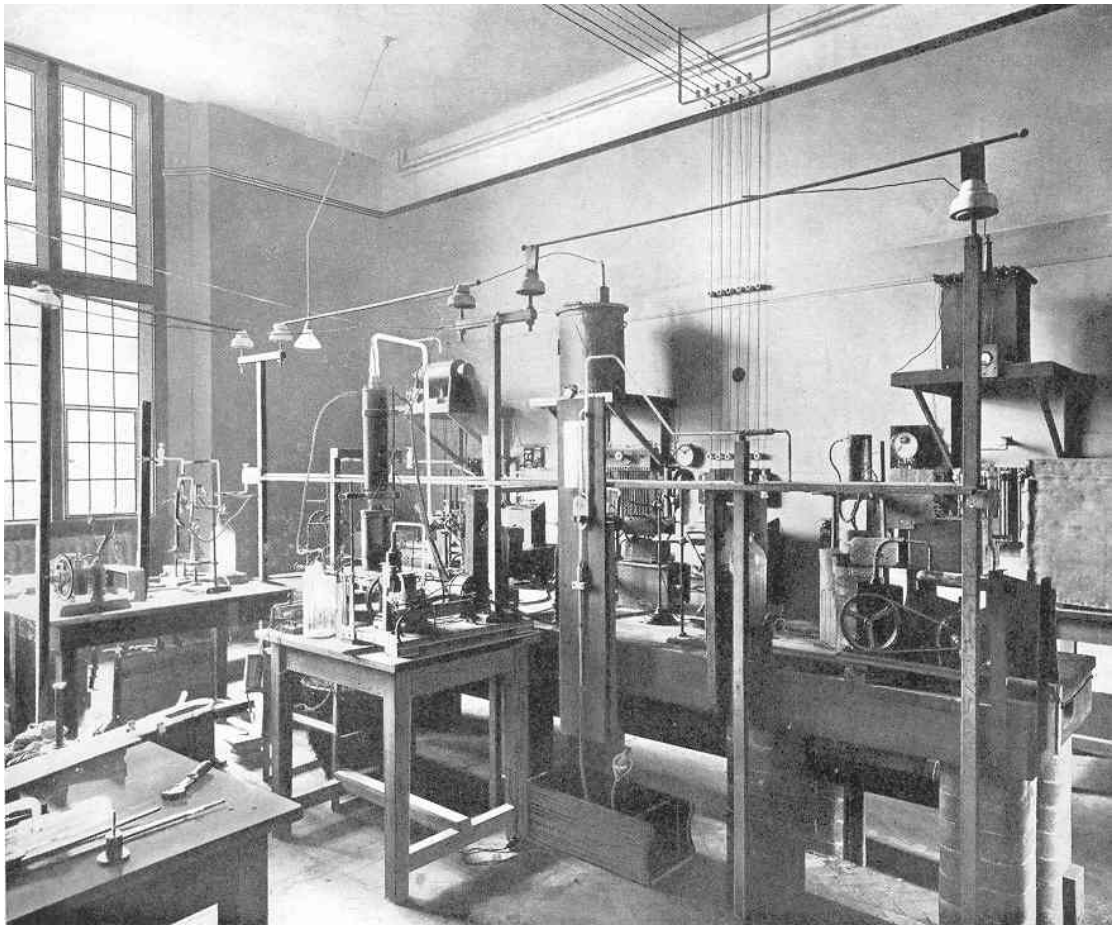
Main Entrance.

The carvings in the spandrels over the doorway are inserted as representative examples of the early and modern discoveries in experimental physics.

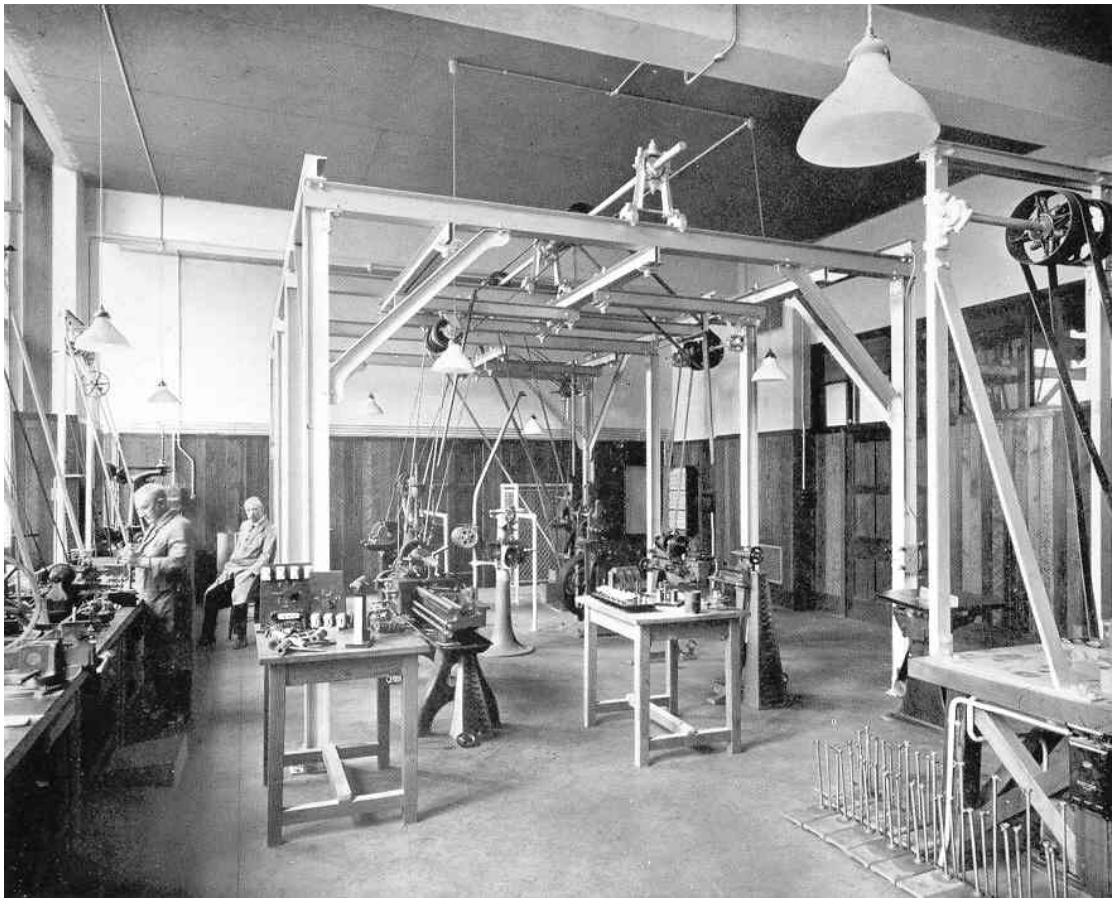
Left:- The dispersion of sunlight by a prism : Newton, 1666.
Right:- The tracks of alpha particles from radium : Wilson, 1911.



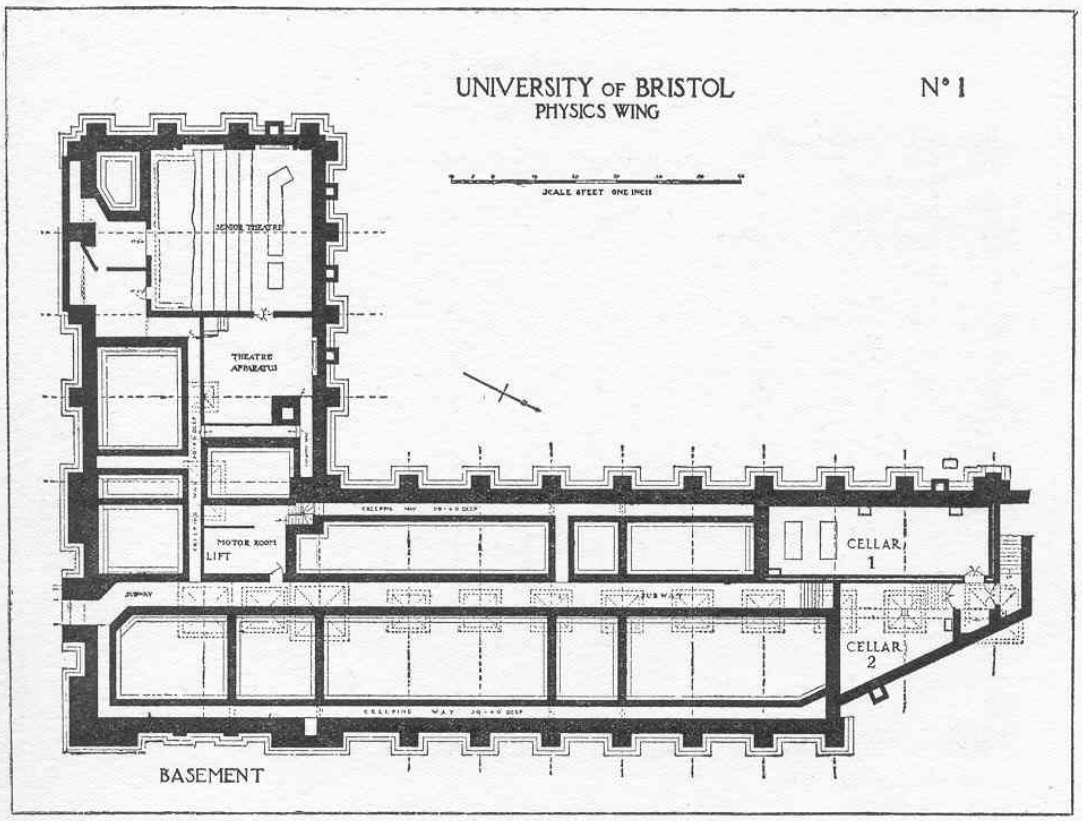
The Main Theatre.



A typical Research Room.

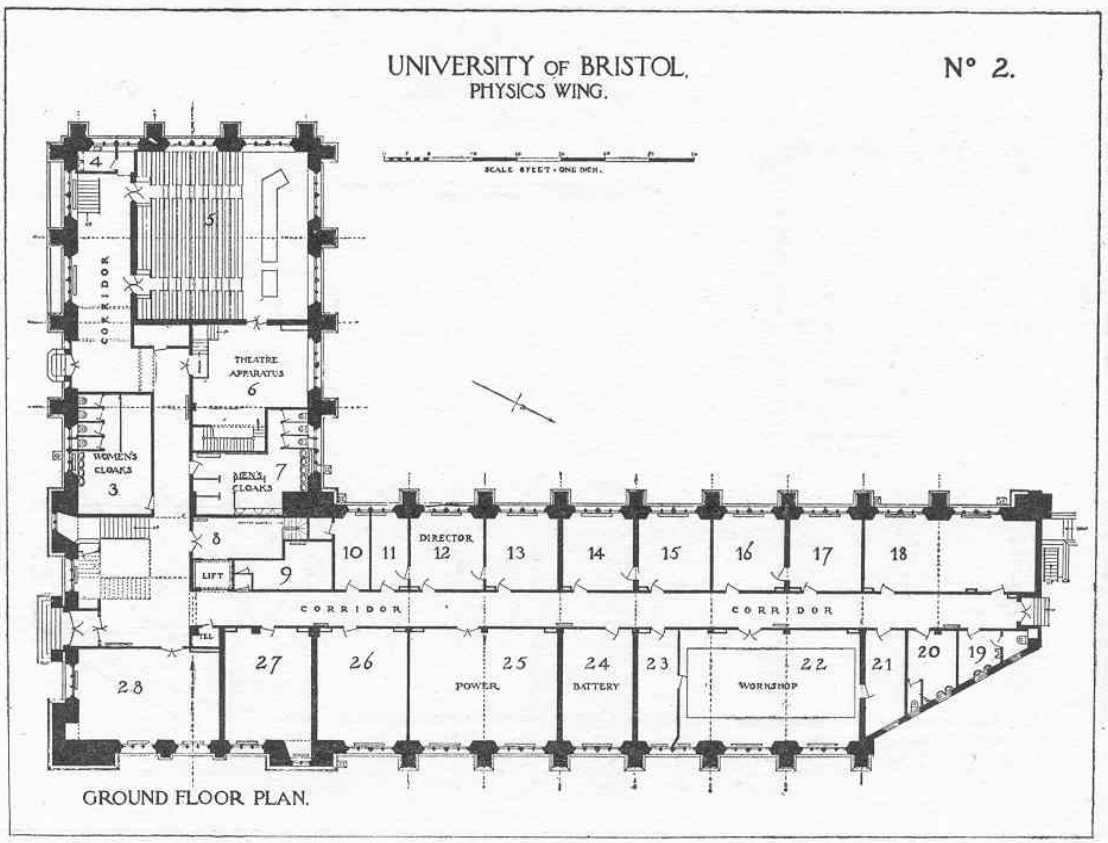


The Instrument Shop.



KEY.

Research Rooms .. .. 1 and 2.

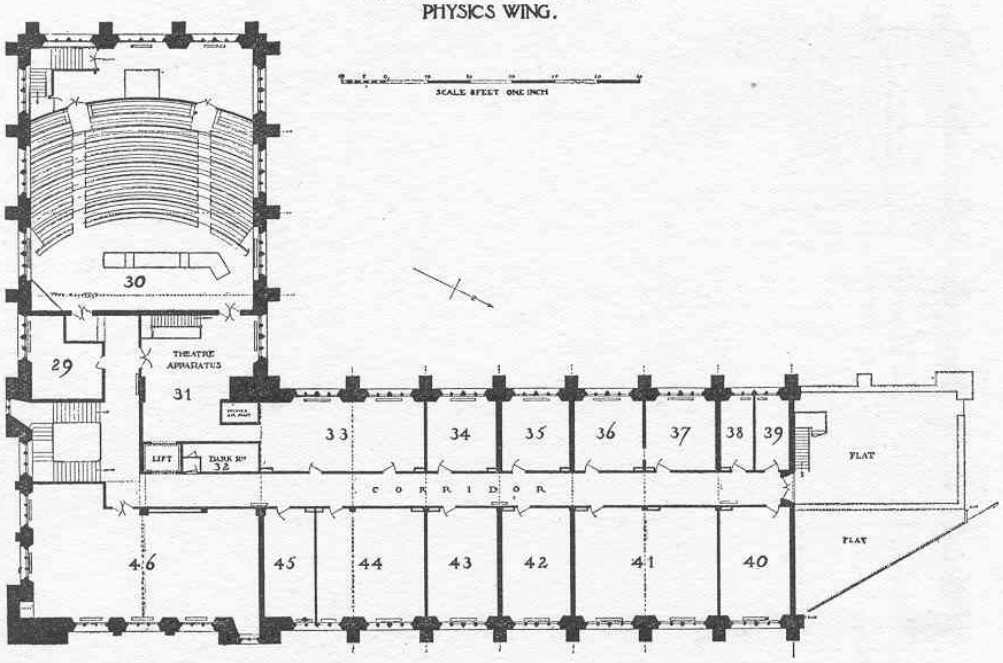


KEY.

Senior theatre	5.
Private or small research rooms	10, 11, 12, 13, 14, 15, 16, 17.
Other research rooms	18, 26, 27, 28.
Photographic dark room	9.
Workshop and Power	22, 23, 24, 25.
Stores	8, 21.
Apparatus	6.
Cloaks	3, 4, 7, 19, 20.

UNIVERSITY OF BRISTOL,
PHYSICS WING.

Nº 3.



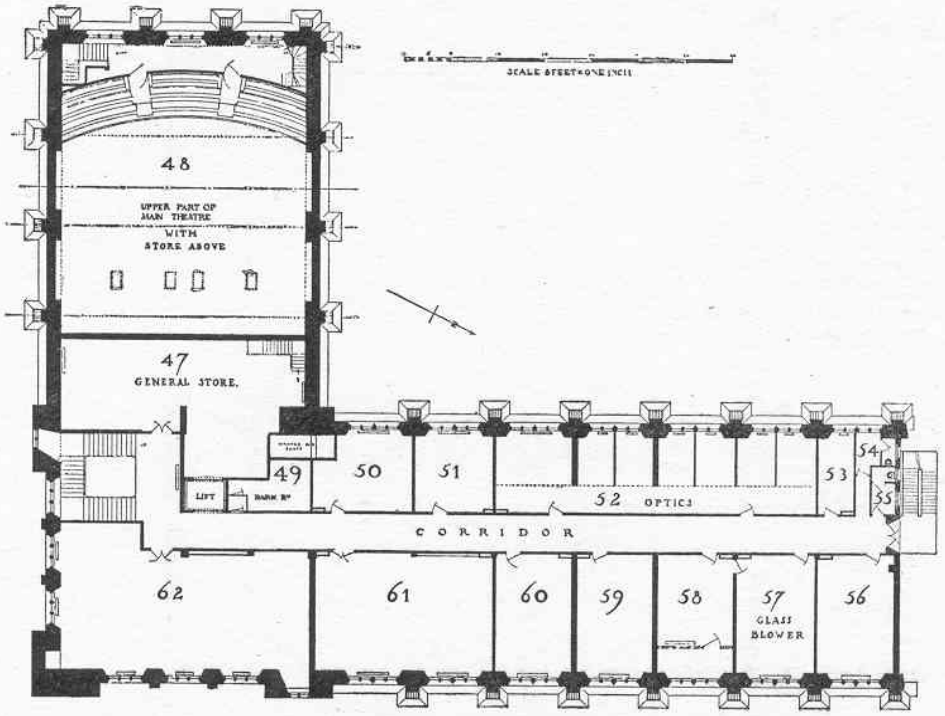
FIRST FLOOR PLAN.

KEY.

Main theatre	30.
Private or small research rooms	34, 35, 36, 37, 38, 39.
Senior teaching laboratories	41, 42, 43, 45, 46.
Photographic dark room	32.
Apparatus	29, 31, 33.
At present unallocated	40, 44.

UNIVERSITY OF BRISTOL
PHYSICS WING

Nº 4



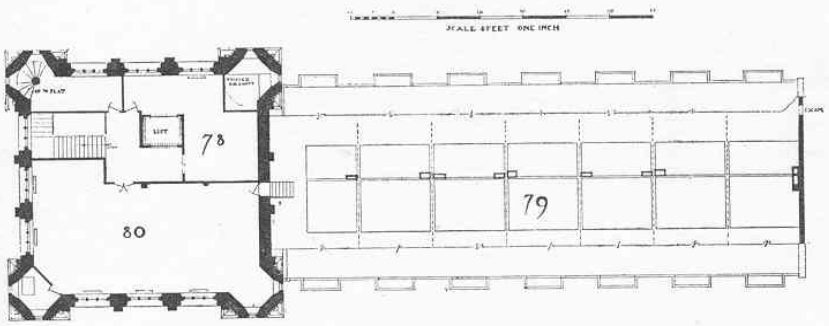
SECOND FLOOR PLAN.

KEY.

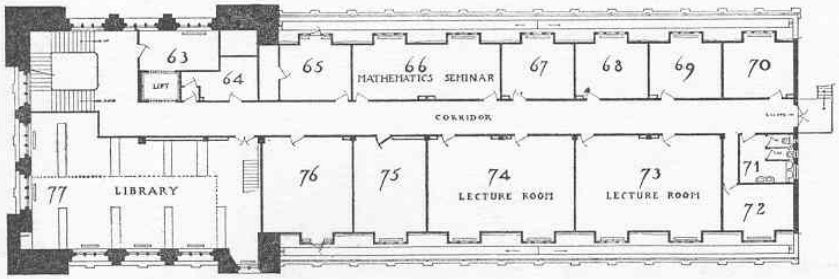
Junior teaching laboratories	50, 61, 62.
Senior teaching laboratories	52.
Private or small research rooms	51, 53.
Other research room	58.
Photographic dark room	49.
Workshop and glass blowing	57, 59.
Stores	47, 48.
Cloaks	54, 55.
At present unallocated	56, 60.

UNIVERSITY OF BRISTOL
PHYSICS WING

N° 5



FOURTH FLOOR PLAN.



THIRD FLOOR PLAN

KEY.

Research room	78.
Store	79.
At present unallocated	80.
Library (Physics and Mathematics) ..	77.
Lecture room	70.
Seminar	76.
Laboratory staff room	63.
Photographic dark room	64.
Cloaks	71.
At present allocated to Mathematics :—	
Lecture rooms	73, 74, 75.
Seminar	66.
Private rooms	65, 67, 68, 69, 72.