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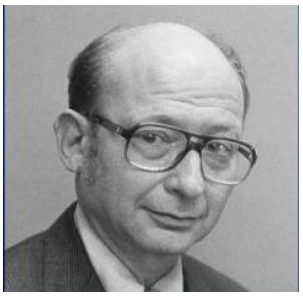
Peter Franken, Mentor

It was my sophomore year, 1956, at the University of Michigan. I had originally come to the UofM with the intention of majoring in chemistry. However, a disenchantment with its Quantitative Analysis course and a liking of my introductory calculus-based physics course,[1] caused me to consider switching majors. The instructor for that course, Noah Sherman,[2] suggested to me that I talk to one of his colleagues, Peter Franken. He knew that Franken was looking to hire an undergraduate to help part-time in his laboratory. So, I did talk to him, and, yes, I did start working in a physics lab. Of course, I was happy to have a bit of extra money.

Franken was at the time working with two PhD thesis students in a field I will call Optical Pumping. The idea was to excite an electron in an atom to an excited state by a light pulse of the necessary frequency. This was even before the time of commercially available lasers, I believe, which, when available, made this type of work much easier. His laboratory was down in the basement of the old H. M. Randall Physics Building. I quickly learned how to get there by going down the stairs.



My first project after I arrived in that lab was to learn the color coding on carbon resistors.[3] Peter, who was about 28 at that time, took a drawer tray full of them, fully-sorted (by their ohms, the unit of resistance), and dumped it out on an empty table. All mushed up. "Sort these out and put them back in the tray." I was to use the three colored bands at the end of the little cylinders. The colors denote numbers, 0 to 9, according to the colors of the rainbow. The mnemonic to remember, he said, is "Bad Boys Rape Our Young Girls But Violet Gives Willingly."[4] By the time I finished filling up the tray I most certainly could look at a resistor and tell you its ohmage.

One of my next chores was to evaluate numerically an integral that he needed for some reason or other. This was before computers were readily available, but a Marchant calculator was. I had never seen such a thing but I think I knew it was an important machine used in the Manhattan Project.[5] So, I learned how to use it and, at the same time, how to numerically evaluate an integral using Simpson's Rule. I never knew why Peter wanted that number.

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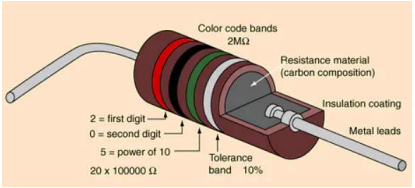
1 My high school physics course was awful. The teacher declared at the outset that we really didn't need to know any trigonometry. It was mostly about gears, levers, and pulleys. To emphasize this the textbook, written by a Charles Dull, had a cover depicting a steam shovel, which had a lot of gears, levers, and pulleys.

2 Sherman was an assistant professor, married to an aeronautical engineering professor, who was probably tenured and who went by the name of Lefty. I used to think he left the university at some point, perhaps when not getting tenure, but an internet search tells me that he was still a professor at the UofM in 1973.

3 These are elements of electronic circuitry, very much used in the days of vacuum tubes. They may still be useful today, but I'm not sure.



4 Those initials are for Black, Brown, Red, Orange, Yellow, Green, Blue, Violet, Gray, and White, representing the numerals 0 through 9, respectively.

5 Feynman used to repair them.

Another of my early chores was to assemble a linear amplifier from a Heathkit. That's when I learned to solder connections. It was based on vacuum tubes of course.[6] No problem, I got it all together and proudly showed it to Peter. "Well, let's turn it on and see how it looks," he said. Attached to an oscilloscope, it came on showing an almost perfect sine wave. *Not* the expected straight, flat line! To which Peter said, "If you were *trying* to create a sine wave, I assure you that it is *not* an easy thing to do." I think he turned the box over to Hal Boyne, one of the two graduate students, who opened it up and found out what I had mis-wired.

Speaking of Hal Boyne,[7] for his thesis project he had constructed a complicated, six-foot high structure of glass tubing that had been mounted on a cart with wheels. This impressive apparatus was connected to electrical outlets, vacuum pumps, and the like. Unfortunately, one day I started moving it to a new location without disconnecting everything. A shattering of glass ensued. I was mortified, but Hal took this disaster relatively calmly. "I was sort of thinking of changing it around some, anyway." My immediate chore then, assigned by Peter, was to machine some chock-a-blocks that could be screwed onto the rails that the wheels rolled on to prevent the cart from being inadvertently moved.

And then I was told to learn a bit about how to blow glass into useful shapes. Actually, this was something Peter himself was interested in learning, also, so it wasn't such a bad experience for me to tag along. This was a skill that I never used since and have forgotten. Another forgotten skill I learned as a result of working in Franken's lab was how to do some arc welding. On steel, not aluminum. I can't now recall what this welding was for.

Apart of various mechanical skills useful in experimental physics, Peter was a very interesting felow. He had recently started playing squash at the courts in the Field House. "Squash? What's that?" He described the game somewhat – it involves a ball and a racquet in a closed room. Oh, I said, sort of like paddleball![8] Which I had already been playing with my roommate, Jack Landin. So, in my nineteen-year-old arrogance, I told Peter, "I bet I could beat you at this squash game you're talking about." The bet was accepted and I lost – handily. Even though Peter Franken was not a very athletic person.

I eventually graduated from Peter's lab and morphed into a theoretician. However, I maintained contact with him over the ensuing years. Around 1961 he and his colleagues discovered how a ruby laser shining on a quartz crystal could generate a beam of ultraviolet light. He became known as the Father of Non-Linear Optics. He also served as one of the readers of my thesis and was one of the examiners for my oral exam. I lost contact with him after I graduated and left Ann Arbor for points East and Southwest.

He left the U of M faculty in 1973 to become director of the Optical Sciences Center at the University of Arizona. He had a distinguished career with many awards and distinctions. All this, despite the remark by one his professors at Columbia, where he had his undergraduate and graduate education, that he was an "inspired idiot."

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6 One of the required courses for a physics major at the U of M was a semester course on electronic circuitry. With my buddy Dave Ross we went ahead and also took the (un-required) second semester, also taught by Bill Parkinson. This was probably 1958, and the electronics was all based on vacuum tubes, such as the 6J6 and12AX7. The next year, 1959, this course was based entirely on transistors, rather than tubes. So much for learning less-than-useful knowledge.

7 Harold Boyne graduated well and eventually became the head of the Atomic Physics Division at the National Bureau of Standards (which is now called NIST).

8 A precursor to racquetball, with a strung racket instead of a wooden paddle.

Many years later, in 1992, I was filling in at the Department of Energy as an advisor for speculative research projects under the Advanced Energy Projects program. Across my desk came a proposal for a small effort by Peter Franken on how to deal with oil spills in ocean waters. (The Valdez oil spill happened in 1989.) He proposed a way to burn off the oil on top of the water. We funded it, but unfortunately it didn't really pan out. That's what high-risk small project funding is all about.

Peter Franken died in 1999. As you can see, he was an important factor in my becoming a physicist. I am lucky to have gotten to know him.