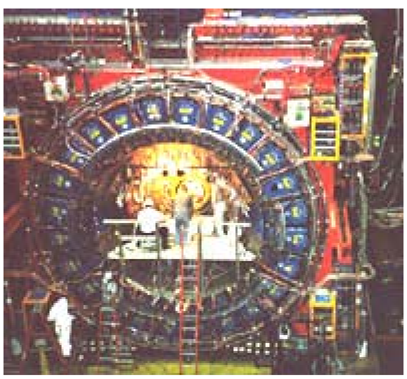
The Photon: Spotlight

A Summer Chronicled

Notes of A Fermilab Intern

As told by Andrea Sharp



The Collider Detector at Fermilab (CDF) took about 10 years to design and build. They run the detector for one year, collect all the data, then analyze it for about six!

I found out about the internship by looking around on the Internet - I was going to apply to a summer interns program at CERN in Switzerland, but I decided I didn't really want to leave the country, and probably heard about Fermilab somewhere, maybe on a poster. So I looked on their websites and found the program and applied to it on a whim. I actually forgot about it until later when I got the invitation letter! I got the email on April 1st so I almost thought it was a joke!

June 4, arrival day

Just arrived from Baltimore. I have my keys to the apartment but they seem to fail at unlocking the door. My roommate let me in and showed me the trick to opening the lock. We went to dinner and then bought some food. I haven't met any of the other interns yet except my other roomate.

June 5, first day

Orientation was at 8:30. I didn't bring the proper identification, of course, so I'll have to check in with Personnel tomorrow with my passport and such. Orientation seems to have missed its mark because I still don't know how things work around here. All of

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On Nanotechnology

Designing Electronics from the Bottom Up

by Michael Furher
Assistant Professor, UM Physics

In the following article, Dr. Furher discusses the field of nanoelectronics and some of the biggest challenges facing the computer industry today.

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How to make a computer

If we want to go about making a computer, how do we do it? Let's ignore the nitty-gritty details of how microelectronic circuits are made for a moment. On a fundamental level, we draw a circuit diagram that has all the transistors (the individual element of a logic circuit) arranged in just the right order, and then we devise a process to fabricate exactly that circuit diagram on a piece of silicon wafer.

Let's say we want to make the computer smaller. For electronics, smaller means faster (more "powerful") and smaller also means being able to store more memory in a smaller space. So, we take our circuit diagram and we shrink it down smaller when we print it on the piece of silicon. This has been the general idea behind the entire computer-chip industry for the last four decades. In fact, it has even been given a name: Moore's Law. Moore's Law states that the number of transistors on a chip doubles every two years, with similar increases in speed. Of course, this isn't really a physical law - just an observation about the speed at which computer-chip technology advances. However, Moore's Law can't work forever: the transistors on a chip can only be shrunk so small. Certainly they can't be any smaller than atoms, and realistically they probably can't be smaller than around 25 nanometers (billionths of a meter) or about 100 atoms wide.

Moore's Law has another downside: the cost of building a computer-chip

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Contact the editor.
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the interns and I (there are 14 altogether, though only 8 of us are here now--others will be arriving within the next two weeks) will be attending weekly lectures on accelerator and particle physics! Tomorrow, our supervisor Erik Ramberg (he did his grad school at Maryland!) will be talking about particle detectors used for fixed target experiments like KTeV.

Charlie's Angels! The interns eventually did become really close over the summer. Here-- two

June 9, end of first week

Observation of the Nu Tau - the last lepton left to be found after its existence was predicted by theorists. This experiment involved recording and studying the decay tracks of protons in their dectector - out of a total of over a million event triggers, 203 events were eventually published in the experiment results!

Last two weeks

I've been

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