

Physics Becomes My Profession

Coming home I found a job waiting. An old friend of father's from East-Prussian days, Professor Max Wien, had heard about my exam and offered me an assistant position at his physics institute in Jena. He was the inventor of the quenched-spark gap,¹ the key device that made wireless communication possible before the advent of electronic tubes. I went to Jena, was greatly impressed by Wien's powerful personality and accepted. The Physics Institute was located on a promontory dominating the city with its church towers and the "Zeiss Works" of optical fame. Not far away lived Professor Maurer, the director of the Anatomical Institute. He and his family took me in as a boarder and soon also as a close friend.

The Zeiss Works -- founded by the optics genius, Professor Abbé, and named by him after his technical co-worker, Carl Zeiss -- was the vital center of town. Located some distance away were the Schott Glass Works, founded by Dr. Schott at Abbe's instigation, to provide the special glasses for all the Zeiss optics. The whole industry was also a new kind of social enterprise: one-third of its profits went to the workers in the form of educational, health and recreational facilities; one-third went to the university for research and new institutes; and one-third was plowed back into new ventures. At that time the development of the Planetarium was one of its large undertakings.

In Max Wien's Institute I found two very able Associate Professors, Försterling and Busch -- representing theoretical and experimental physics respectively -- and a group of partly very good Ph.D. students who at first looked slightly dubiously at this fresh intruder. At the time of my arrival, Försterling was on vacation so Max Wien gave me his latest theoretical manuscript to read. To his amusement I pointed out some errors, which later, on Försterling's mild riposte, proved to be my errors. Thus, cut down to size, I soon became a good friend of everybody and felt at home.

Max Wien himself had developed a spark-gap technique for a study of the conductivity in liquids at very high field strength and worked until late in the evening discovering the deviations from Ohm's law now known as the "first" and

the "second" Wien effects. He wanted me to work on the properties of thin magnetic films made by cathodic sputtering. I asked how the sputtering of metals occurred, and, since nobody knew, decided to find that out first. Thus I became deeply involved in a fundamental study of great experimental difficulty, which demanded an extensive development of, for that time, very sophisticated equipment and measurement techniques. The study took two years but demonstrated quantitatively that the metal was released from the cathode as atoms by positive-ion bombardment.²

In the basement of the Institute, not far away from me, Gerhard Hansen and Anneliese Schramm, his future wife, worked on the hyperfine-structure of spectral lines. Hansen was a superb experimenter who built a Fabry-Perot interferometer tunable with high precision to individual spectral lines. He could have discovered the "laser" effect but obviously the time was not yet ripe for it. Similarly, Professor Busch discovered that he could focus electrons according to optical laws. He could have invented the "electron microscope" but scientific thinking at the time was still dominated by classical ideas.

Across from me in another basement laboratory, Dr. Scheibe worked on the development of microwave generating tubes and built them with wonderful precision. Max Wien himself worked on frequency modulation to avoid radio interference with a colleague in the Institute for Applied Physics next door. Upstairs, Professor Försterling worked with his Ph.D. student, Walter Wessel, on theoretical optics problems. Called as full professor to Cologne, Wessel was succeeded by Professor Joos, a genuine Bavarian, who wanted to work with me at first and proved to be of great help with his knowledge. However, he bowed out in desperation when the experimental problems became very tough. We met twenty years later again under wild circumstances.

In the meantime, I had received a patent on my "thermo-microphone" and was invited to Berlin for a tryout of the instrument. My old Wandervögel friend and neighbor, Rudi Berthold, was now with Siemens in Berlin and took me under his wing. He was superbly qualified for experimental work and had a charming sense of humor. When I stood slightly awed before the Siemens research buildings and asked: "How many people work here?" his classic answer was, "10 percent." Together we listened anxiously when my thermo-microphone went on trial at the Deutsche Broadcasting Station: a wonderful soprano climbed up the scale and, on the approach to the high C, her radio voice began to vanish. Obviously, while my instrument was better than most, it was not yet good enough. Soon, other new microphones -- the cathodophone and the condensor microphone -- made similar debuts. In 1926, I wrote a little booklet about the subject, *Microphones in Their Modern Development*,³ and thus terminated this part of my education and activity.

Extinction of "das Haus in der Sonne"

We von Hippel children had christened our home in Göttingen "das Haus in der Sonne" [the house in the sun] after a lovely book by a Swedish artist describing with paintings the tumultuous life of his family. I had made a photo-album of our family life under that title for the silver wedding anniversary of our parents. Our mother with all her love and charm had been the center of it. She was the refuge for everyone in times of need. Now, in her 54th year, she was dying of tuberculosis (see Figures 30-32).*

The Allies -- contrary to all promises at war's end -- had continued under pressure from the French (Clemenceau) to starve us, and our mother, neglecting herself, had always taken care of others. My brother Ernst was married and our mother was able to enjoy her first grandchild. We were at her bedside when life faded away. Our father was heroic but broke down afterward.

We sons had to return to our professional life: Ernst as Assistant Professor of Public Law in Heidelberg; Fritz as Doctor of Civil Law to the Department of Justice in Berlin; and I as Assistant at the Physics Institute in Jena. Sister Olga remained for awhile, until Fräulein von Koehnen, induced by Tante Mariechen, took over. Later, in the fall of 1926, Olga joined me in Jena and finished her high school exam as a prerequisite for her social studies with Professor Nohl.

On Christmas 1926, mother's sister, our wonderful "Tante Mariechen," also died. She had been a marvelous friend and an inspired educator of young girls. Her last pupils were Marianne von Ritter and Dagmar Franck.**

In the spring of 1927 I became engaged to Marianne: beautiful, gifted as an artist and musician -- my ever-beloved first wife.

Adventures in Norway and England

The urge for adventure in foreign countries was still there. I managed to get the money for a trip to Norway in the summer of 1925 and to England the following year by writing two major articles for an export journal.***

Both trips started from Hamburg where Curt Bondy's father lived and took me in with great hospitality. He was a rich banker with a lovely house on the Elbe

* Emma von Hippel died, February 28, 1925.

** Dagmar, second wife of AvH and mother of his five children.

*** A journal that advertised German goods abroad and also featured technical articles. AvH wrote for it to earn foreign currency.

River in Otmarschen. Curt, driven by his social conscience to make amends for this luxury, had accepted the duty of being a social patrolman at night in St. Pauli, Hamburg's red-light district. I accompanied him, equipped with a police whistle to call for help in emergencies. It was a strange experience. Full of innocence, like Don Quixote, I looked at the ladies leaning and waving out of the houses of ill repute and thought they needed help instead of a lover. Drunken sailors staggered by, brawls broke out, police drove up -- and I walked through all this hubbub full of sympathy and ignorance.

The next day I shipped out with a friend from the Gilde as deck passengers on a tramp steamer to Stavanger, Norway. Soon after departure a big storm blew up. Our whole group of men, women and children was pushed into the hold and the cover screwed on. For three days it was Hell. Most people, including me, were violently seasick from the ship diving from heaven to abyss, but it also proved a blessing. A Norwegian schoolteacher and his wife from a country⁴ school near Trondheim did not get seasick and helped us survive. We became friends and visited them for few days at the end of our trip to teach German in his class.

Disembarking in Stavanger, we hiked north from the Hardangerfjord with its beautiful waterfalls and snow-capped mountains to the Sognefjord. On the glacier we were caught in fog and had to blow a horn to be rescued by a lovely maiden from the Alpine hut. Crossing the Sognefjord to the (at that time) lonely and wild mountain range of Jötunheimen, we met only one person in five days, a woodcutter with whom we shared our provisions. Every night we slept before an open fire, wrapped in a homemade sleeping bag. Now and then we saw a reindeer. We followed our compass across the mountain range, reached the plain at last, took transportation to Trondheim, and then a ship headed for home.

The trip to England, for which I joined a "seminar group" with Curt Bondy at Hamburg, proceeded in a much different style. We shipped out to Southampton, went to London for joint seminars with English students and went down into a coal mine in Wales. We had some misgivings because an English coal strike had just petered out, due to the strike-breaking action of the industrialists who had shipped in coal from the German Ruhr Valley. However, the miners were friendly; we greeted each other with our war nicknames, "Hi, Fritz" and "Hi, Tommy," learned about their life and were astonished by the antiquated technology and safety measures of this industry. Back in London at a farewell party, I was chosen to give the "thank you and goodbye speech" for our group -- probably because my somewhat atrocious English caused great merriment.

Life and Friends in Jena

My years as an assistant in Jena from the fall of 1924 to the summer of 1927 were full of scientific work and happy friendships. In addition to my own research, I helped in preparing lecture demonstrations, gave seminars, advised Ph.D. students and participated in rousing festivities (see Figure 33). Soon I had my own Ph.D. student in the cathodic sputtering project. My colleagues, Gerhard Hansen, Anneliese Schramm and Walther Wessel, became friends and up-to-midnight co-workers in the Institute. My landlord, the director of the Anatomy Institute, Prof. Maurer and his family -- full of warmth and musicianship -- adopted me. The daughter of the famous cellist, Klengel, herself a cello teacher, a friend of the Maurer's and mine, even wanted to give me lessons. Alas, I might still have learned something.

Jena, with its beautiful Saale Valley and all the Thüringer landscape with its old castles, churches and mountain trails along the Rennsteig was a paradise for hiking. I swam with father Maurer at noon in the Saale River and afterwards went to our luncheon roundtable full of fun with my assistant colleagues. Once a year a special student train went to Weimar for a performance of Schiller's "Räuber" [the robbers] and, when the robbers sang: "A free life lead we...,"⁵ the students marched on stage shouting, "That we can do much better!"⁶ singing "*Gaudeamus igitur* [Let's be joyful..]" Several times I went to Naumburg with its wonderful Romanesque cathedrals where, in a royal chapel, the walls are alive with an assembly of statues of knights and ladies in lively discussion.

Professor Maurer's Anatomical Institute contained two appalling attractions: The great naturalist, Ernst Haeckel [1834-1919], an early proponent of Darwin's theory of evolution, had been a Professor in Jena and friend of Maurer's predecessor. Convinced that Haeckel was a genius, Maurer's predecessor persuaded him to donate his brain at death to the Anatomy Institute for detailed study. When he died in 1919, the anatomist appeared and, to the consternation of Mrs. Haeckel, said, "your husband promised me his head" and cut it off. There the brain stood, preserved in alcohol but useless for science at that time.

A more amusing relic of the past was the student prison in the building, where mischievous youngsters were locked up for a few days in earlier years. One of the last victims had taken his revenge by covering the walls with a dramatic rendering of the "rape of the Sabine women" with the professors naked on their horses abducting their colleagues' wives. It was a very powerful joke. Let's hope the student was not expelled.

Marianne

Events in the spring of 1927 changed my life decisively: I became engaged to Marianne von Ritter and was offered a Rockefeller fellowship. I obviously hated to leave her but, since Marianne was still in her last year of education in painting and professional bookbinding, we decided I should accept. I chose the most distant university in America, the University of California at Berkeley, and became the successor there of Hertha Sponer.*

For the last meeting of our "Akademische Gilde," we rented the old castle Lobeda and performed a Goethe musical play on the Saale meadows with Marianne playing the main role. Then Marianne and I left to spend a few days in the painter's colony Worpswede and followed by our farewells in Bremen, where a steamer left for the 12-day trip to New York. The ship was filled with emigrants from Europe. Their sad songs fitted our grief at parting (see Figures 34 and 35).

* Sponer had just spent a year in Berkeley.

Endnotes: 4. PHYSICS BECOMES MY PROFESSION

1. Löschfunkenstrecke.
2. A. von Hippel, *Ann. Phys.* [4] 80, 672-706 (1926).
3. *Mikrophone und Telephone in ihrer neuzeitlichen Entwicklung*
4. "Landsmal."
5. "Ein freies Leben führen wir..."
6. "Das können wir viel besser!"



30. Searching for mother's key
(left to right: Olga, Fritz, Arthur and Eric Reitzenstein)



31. Family reunion (1923). Left to right in back: Fritz, Ernst's wife, Gertrude, Ernst and Arthur. In front: Father, Mother with granddaughter Li, and Olga.



32. Picture of mother
(Emma von Hippel)



33. Lecture-demonstration in Jena (1927)



34. Marianne during my
visit to her family in
Switzerland (spring 1927)



35. With Marianne before leaving for California (1927)