New Faculty Profile

Hirosi Ooguri

by Julia Sommer

Hirosi Ooguri remembers becoming interested in physics as a nine-year-old when the death of his grandfather made him think about the eternal questions: "Where did we come from? Why are we here? Where are we going?

"I wanted to know something of enduring value," he says. "In school, Chinese and Japanese literature taught us that everything is transient. Physics seemed to counter balance that. The fundamental laws of the physical world hold true throughout the (known) universe."

At 11, Ooguri's father bought him an encyclopedia. After reading all 24 volumes, he was more convinced than ever that science was the field for him.

Today at 32, Ooguri is the youngest full professor in the physics department. He arrived in December, after four years as associate professor at Kyoto University's Research Institute for Mathematical Sciences.

A theoretical physicist, Ooguri's specialty is quantum gravities and string theories--a field that can escape the comprehension of even the most intelligent lay person.

In its simplest terms, it involves figuring out how the universe is put together, down to the tiniest particles. Ooguri is exploring the intriguing possibility that fundamental constituents of the universe are string-like objects rather than point particles. He is co-teaching a seminar on string theory this semester with new math professor Maxim Kontsevich.

"If there is a single set of laws which describe our whole universe, both the solar system and atomic physics, it must be something which incorporates Einstein's theory and quantum mechanics in a single consistent framework," explains Ooguri. "Finding such a framework has turned out to be one of the most important and difficult questions in theoretical physics this century. There are strong suggestions, not yet confirmed, that string theory leads to a consistent unified theory of matter and forces, including gravity."

Ooguri chose to come to Berkeley because of its strong physics and math departments--theoretical physics is more and more a melding of the two. He was also attracted by the theoretical physics group at Lawrence Berkeley Laboratory and the Mathematical Sciences Research Institute. All in all, "Berkeley is an exciting place to be and a wonderful place to concentrate in," he says.

"Professor Ooguri is widely recognized as one of the top young particle theorists in the world. He has already contributed to a number of breakthroughs in theoretical physics and we look forward to his continued success at Berkeley," says Roger Falcone, physics department chair.

Before even finishing his PhD at the University of Tokyo in 1989, Ooguri was invited to spend a year at Princeton's Institute for Advanced Studies. He spent 1989-91 at the University of Chicago's Enrico Fermi Institute and 1992-93 at Harvard's Lyman Physics Lab.

"I had a very nice position in Japan," says Ooguri. "I had no teaching or other obligations, but Berkeley offered me the chance to interact with more people in my field. And I'm finding that teaching is also exciting. It gives me the chance to meet young students and future researchers."

Ooguri is teaching a graduate course this semester on general relativity. Next fall he will teach a graduate course on mathematical methods in physics.

"New discoveries in physics inspire mathematicians to explore new fields," explains Ooguri. "Physics is like an

experimental lab for mathematicians. Math is concerned with the inner workings of a theoretical universe, while we (physicists) investigate the actual universe we live in. With the enormous leaps forward in quantum field theory over the last 20 years, modern mathematics has become more and more important to physics."

Ooguri's office in Birge Hall is small and simple: a blackboard, steel desk, bookcases and computer, with the campanile rising a few yards from his one window. "I just think and compute," he says of his efforts to understand the universe.

Ooguri computes the old-fashioned way, using pen and paper and the blackboard, but increasingly relies on the computer and symbolic manipulation programs, such as Mathematica.

The computer also allows Ooguri to communicate instantaneously with colleagues and collaborators around the world. "We send equations back and forth," he says enthusiastically. "While I'm sleeping here, colleagues in Japan are sending me messages and vice versa. That way we can work on a project 24 hours a day!"

Ooguri also uses a simultaneous talk program that allows him to communicate with a colleague via two windows on the computer screen. "If we add the telephone, it's as if we are working together on one blackboard," he explains.

Moving to the United States has meant big linguistic and cultural adjustments for Ooguri. One of his earliest shocks was hearing faculty colleagues at Chicago referred to as "guys." In Japan, he says, faculty are always addressed as professor and their status is almost priestly.

Another surprise was receiving student evaluations of his teaching--unheard of in Japan, where the relationship between faculty and students is much more formal. "I've learned that I must be less distant from students here," he says.

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