

Allen Miller, June 23. 1932 –

When Allen entered the High School of Music and Art, he realized from the competition, that he would not become a pianist. He had started his music education on the piano and took lessons from Russian concert pianist Ania Dorfman in his teens. While in high school, he took bassoon lessons from Tina DiDario, who later became the wife of Melvin Kaplan, an oboist and agency manager. His parents thought him to have strong musical talent, but the talent of the other students surprised him and by the time he graduated from the school he knew that his future was not in music.

Both of Allen's parents came to the United States from Europe. His mother arrived from Russia at age 6 and his father from Austria at age 14. His mother was descended from a long line of rabbis in Russia. Here she was able to attend Brooklyn College. His father graduated from a two year program at the Brooklyn College of Pharmacy. He opened a drug store in Williamsburg, Brooklyn and had a successful career. Both parents supported Allen's musical education and would have liked a musical career for him. However, once the possibility of a music career for Allen was over, his parents did not encourage Allen to consider graduate school education. They felt that after he graduated from college, he should get a good paying job.

Allen first became aware of physics in his senior year in high school with a teacher who shared his interest with the students. Although he had taken some mathematics that he enjoyed, he did not take advanced algebra or calculus. After graduation in 1949, he entered CCNY (City College of New York), played bassoon in the College orchestra, but maintained friendship with students from the High School of Music and Art. After a year, he transferred to Brooklyn College where he took algebra, analytical geometry, calculus, and a semester of ordinary differential equations. At the same time he built a weak major in physics: mechanics, electromagnetism, thermodynamics, optics, and a course in theoretical physics taught by William Rarita. In 1953, he graduated with a BA in physics. However, his interest in mathematics led him to read popular books like *123 Infinity* and *Mathematics for the Millions*. In this period, he also became interested in philosophy and read some Schopenhower and Spinoza, but this did not lead to serious study.

After he graduated, his parents wanted him to get a job. They could not understand why he would want to stay in school. However, Allen had become interested in mathematics and physics. He applied for graduate work at Rutgers University where he was accepted as a TA in mathematics. There he took the usual first year graduate courses in real and complex variable but, he also took a yearlong course in theoretical physics with Bernard Serin. In his second year he took a course in modern algebra, did a master's thesis in Lebesgue integration, and took a course in electromagnetic theory. In 1955, he received the MS degree in mathematics and was admitted to the PhD program.

However, Allen was not satisfied with mathematics. He wanted to study a field more connected to the real world. He needed some time to think and with some pressure from his parents he dropped out. To his parents satisfaction, he was hired as a physicist by Electronics Corporation of America, in Cambridge, MA, to make infrared sensitive PbTe thin films. Here he learned vacuum system techniques which made him sensitive to the needs of experimentalists, but were of no other value to him. After a year, the government contract for the work came to an end and

the five members of the group he worked with were fired. Although his parents were alarmed, Allen was glad, as he wanted to get back to graduate school to study physics.

In June, 1956, he applied to Rutgers for graduate work in physics and was admitted with a TA for the fall semester. While working in Cambridge, he had taken a first year course in quantum mechanics. As a result, he was admitted as a second year student with the requirement that he take Advanced Laboratory and four weeks of machine shop and glass blowing. In his second year, Allen had an RCA fellowship. He took the PhD qualifying exam in the fall, 1957. Elihu Abrahams had arrived as an Assistant Professor in 1956 and Allen began his research career as his student. They tried to understand the results of spin resonance experiments in doped silicon and germanium. Elihu had written a “this mechanism doesn’t work” paper on the problem. Together, they tried a number of different approaches which also didn’t work.

In a stroke of good luck, Elihu Abrahams got a letter from a graduate student at Purdue in H.Y. Fan’s semiconductor experimental group. The student, R. K. Ray, was measuring the electrical conductivity in doped silicon at low temperatures and wanted a theoretical explanation of his results. At the same time, Hellmut Fritzsche of the University of Chicago had published an experimental paper on the low temperature conductivity of doped germanium. They corresponded with and received encouragement from Fritzsche. Allen and Abrahams together worked out an explanation, based on a hopping theory of transport. This work formed Allen’s dissertation and the PhD degree was awarded in 1960. In his remaining time with Abrahams, he did some work on spin waves in metals. In that work they used many body techniques in an attempt to extend a paper by Freeman Dyson. In the course of this work, Elihu remarked that there are two kinds of solid state theorists: those who work closely with experimentalists and those who work with formal conceptions. He thought the latter should come later in life. Allen had chosen physics over mathematics because he wanted to be closer to natural phenomena.

Allen left Rutgers in 1960 for a postdoc at the University of Illinois at Urbana-Champaign funded by the then physics department chair Frederick Seitz. The \$6000 stipend pleased his parents. While there, he worked with David Pines on superfluid He and together with Filipe Nozières, they wrote a “competent” paper, working out how impurities change the excitation spectrum of liquid He.

When his two year postdoc ended, Allen searched for another position. As luck would have it, Syracuse was looking for someone with his experience. He had met Henry Levinstein, Harvey Kaplan, and Arny Honig at APS meetings. While he had not interacted with them, his name came up and he was hired as an Assistant Professor in the fall, 1962. In his first year, he was assigned 6 hours of teaching, graduate and undergraduate classical mechanics.

Before arriving in Syracuse, Allen was contacted by Arny Honig about Harvey Scher who wanted to do a theoretical dissertation in solid state physics. Harvey had passed his qualifying exam and had started working with a particle theorist. However, he was more interested in the properties of materials. He spoke to Arny who sent him to Allen. Allen suggested a problem on superfluid He<sup>4</sup>. He had applied for and had received a two year U.S. Air Force grant of \$40 thousand to study the properties of He<sup>4</sup>. It was extended for a third year. Harvey Scher completed

his dissertation in one year. He then had postdoc positions with the University of Pittsburg, followed by employment at Xerox, and Bell Labs, and now is at the Weizmann Institute in Israel.

As Scher was finishing his dissertation, graduate student Bruce Friedman was stranded in his research on temperature and relativity when Peter Bergmann left for Yeshiva University in 1963. He came to Allen who had him work on a theoretical problem arising from experiments in Arny's lab. A student, Rudy Enck, had measured the donor-acceptor transition rate in silicon and wanted a comparison with theory. Over the next two years, Bruce calculated the rate and found agreement with the measurements. He left with his PhD in 1965.

After trying out some ideas on liquid helium, Allen dropped the subject. While teaching quantum mechanics at the Rome Development Center, Allen met Morris Shatzkes who was completing the requirements for an MS degree. Shatzkes wanted to do a dissertation on localized magnetic moments in solids. This work was completed in 1968. The following year a student from the IBM program in Poughkeepsie, NY, Paul Chang, came to work with Allen on ferromagnetism in metals. In particular, they studied the role of the coulomb interaction on ferromagnetism and Shatzkes obtained the doctorate degree. Another student from IBM wanted to study the effect of radiation pressure from the Sun on planetary orbits. For an MS degree, he found that it was negligible.

Although he had given up on a career as a pianist, Allen did not lose interest in music. He joined the East Wind Quintet as the pianist. They gave numerous concerts in the houses of Syracuse residents. This lasted for five years, before professional obligations required him to leave the group.

At this time, Allen became interested in politics and felt that there was a need for different positions on issues to be stated, especially when the two large-party candidates expressed the same view. He was selected to run for the State Senate in 1984 on the Liberal Party slate. Earlier, in 1966, along with Paul Siminoff and Dale Tussing, he helped run the Congressional race for Norman Balabanian, a Professor in the Electrical Engineering Department. In '68, he was Dale Tussing's treasurer in his campaign for Congress. After Dale lost, Allen remained active and became Chair of the Liberal Party until its extinction in 1994.

For the academic year '70-'71, Allen had a sabbatical year at the Hebrew University in Jerusalem. There he profited and enjoyed conversations on condensed matter with condensed matter theorist Shlomo Alexander. They worked on problems of the effective mass of impurities in semiconductors, as well as the energy levels of acceptor and donor semiconductors. Two publications resulted from this work.

After returning to Syracuse, Allen's involvement with politics took up much of his time. However, in 1974, a popular talk on elementary particles by Paul Frampton was advertised. Allen went to the talk and there he met Ann Tierney, a graduate student in mathematics. The talk by Paul Frampton was anything but popular, but the relationship with Ann blossomed and they were married shortly. Ann had completed her Masters degree in 1973. She was hired as an Assistant Professor of Mathematics in 1976 at Onondaga Community College, taught typical

undergraduate math courses (e.g., calculus , pre-calculus algebra, differential equations and linear algebra) for thirty seven years, and is now enjoying her 2013 retirement.

In 1984, Peter Dowben came to Syracuse. He did experiments on the segregation phenomenon that occurs in metallic alloys and Allen began an association with him. A number of papers resulted from this collaboration. Also, Peter and Allen co-edited the book *Surface Segregation Phenomena*, published by CRC Press in 1990, a collection of thirteen review papers on surface segregation. When Peter left Syracuse for Nebraska in 1993, Klaus Schroder, a faculty member in Chemical Engineering, came to Allen to work on a problem in magnetism in metals. This collaboration led to a number of research publications, until Schroder retired in 1998.

Allen's involvement with High School teaching began in 1991. In order to attract more students to physics, the department in collaboration with David Smith, the Syracuse University Director of Admissions, brought in high school students for a day long visit. There were physics demonstrations and talks by faculty in the morning and tours of the university in the afternoon. It faltered with small success, relative to the extensive time spent. After two years it was dropped. Next, a program in Adventures in Science was attempted with less success.

After that failure, a letter was sent out to Central New York area high school physics teachers asking them to come to a Saturday meeting to discuss interaction with the Physics Department. About eight came to the meeting. Marvin Goldberg, Physics Chair, pointed out that SU is centrally located and could help the teachers. John Fitzgibbons (see PHYSICS MATTERS V9, 13, 2014) suggested a series of programs on Saturday mornings. In the following discussion, the needs of the high school teachers came out. At the beginning of the program in 1991, Allen organized the content by himself. A few years later, Sam Sampere joined him. Together they wrote two successful proposals to the John F. Snow Foundation for funding of \$20,000 for the equipment for "make-and take" meetings. On Saturday mornings, high school teachers would make a demonstration which they could then take home to use in their classes. In addition, certain of the teachers gave presentations for the others. In 2009, Sam began teaching PHY 211, so Allen is once again organizing alone.

Recently, 2014, Ken Foster asked Allen to read over a biophysics paper of his to look for possible mathematical and conceptual errors and to see whether he could make contributions of his own. Ken studies an organism called chlamydomonas which swims by beating the medium with appendages called cilia (PHYSICS MATTERS V2, 7, 2007). Ken is trying to understand the beating mechanism and the consequent traveling waves in the cilia that result. The internal energy of the cilia appears to be constrained and varies little with the viscosity and other properties of the fluid in which the cilia is swimming. These questions are absorbing some of Allen's time these days, together with the continuing program of interaction of the physics department with CNY high school physics teachers.