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Max Born on Physics in Göttingen in the 1920s and Early 1930s (Retrospective Account, 1975)

In the following piece, physicist and Nobel Laureate Max Born (1887-1970) recalls his activities at the University of Göttingen in the 1920s and early 1930s. A life-long friend of Albert Einstein, Born was instrumental in the development of quantum mechanics and worked with many of the greatest physicists of the 20th century. In 1926, he formulated the Born Rule (or Born's Law), a fundamental contribution to theoretical physics that was widely recognized as such at the time. It took nearly three decades, however, for his achievement to be recognized by the Nobel Prize committee, which finally awarded him the prize for physics in 1954. Born was principally associated with the University of Göttingen, but in 1933 was deprived of his chair and forced to leave Germany. In 1936, he became a professor of theoretical physics at the University of Edinburgh, where he remained until his retirement.

My department consisted of one small room in the Physical Institute, and its staff of one assistant and a half-time secretary. There was no workshop and no technician as I had at Frankfurt, since I had entrusted the experimental department to Franck. Nevertheless, I tried to continue some experimental research by having a student working under my direction. But this did not go well. Franck and Pohl were both skeptical about my experimental abilities and showed this in a rather discouraging manner. Pohl was obsessed by a fear of mercury poisoning and took great precautions in his department against spilling this metal in the rooms. Now my student's room was just above Pohl's private study, and one day a drizzle of mercury rained down from the ceiling. A big vessel of a vacuum pump containing mercury had broken and emptied its contents on to the floor. Pohl was mad with anger and anxiety, he ordered the floor of the poisoned room to be removed and made life for my student as unpleasant as possible. I decided to give up experimental research and to restrict myself to theoretical work, always prepared to advise Franck and Pohl and their collaborators if they asked me.

I organized a three-year course in theoretical physics, consisting of six series of lectures corresponding to the six semesters. The students who attended were supposed to know calculus and analytical geometry; therefore most of them began our course in their second year after having taken one year of mathematics-but of course we did not ask them, nor care, where they had learned it. There was, as I have said before, complete freedom of teaching and learning at the German universities, with no class examinations, and no control of the students. The University just offered lectures and the student had to decide for himself which he wished to attend and whether he was able to follow them. Our six lecture series were (1) mechanics of particles and rigid bodies; (2) mechanics of continuous media; (3) thermodynamics; (4)

electricity and magnetism; (5) optics; (6) elements of statistical mechanics, atomic structure and quantum theory. Each series consisted of four lectures a week and a tutorial. Apart from the main course, I used to give a special lecture on some problem of modern physics, two hours a week. Later, when my assistant became a lecturer, the main course was given twice with a shift of three semesters; and in the last period, when I had two assistant lecturers, even three times.

All three sections of the physical laboratory, Franck's, Pohl's and mine, held a joint seminar which was a great and exciting affair. Many neighboring departments took part including those of Reich (applied electricity), Prandtl (applied mechanics), Tammann (physical chemistry), Wiechert, later his successor Angenheister (geophysics), Hartmann, later Kienle (astronomy), etc.; and often the mathematicians attended. Numerous important results were first announced at these informal meetings. Franck, Pohl and I took turns in providing a subject and taking the chair. It was customary to interrupt the speaker and to criticize ruthlessly. We had the most lively and amusing debates, and we encouraged even young students to take part, by establishing the principle that silly questions were not only permitted but even welcomed. There was permanent petty sniping between the extreme experimentalists of Pohl's school and my theoretical men, while Franck maintained an intermediate position: though he was no mathematician, his work was a sound mixture of theory and experiment; he had an uncanny gift for translating abstract ideas into practical demonstrations with relatively simple apparatus.

Source of English translation: Max Born, *My Life, Recollections of a Nobel Laureate*. New York: Charles Scribner's Sons, 1978, pp. 210-11.

Source of original German text: Max Born, *Mein Leben*. Munich: Nymphenburger Verlagshandlung, 1975, pp. 288-89.