Remembering Owen Chamberlain

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I had the privilege and the pleasure of knowing Owen for more than fifty years, and working closely with him for most of that time. I well remember our first meeting. In the early summer of 1953 I started to work for Emilio Segrè as a graduate research student. Owen, who at that time collaborated closely with Segrè, was the other faculty member in the group, and they jointly guided the six or seven graduate students who were working with them. I had just walked into Owen's Rad Lab office to introduce myself: "Professor Chamberlain, I'm …..", when he interrupted me to say: "I'm Owen." Needless to say, Owen's easy informality came as a considerable shock. After all, to a young student like me a professor is a professor, and if he has a first name at all, it is probably known only to his mother. But Owen was Owen to all who knew him, and whereas Professor Segrè could appear at times to be somewhat aloof, Owen was always very approachable. Owen, who seemed to know everything (and probably did), was the one we tended to go to when we did not understand something. He impressed us all with his ability to use his deep knowledge of physics to give his own unique explanations to whatever problem he was confronted with. We called these explanations "Chamberlainisms". Similarly, he put his own stamp on his research activities by coming up with clever, often innovative, ways of tackling whatever experimental challenges had to be overcome. As one of our graduate students once put it: "He is one smart dude".

The Bevatron, then the world's highest energy particle accelerator, was put into operation at the Rad Lab in 1954. Its energy had been chosen to make it possible to create proton-antiproton pairs, if indeed they existed. Several groups prepared to look for them. Ours was no exception, and so Owen and Clyde Wiegand together with Segrè and later Tom Ypsilantis prepared a very simple, yet elegant experiment that culminated with the first observation of antiprotons in September 1955. I had the good fortune to be invited to work on this project, and to marvel at the skill that Owen and Clyde brought to this endeavor. As you all know Owen and Emilio shared the 1959 Nobel Prize in Physics for their roles in this experiment.

Life around Owen was always interesting. On Tuesday evenings the members of the group would meet with him to discuss physics at his house on San Benito Road. Trips to the mountains were another diversion. One in particular comes to mind. It must have been around 1957 or 1958. Twenty-four of us including the Segrè family, Owen, Clyde, postdocs, and students headed up to Budd Lake in upper Yosemite. A few of us had done some climbing, so we invited everyone to join us in climbing nearby Cathedral Peak. In the guidebooks it is rated as a class 4 climb, which means that there are sections that are steep and require the use of a rope. Segrè chose to go fishing instead, but Owen, Clyde, and perhaps six or seven others decided to come along. The steep section is near the top where a delicate traverse along a narrow ledge on an otherwise precipitous blank face leads to a smooth chimney that one has to somehow wiggle up for about 10 meters. The more experienced climbers led the way, and when Owen's turn

came we tied the climbing rope around his waist and sent him on his way along the traverse. Although he was belayed from the top, a photo I took shows him with a kind of "What-am-I-doing-here?" look on his face as he started up the chimney. Perhaps he was developing new respect for the law of gravity.

In 1960 he embarked on a completely new research program that was to occupy him for the next twenty years. Somehow he had become aware of the technique of dynamic nuclear polarization that had been independently developed by Anatole Abragam in France, and by Carson Jeffries in Berkeley. He immediately realized its potential in building polarized proton targets for use in high-energy physics experiments, and so he set about building such a target. To do so required a completely new set of skills, such as solid state physics, the growing of exotic crystals, sub-1K cryogenics, designing high field magnets of great uniformity, microwave generation and transmission, and rf detection of NMR signals. It was a perfect match for Owen's way of doing physics. He plunged in head-first and assembled a talented group of co-workers including faculty colleague Jeffries, post-doc Gil Shapiro from Columbia, graduate student Claude Schulz, and problem solver and technical wizard Ray Fuzesy. It was a challenging task, but he and his colleagues persevered and succeeded in producing the first polarized proton target, a 1" cube of $LaMgN0_2$, containing 3% free protons that could be polarized to about 20%. It was the start of a veritable industry that now has meter long targets with 20% free protons polarized to more than 90%. The technique has been used in practically every major high-energy physics laboratory in the world, and major international spin conferences have attracted hundreds of participants every year. Owen's pioneering efforts in this field soon propelled him into a sort of godfather role among his colleagues. Here at Berkeley more than a dozen of our students used polarized targets for their PhD thesis research.

For almost a decade, starting in the early 1970s, our group hosted a group of talented Japanese colleagues, who had come to Berkeley to work with us to study the interactions of energetic heavy ions. Owen's influence on their activities was warmly recalled in recent letters from Shoji Nagamiya and Kenzo Sugimoto. Just a couple of months ago, on a trip from Washington, D.C. to Tokyo, Shoji made a special stop over in Berkeley to visit Owen.

In the '80s Owen tackled yet another new challenge, and that was to design the so-called high-voltage field cages for Dave Nygren's TPC detector. Once again he applied the Chamberlain magic touch to find an elegant and yet simple solution to a complex problem.

In the '90s his health began to fail, but nevertheless he maintained his interest and involvement in the group's research activities. By that time we had joined forces with colleagues at SLAC to test the Standard Model of electro-weak interactions with unprecedented precision. The Berkeley group designed and built a novel polarimeter that was a key ingredient in this work, and Owen, as usual injected ideas and critical analysis. One incident relating to this project comes to mind. It was the afternoon of October 17, 1989. Owen and Ray Fuzesy were in the SLC tunnel at SLAC installing some parts of the polarimeter when

the Loma Prieta earthquake struck. Suddenly they found themselves chased around the tunnel by a rolling toolbox. Fortunately, they escaped unscathed, but perhaps that was when Owen decided that the time might be ripe for him to retire to the wings.

It was also around this time that another aspect of Owen's multi-faceted interests revealed itself. One of our graduate students, Matt Kowitt, was "Dead Head; i.e., a dyed-in-the-wool fan of the Grateful Dead. One day he invited Owen, who was actually a closet "Dead Head", to a concert at the Oakland Coliseum. Prior to doing so, through a complex network of intermediaries, he contacted the "Dead" and explained who Owen was, and that he would enjoy meeting them. I think one of the high points of the many high points in Owen's career was when he was invited to be on stage with the performers during the second half of the concert. Later, Mickey Hart, the lead drummer, asked Owen: "What did the big bang sound like?" which must be a question dear to the heart of any percussionist.

About ten years ago, on the occasion of Owen's 75th birthday, I was asked to speak about "The Legacy of Owen Chamberlain". It was a rather pretentious title for a very unpretentious man. I focused primarily on physics-related experiences, but noted that his involvement in social causes, as an advocate for peace, and for providing opportunities for the professional development of young people are surely a crucial part of his legacy. I consider the antiproton and the polarized target work as the most important components of what one might call his physics legacy. But when all is said and done, I thought that greatest legacy of all was his influence on the lives of the people with whom he came into contact – his students, postdocs, colleagues and friends – all of whom are perpetuating this legacy in their own way.

The last few years of Owen's life were difficult. The ravages of Parkinson's disease continued to take their toll, but throughout this period there was one constant saving grace, and that was the truly wondrous care that Senta provided for him. I know that her love, dedication and skill were crucial in helping Owen cope with his affliction. The soft smile on his face whenever she was near him said more than words ever could in showing what she meant to him.