

A Short History of Physics Laboratory II The Technical University of Denmark

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THE roots of Physics Laboratory II extend far back in history and originate in the latter half of the 18th century. At that time, no distinct lines were drawn between the various scientific disciplines, with medicine and physics being then looked upon as one domain, which can still be seen from the word 'physician'.

Working at that time at the University of Copenhagen, was a professor of medicine by the name of Christian Gottlieb Kratzenstein (1723-1795), whose activities within the natural sciences were widespread. As a result of his general interest in natural phenomena, physics and chemistry were introduced as separate sciences at the University. He wrote, among other scientific publications, a series of lectures on experimental physics, and, in addition, provided a considerable collection of physics apparatus. From this period onward an unbroken - though tortuous - line runs to the Physics Laboratory II of our times.

The majority of Kratzenstein's collection and books were lost during the great fire that devastated Copenhagen in the year 1795, but fortunately another natural scientist - destined to be one of the most outstanding scientists of that era - arose to continue the work of Professor Kratzenstein, namely Hans Christian Ørsted (1777-1851). Ørsted's interests, like Kratzenstein's, were widespread, and already from the age of 20 he displayed considerable scientific acumen, both within the realms of research physics and in the dissemination of the knowledge of the natural sciences. As a consequence of his work he was appointed extraordinary professor of physics at the University of Copenhagen. Moreover, he managed to supplement and enlarge Kratzenstein's collection which was henceforward known as the Physics Collection.

Ørsted was convinced that the natural sciences were of the greatest importance to society, and on his initiative an institute for engineering students, the Polytechnical College (now: The Technical University of Denmark,

DTH), was established in 1829. This new College began its activities in the center of Copenhagen, in buildings which formerly had been professorial dwelling quarters. The University of Copenhagen was to offer the physics courses, but owing to the University having by tradition its roots in theology and the humanities, the dominating influence of the natural sciences on engineering education gradually resulted in the greater part of the physics curriculum being undertaken at the Polytechnical College. Lecture courses, however, continued to be given by the professor of the University, who also remained responsible for the Physics Collection.

This gradual transfer formed the basis of a physics laboratory at the Polytechnical College. However it was not until 1890, when the College moved from the extremely cramped quarters in the old city of Copenhagen to new buildings which were located on the then outskirts of Copenhagen, that the possibility for laboratory work became a reality. A new physics department with the name Physics Laboratory (in time to become Physics Laboratory I) was formed under the authority of the Polytechnical College alone, whereas Physics Collection - which remained the responsibility of the physics professor of the University - retained this name. The education in physics, for both undergraduates of the University as well as of the College, was then catered for by the two departments working in cooperation.

In 1912 Martin Knudsen (1871-1949) succeeded as professor of physics at the University, and under his leadership the Physics Collection became an internationally recognized laboratory. His researches into gas flow at extremely low pressures were a major contribution towards the completion of the kinetic theory of gases.

This rather artificial arrangement, involving a university professor who in reality spent almost all his working hours at the Polytechnical College, lasted until 1939.

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Subsequently, the Physics Collection and the higher education related hereto were assigned to a new professorship at the Polytechnical College, or the Technical University as it was now called. This professorship was subjected to difficult working conditions during the German military occupation (1940-1945), which resulted in Denmark being almost totally isolated scientifically from countries other than Germany.

At the end of World War II, the need was great to rebuild and further develop the state of physics and technology in Denmark. As a consequence, steps were taken to construct new premises for the Technical University at a site in Lyngby about 12 km north of the city of Copenhagen, and at the same time it was decided to considerably enlarge and strengthen the scientific activities of the departments. At first this caused great difficulties for the Physics Collection, since part of the department was designated as a new department with new scientific responsibilities in the field of atomic physics, while the remaining part - consisting of one staff member (the professor) - was given the task of continuing the Physics Collection, thereby providing the future basic education in electromagnetism and optics for students of electrical and chemical engineering.

All this called for an extension of the scientific staff to a total of 8 to 9 persons, the composition of new curricula, the development of completely new practical exercises for the students, as well as the planning of a new laboratory including building arrangements, installations and apparatus. Moreover, a very compressed time schedule was imposed, since the department was to be, of all the departments of the Technical University, the very first to move to the new site at Lyngby (1962). At that time it was extremely difficult to find and engage competent and experienced staff members. The reason was that the scientific institutes of the other Danish universities were simultaneously undergoing expansion, and thereby the pool of qualified manpower was being drained rapidly. And to top it all, the Physics Collection, suddenly and quite unexpectedly, was given the added task of attending to the

work involved following Denmark's membership of the International Meter Convention.

In this situation it was of paramount importance that the department - which at the same time changed its name from Physics Collection to Physics Laboratory II - was able to engage A. Pedersen as a senior staff member. His deep knowledge of classical electromagnetism together with his wide experience in related industrial activities from his association with English Electric (England), and ASEA (Sweden), supplemented with his high pedagogic abilities, made him an ideal colleague to assist forcefully in the widespread work which lay ahead.

Pedersen has been an integral part of the Physics Laboratory II of the Technical University of Denmark for the last three decades. This Special Issue of the IEEE Transactions on Electric Insulation bears witness to the international position which he has gained for the Laboratory in the field of electrical insulation throughout this period of time.

On a more personal note, I would like to say that Pedersen was my trusted colleague during almost the entire period of my professorship at Physics Laboratory II, which spanned almost 25 years. From the preceding account it is apparent that this period was characterized by heavy demands being placed on the staff and, in many respects, under difficult working conditions. In spite of these obstacles, the results achieved were most satisfactory, and to a large extent this success can be attributed to the fact that Pedersen could always be entrusted with extensive and independent duties.

Finally, I should like to add that a keen professional understanding existed between Pedersen and myself during the many years of our association. The reader will understand, therefore, that I cannot end this contribution without expressing my heartfelt personal thanks for more than 20 years of enjoyable and fruitful cooperation, a legacy which has steadfastly characterized Physics Laboratory II.

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