faculty profile

Steven Louie

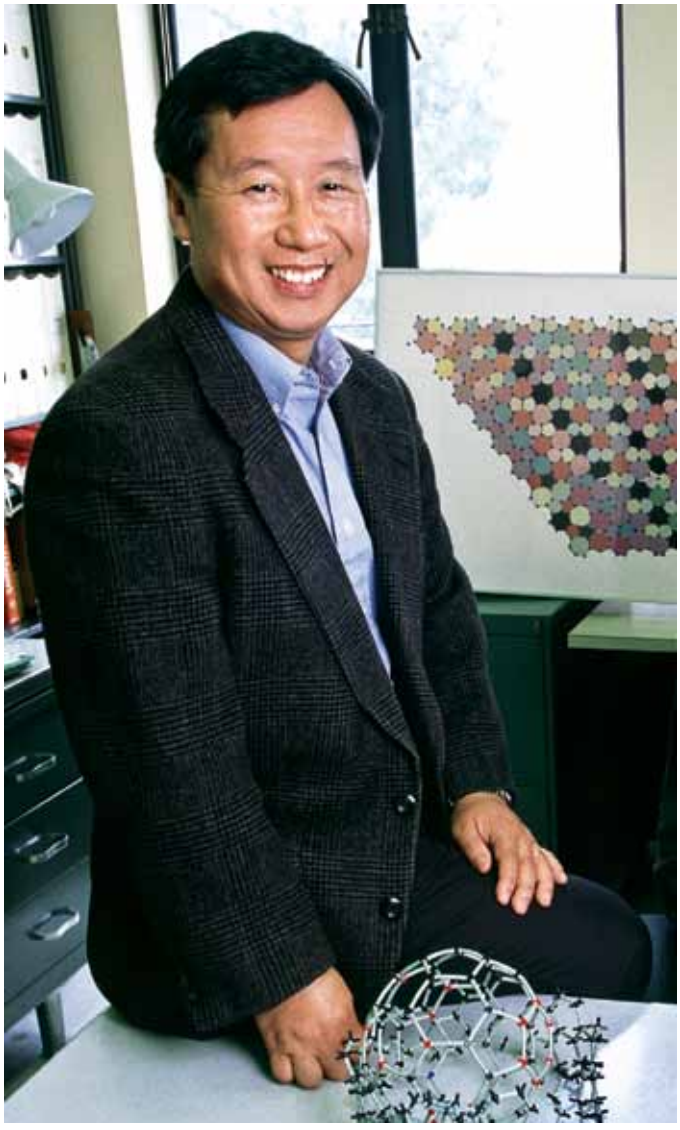
Professor Steven Louie has spent a lot of time on the UC Berkeley campus. He graduated in 1972 with an undergraduate degree in physics and mathematics and then earned his PhD in physics here in 1976. Following postdoctoral appointments at IBM and Bell labs, he taught briefly at the University of Pennsylvania before returning to UC Berkeley as a faculty member in 1980. Today, he is a professor in the physics department and a Senior Faculty Scientist at Lawrence Berkeley National Laboratory. He also directs the Theory of Nanostructured Materials Facility at the Molecular Foundry. I spoke with him recently about his research and his impressions of UC Berkeley over the years.

Your research focuses on nanomaterials and their physical properties. Why should people outside of physics be interested in nanomaterials?

As you go from macroscale to microscale to nanoscale, the behavior of matter changes. For example, objects give out light of a certain color, but if you give the material a smaller and smaller diameter, you change the frequency, or color, of the light that comes out. This means that you can tune the properties of the material by just changing its size. In terms of fundamental science, many interesting phenomena occur in nanostructures that help us understand nature. At the same time, because properties change at the nanoscale, there are many applications for nanostructure research. Look at the electronics industry, where you try to make things smaller and smaller in order to pack more transistors and other devices into a given chip. If making the device smaller causes its properties to change dramatically, then you have to understand how the device behaves in these new dimensions.

What do you see in the future of nanoscience?

The future of nanoscience is very exciting. There's a lot of promise in terms of new discovery and new applications. In the field of energy research, for example, a lot of studies are trying to develop new nanostructure-based photovoltaic devices that might function better than standard solar cells. They might also be cheaper to make, because making nanostructures might be cheaper than growing pure silicon crystals for solar cells.



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Is it the application that motivates you, or just a general interest in the subject?

Well, both. The reason I chose condensed matter theory as opposed to some other branch of physics is because it's very much related to real-world phenomena—there are lots of practical applications. Another attraction is that the scale, both in terms of expense of doing experiments and how long it takes to do experiments, is much smaller compared to particle physics or other large scale investigations. That allows theorists like me to interact very closely with experimentalists. I could propose something or construct a theory that could be either proven or disproven by an experiment. There's a very strong interaction between theory and experiment in my field.

Do you notice any changes in the campus community since you were first here as a student?

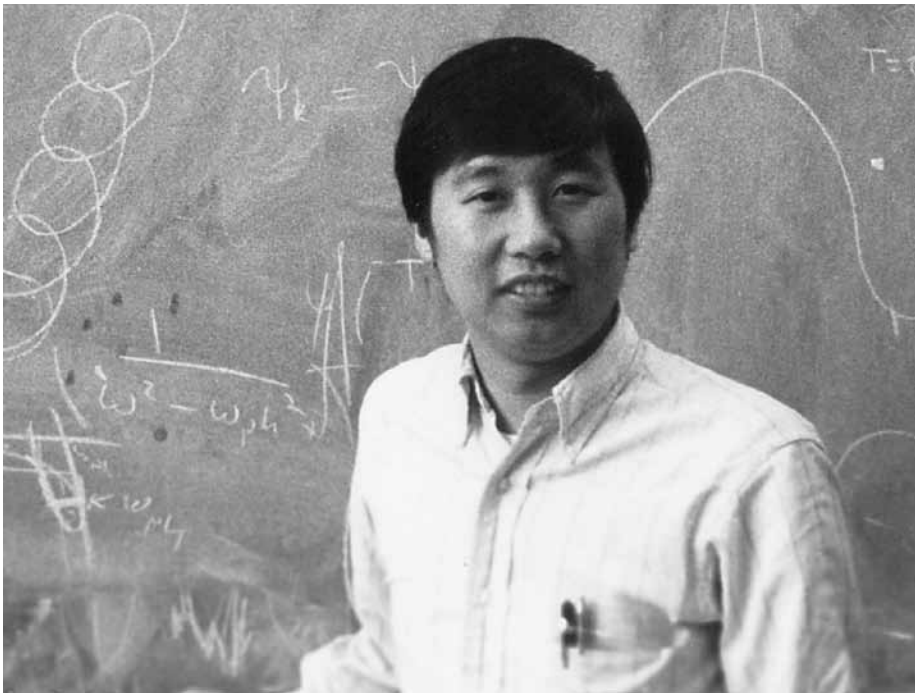
When I was a student, there was much more student activism. Students were more involved with social issues. There was plenty of social activism at other universities too of course, but Berkeley led those activities in the late sixties and early seventies. Students now are much more mature and serious. They take their studies more seriously and plan out their futures at a much earlier stage. Also, students tend to be more aware of other issues like energy conservation, environmental issues, and so on.

So the recent protests over the budget cuts reminded you of old times?
Yes, though this is actually much milder than student activities in those days.

Speaking of budget cuts: have you felt any impact on your research activities?
There has not been too much impact on research funding, because of the stimulus package money going into the sciences—funding for research in the physical sciences has in fact been quite good over the past two years. In terms of teaching, the budget cuts have had some impact. The number of courses being offered by the physics department has been reduced, and we cut the number of teaching assistantships and readerships. This means that students are not able to take required courses at the time they want them.

I've noticed a gender imbalance in the physical sciences. Why aren't there more women in physics?
We should really do something about that. I have two daughters and a son. I remember when they were in high school, I went to their AP physics class. In fact, there were many girls in the class and they were doing very well. I think in junior high and high school, females tend to be very competitive in terms of their performance and interest in sciences. But somehow, when they get to college and then go on to graduate school, the number of female students in the physical sciences declines significantly.

What should we do about that?
This is an issue that many bright people have thought about. I think that maybe mentoring and having good role models is important because young people in their first years of college are deciding what to do with their life, and seeing a lot of successful female professors and scientists might really influence their decisions.



Before he was a professor, Steven Louie was a UC Berkeley graduate student in Marvin Cohen's research group from 1972 to 1976.

I heard your colleagues held a symposium last year in honor of your 60th birthday. What was it like seeing all your former students?
It was very exciting. It's always great to see how successful your students and postdocs are. Training students or postdocs is almost like raising children. You take somebody who's bright, eager and excited to do science. It's very satisfying to watch this person go from a stage where they're very bright, doing problem sets and learning knowledge from textbooks, all the way through independent researcher at the end. Sending them out into the world and watching them become successful is also very satisfying.

What do you feel is your greatest accomplishment in life so far?
That's a hard question. Being part of this great university is something I feel great about. To have my work recognized and be invited back to Berkeley, to contribute to making Berkeley an exciting place to do science is one of the most satisfying parts of my life. When I was in industry at IBM, I was a postdoc, and after two years you either continue on to be a permanent staff member or you move to a new place. And I decided that although it's great to do just science—basic research, practical research—I would rather have a life that involved more facets. Being a university professor is much more satisfying because you get to nurture people, you get to do science, and you have opportunities to do public service, too.

Anna Goldstein *is a graduate student in chemistry.*

JAMES R. CHELIKOWSKY