

Essay: Robert H. Siemann as leader of the Advanced Accelerator Research Department

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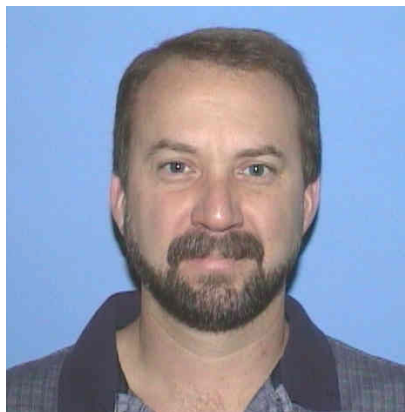
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Robert H. Siemann originally conceived of the Advanced Accelerator Research Department (AARD) as an academic, experimental group dedicated to probing the technical limitations of accelerators while providing excellent educational opportunities for young scientists. The early years of the Accelerator Research Department B, as it was then known, were dedicated to a wealth of mostly student-led experiments to examine the promise of advanced accelerator techniques. High-gradient techniques including millimeter-wave rf acceleration, beam-driven plasma acceleration, and direct laser acceleration were pursued, including tests of materials under rf pulsed heating and short-pulse laser radiation, to establish the ultimate limitations on gradient. As the department and program grew, so did the motivation to found an accelerator research center that brought experimentalists together in a test facility environment to conduct a broad range of experiments. The Final Focus Test Beam and later the Next Linear Collider Test Accelerator provided unique experimental facilities for AARD staff and collaborators to carry out advanced accelerator experiments. Throughout the evolution of this dynamic program, Bob maintained a department atmosphere and culture more reminiscent of a university research group than a national laboratory department. His exceptional ability to balance multiple roles as scientist, professor, and administrator enabled the creation and preservation of an environment that fostered technical innovation and scholarship.

I. SCIENTIST, COLLEAGUE, AND COLLABORATOR

Bob was a scientist of exceptionally high standards and uncompromising integrity. He combined intellectual rigor with a strong, hands-on work ethic. Bob believed deeply in the value of scientific collaborations—especially between universities and national laboratories. He believed successful collaborations leveraged the unique, state of the art facilities and expertise available at national laboratories with the broad range of scientific disciplines and academic rigor found in the university environment. As a SLAC professor, Bob managed to simultaneously thrive in both worlds.



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Mark J. Hogan

The poker expression “all in” summarizes Bob’s approach to his professional collaborations. Bob took his responsibilities as a collaborator very seriously and participated fully in all aspects of experiments from writing the proposals, planning and executing the experiments, analyzing the data, and writing-up and presenting results. No result was too small to escape his full scrutiny and understanding. Anyone who ever submitted a conference paper without his review will have the scars to prove it!

II. PROFESSOR

Bob approached accelerator physics with the same intellectual rigor as any other field of scientific inquiry. He understood that the farthest-reaching innovations in accelerator science were most likely to be spawned in an academic atmosphere founded on thorough inquiry and painstaking documentation. The founding of this scholarly journal is perhaps the most emblematic example of his dedication to his field as a true science.

He taught numerous courses at Stanford University, writing out his lectures longhand and preferring traditional delivery at the chalkboard to computer presentation. The resulting discipline of mind—of being able to think on the feet from first principles—served Bob well in many arenas. He was revered by his students for his clear physics insight, patient guidance, and flexible style. Although uncompromising in his standards of academic scholarship and intellectual rigor, he was surprisingly accommodating when relating to his students. He would relentlessly push students to work 12-hour days (a “short workday”) and to repeatedly revise papers until the science was accurate and the language precise, but would listen carefully and provide gentle guidance when students sought his counsel.

III. MENTOR

At 6 ft 7 in., Bob was an imposing presence physically, yet he fostered a nurturing academic environment in AARD that was loved by staff and students alike. As a mentor he was generous to a fault with his time and was always willing to discuss an idea, work through a problem, or just listen to a complaint. When working, Bob always led from the front. He would never ask anyone to do something that he himself was not already doing or willing to do—regardless of official titles. Bob believed in getting the job done and would frequently work late into the evening or on weekends and holidays if required. While Bob was capable of doing many things himself, he also understood that part of mentoring is holding back to create room for young people to grow and advance in their careers. Growth requires new opportunities to succeed or to fail, and the support to regroup and try again. Bob did not insist on perfection, only that people give their best effort and not give up.

Bob showed great pride in his work and that of his colleagues, yet he did not seek to take the limelight away from people coming up under him. Bob encouraged people to take risks and bring up new ideas. He fostered a learning environment where people felt comfortable trying new things and taking on additional responsibilities. As a physicist, Bob was equally at home discussing nonlinear dynamics or patiently reminding people of the virtues of 50 ohms. He enjoyed the “how” as much as the “why” when solving problems. Bob’s depth of knowledge served as a constant reminder that there was always so much more to learn. Despite his high standards and uncompromising personality, Bob engendered tremendous respect from both colleagues and competitors alike. The care and pride that Bob showed in his teaching left an indelible impression on all of the students and staff fortunate enough to receive his rigorous and enthusiastic mentorship.

IV. ADMINISTRATOR

Bob established and preserved an academic atmosphere within his department, a challenge to do in a national laboratory environment. Part of this was a natural result of the focus on long-

term research, but a significant part was due to his ability to balance multiple roles and shield his students and staff from some of the demands that are normal at a large laboratory.

V. HOBBYIST

Saturdays were often Bob's time to enjoy himself in the lab. His favorite activities included designing and building custom electronic circuitry and assembling first-class instrumentation hardware and software. It was often joked that learning to construct electronic circuitry by the wire-wrap method was a graduation requirement for his students. Over the years he constructed a wealth of analog and digital circuits to control and instrument the experiments. The construction of a w-band vector network analyzer from an array of laboratory instruments was among the most ambitious projects he undertook. Sophisticated rf and lock-in detection techniques were required to achieve more than 60 dB dynamic range over the 75–110 GHz range. Bob also wrote a wealth of LabVIEW software that integrated the equipment into a powerful scientific instrument.

VI. CONCLUSION

“Success is not the key to happiness. Happiness is the key to success. If you love what you are doing, you will be successful”—Albert Schweitzer.

Bob was tremendously successful by such a measure and he instilled his passion for all aspects of his professional life into the many students, staff, and colleagues fortunate enough to have worked with him. Bob's legacy carries on today in the many lives he touched as well as with initiatives to build a new facility to continue plasma wakefield experiments, and the continuation of efforts to produce laser-powered accelerators. He will be missed.

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