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Quarknet Intern 2005
Personal Report

I had two options on how to spend my summer vacation. I spent a couple of weeks debating between the two. I asked my friends opinions and teachers too. I wasn't sure I picked the right one once I had made my decision, but now I am confident that spending my summer at UC Santa Cruz, as an intern, was the perfect opportunity.

Before the school year ended Mr. Kliewer had each of us pick a research topic to get us better prepared for the work we had in store for us. I nonchalantly browsed through the topics, and not having heard of many of them before, I picked one that sounded interesting, the Muon Lifetime Experiment. Mr. Kliewer told me after I picked it that it had a lot of math in it, but I was content because I enjoy math. Like any typical student I procrastinated. I waited until about three weeks before we left before I even picked up a book concerning any of the topics we were going to be immersed in. To prepare myself I read a few chapters in a space-time physics book, and researched my topic. The book reading was fine, but when I started my other research it was extremely difficult because I had absolutely no background in particle physics. I hit some bumps as I was trying to put together a presentation to brief the others with, but I still gained a lot of knowledge from delving into an unknown topic.

Before I knew it, it was time to pack my belongings and move to Santa Cruz for four weeks. I arrived with anticipation of the unknown. The first morning soon dawned bright and clear, and I arrived at the lab earlier than expected. Gray, who was also an intern but had arrived three weeks earlier, gave me a quick rundown of the scintillators. I found, to my delight, that I wasn't as completely clueless as I thought I would be. Sure, there were a few concepts, terms and pieces of equipment that I had to ask about, but I knew the gist of what was going to take place. Once the others had arrived and after we had a meeting, it was then time for our first presentations. It turned out that we weren't just giving them to each other, but to Hartmut as well. When I started giving my presentation, I was overcome with a sense of lack of preparation. I was totally, as the saying goes, "grilled". It put in perspective just how little I knew in the far reaches of particle physics. So, with this in mind, I dove headfirst into learning what I lacked.

The first task I was assigned was to plateau scintillators, or acquire data to get a graph that will show the optimal settings for the equipment. The next week passed in a blur of briefings, meetings, and plateauing. I gained so much more knowledge in that short week because getting experience is the best way to learn.

The second week proceeded with more plateauing, but on different scintillators. I learned how to hook up a discriminator, level adaptor, and logic gates. I also learned

more about the different kinds of daq boards that we could use to do the final experiment of muon lifetimes. We also attended a Telsa Coil demonstration for the COSMOS students, and that was fascinating! Another day that week we went to SLAC with Terry as our guide. It was really neat, we got to go places that they don't normally take tours.

Our third week came and we realized that we still hadn't completed much even though we were putting forward lots of effort. I helped Jennifer polish new scintillators that we were building, and we ran our first muon lifetime data! We had some problems setting the thresholds and PMT voltages, but we were able to use the WALTA board to acquire data. Once we had analyzed the data, it wasn't exactly perfect. The average muon lifetime is 2.19703 ± 0.00004 microseconds, and ours was 0.883... So, this was not exactly accurate. We had another meeting and hashed out what we could do differently the next time we ran the experiment. I helped Jennifer on wrapping the new scintillators, and we made sure they were light tight. The next step for us to continue was to plateau the new counters and make sure the setup that we decided to use of the WALTA and FPGA worked.

Before we knew it the final week was upon us. We plateaued the new scintillators and ran the muon lifetime experiment. Along the way we encountered many hurdles that we had to surpass. Megan and I accidentally made some of the wires that were soldered to the WALTA board smoke and melt, so those had to be replaced. We ran the experiment a couple more times to get better data. The second time was a little better, but it still wasn't exactly right. The third time was a lot better; we ran the experiment for a longer period of time, so statistically there were more data points.

I think that my internship this summer was well worth the effort. I learned so many new skills and I am ready to apply them to the real world. This gave me a taste of what college life can be like. I wouldn't change anything about my experience (well, maybe not so much plateauing because it is very tedious!). I have gained a vast amount of knowledge in an area that I was weak in. All in all I had a very rewarding time.