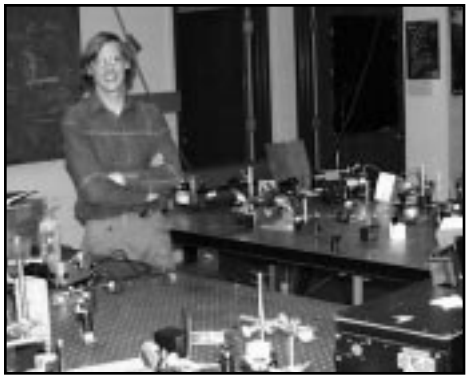
Chipping Away at Atoms with Lasers

Most of us learned in high school that an atom is the smallest form of matter. Atoms make up everything from our bodies to air and water molecules. An atom, we learned, cannot be divided and still retain its chemical identity. We also learned that atoms consist of protons and neutrons and electrons in just such a number as to compose an element. Armed with this information, hopefully we all made it through the science test on that topic.

In UMR's Physics Department, Prof. **Greg Story** is taking knowledge gained by researching atoms to exciting new levels. Story is curious about the structure of atoms and uses laser technology to discover the make-up of various atoms. "What we're interested in is the structure inside something so small you can't see it," Story said.

Inside his laboratory at UMR, Story's research appears as a fascinating laser-light show. On top of a large, stainless steel table is a system of lasers generated from one intense, short-pulse laser. Using mirrors, prisms, magnifying glasses and special liquids in tubes, Story and his students are able to convert a single laser into a number of lasers whose color can be changed. A recent $280K grant from the National Science Foundation has helped to create this laser wizardry.



Greg Story in his Laser Lab

It is beautiful, but the process is complex. By using the energy from the laser, electrons can be chipped away from atoms and then collected. By examining the electrons thus liberated, it is possible to "piece together" the structure of the atom. "What you have to do is hit the atom with something and see what comes out," explains Story.

By using different photon energies and measuring how the electrons come off, Story says it is possible to gain a great deal of information about the make-up of the atom. Information about the structure of atoms could help give astronomers a better idea of what types of matter are in distant galaxies, and what elements make up the galaxies. This research could also help scientists develop better, more efficient methods of nuclear fusion.

Although he has already published more than 23 research papers, Story is not a mad scientist who works in seclusion late at night in his lab. Far from it. In fact, the professor said he encourages students to join in his research. He currently has three students working with him on a regular basis. Undergraduates **Jeremy Maddox** and **Joshua Zirbel** and graduate student **Heider Ereifej** learn the art of research while assisting him.

Story said he likes to see students participate in the laboratory work. "We are really big on getting undergraduates involved in research," Dr. Story said. "You have to be more creative when you're in the lab."

Student with Perfect SAT is a First for UMR

Last fall, current physics major **Sean McKinney** of Springfield, MO, became the first student with a perfect SAT score to attend UMR.

McKinney, a graduate of Glendale High School, took the SAT in June 1996, the summer before his senior year, and scored a perfect 1600.

"I anticipated a high score in math, but I didn't expect an 800 in English," McKinney says.

Of the 2.47 million students who took the SAT last year, 545 of them scored 1600, according to the Educational Testing Service of Princeton, N.J., which administers the test. A score of about 1,000 is the average.

McKinney is enrolled in UMR's five-year Master Student Fellowship Program, which will allow him to earn a master's degree in five years.

He plans to pursue a Ph.D. degree and become a physics professor.

"I like searching for underlying truths and finding fundamental answers," McKinney says. "I like to use mathematics to find answers, to find out what is at the root of things."

Sean started early on his unergraduate research experiences at UMR. Since last summer, he has been working in the thin-film analysis laboratory in the Physics Department with Prof. **Dan Waddill.**

Where There's a WILL, There's a Way

Do you want to help shape the future of UMR even after your own lifetime? One way to do so is through an outright *bequest,* a charitable gift that is exempt from federal estate tax. Planned giving may also be done through *wills.* Another way is through a *charitable remainder* trust, which can give your beneficiary a lifetime income while the principal is held for the institution(s) of your choice.

Other similar trusts can also be established depending on your specific goals in maximizing personal needs, minimizing after-tax costs, and making charitable contributions. One example is the very generous deferred gift of **Norman** and **Natalie Pond** described on the front page of this Newsletter.

General bequests and a variety of other donations can be arranged through **Sandra Ogrosky** in UMR's Development Office. She can discuss with you the numerous options for planned giving or can send you brochures with detailed information. Contact Sandra through the Physics Department at (573) 341-4781, e-mail her at sogrosky@umr.edu or call her directly at (573) 341-6088. This type of gift goes on giving long into the future, continuing to bear the imprint of the giver and attesting to his or her generosity.